National Higher School of Political Sciences

Departement of International Relations

The Sino-American Rivalry in Artificial Intelligence AI: Emerging challenges in the global landscape- Africa as a study case-

A Dissertation Submitted in Partial fulfillment of the Requirements for the Degree of Master in International Relations

Submitted by :

Chaima Hamiane

Supervised By :

Dr. Hichem Daoud El Ghandja

Jury Board

Dr. Lokmane Meghraoui	***President***
Dr. Hichem Daoud ElGhandja	***Supervisor***
Dr. Amel Hadja	***Examiner***

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Dedication

This thesis is dedicated with profound gratitude to my parents, whose unwavering love, support, and sacrifices have been the bedrock of all my endeavors. Their unwavering belief in me, even in the face of challenges, has been an invaluable source of strength and inspiration. I also dedicate this work to my future self, a constant reminder of the dreams I aspire to achieve. This thesis serves as a testament to the dedication and perseverance I strive for, a stepping stone towards a future filled with knowledge, growth, and meaningful contributions.

Acknowledgements

In the name of Allah, the Most Gracious, the Most Merciful.

I would like to express my sincere gratitude to Allah for His divine direction during this research journey, i am incredibly grateful to Allah for giving me the capacity to learn, the courage to overcome obstacles, and the power to keep going even when things get tough.

I would like also to offer my sincere appreciation and gratitude to my supervisor, Dr.Hichem Daoud Elghandja, for his enormous assistance, support, advice and knowledge during the entire dissertation-writing process. I am incredibly grateful to have had a supervisor that is extremely knowledgeable,insightful and kind.

And Finally, I also want to express my sincere gratitude to the jury members for their openness to discuss my research and provide me with insightful recommendations.

Abstarct

This research seeks to highlight the rivalry between the architect of the rules-based order (the United States) and the leading revisionist peer competitor (China) which appears to be centered on the race to develop AI systems emphasizing the far reaching implications of these dynamics for African states and how to navigate this complex digital ecosystem in a way that benefits them without subserving the agenda of either side.

This study uses the comparative analysis to analyze AI advancements in both states and focalize the gaps of the rivalry, in addition to the statistical analysis to determine which party holds a competitive advantage over the other, based on a set of quantitative indicators. While incorporating a case study to illustrate specific instances of AI rivalry implications which could provide concrete examples of how the rivalry manifests in real-world scenarios, particularly in the African landscape.

The study has revealed that the US has more opportunities to win the race regarding its capabilities and China is catching up and taking the lead in Africa's AI, while this rivalry has multidimentional implications on African states like Data exploitation, regulatory divergence resulting from infrastractural gaps and digital skill barriers and some positive aspects regarding AI's positive and transformative potential for African development. It also reaffirme by the end that the non-alignment is a more pragmatic way for Africa to manage its foreign partnerships while it is imperative to build the necessary AI capabilities.

***Key words** : Rivalry, AI systems, African States, United States, China.*

الملخص

هذا البحث يسعى إلى تسليط الضوء على التنافس بين القوى المهيمنة على النظام (الولايات المتحدة) والقوى التعديلية المنافسة (الصين) والذي يبدو أنه يتمحور حول السباق على تطوير أنظمة الذكاء الاصطناعي مع التركيز على الآثار البعيدة المدى لهذه الديناميكيات على الدول الأفريقية وكيفية تموقعها في هذه البيئة الرقمية بطريقة تحيلها الى تطوير الذكاء الاصطناعي دون ان تخدم اجندة أي من الطرفين.

وتستخدم هذه الدراسة التحليل المقارن لتحليل مدى التقدم في مجال الذكاء الاصطناعي في كلتا الدولتين والتعرف على ثغرات التنافس، بالإضافة إلى التحليل الإحصائي لتحديد الطرف الذي يتمتع بميزة تنافسية على الآخر، استنادًا إلى مجموعة من المؤشرات الكمية المتمثلة في المؤشر الدولي للذكاء الاصطناعي بتحليل مجالات رئيسية منها البحث والابتكار والاستثمار ,كما تم استعمال المعادلات الإحصائية بالصيغة الرياضية للمتوسط الحسابي والانحراف المعياري. مع تضمين دراسة حالة لتوضيح حالات محددة من آثار التنافس والتي يمكن أن توفر أمثلة ملموسة لكيفية تجسيد التنافس في سيناريوهات العالم الحقيقي، لا سيما في المشهد الأفريقي.

وقد كشفت الدراسة أن الولايات المتحدة لديها فرص أكبر للفوز بالسباق فيما يتعلق بقدراتها و أن الصين تحاول إدارة الهشاشة في تطوير الذكاء الاصطناعي بصفة تمكنها من تخطي الولايات المتحدة في السنوات القادمة مع تفوق واضح في سوق الذكاء الاصطناعي الافريقية ، في حين أن هذا التنافس له آثار متعددة الأوجه على الدول الأفريقية مثل استعمار البيانات، والتباين المعياري لحوكمة الذكاء الاصطناعي وإمكانية استخدام افريقيا كحقل سريري للاسلحة الذكية بالإضافة الى بعض الجوانب الإيجابية من الاثار التي تتعلق بإمكانيات الذكاء الاصطناعي لخدمة الأهداف التنموية خصوصا في معادلة الامن والتنمية في افريقيا. كما يؤكد البحث في النهاية على أن عدم الانحياز هو طريقة أكثر براغماتية بالنسبة لأفريقيا لإدارة شراكاتها الخارجية في هذه التكنولوجيا الجديثة في حين أنه من الضروري بناء القدرات اللازمة للذكاء الاصطناعي كما يجب أن تكون الاستراتيجيات الجديدة قابلة للتكيف مع السياق العالمي من حيث التدريب والتعليم والاستثمار

الكلمات المفتاحية: *التنافس، الولايات المتحدة، الصين، أنظمة الذكاء الاصطناعي، افريقيا*

Résumé

Cette recherche vise à mettre en lumière la rivalité entre l'architecte de l'ordre fondé sur des règles (les États-Unis) et le principal rival révisionniste (la Chine), qui semble centrée sur la course au développement de systèmes d'intelligence artificielle (IA), en soulignant les implications profondes de ces dynamiques pour les États africains. L'étude explore également les moyens de naviguer dans cet écosystème numérique complexe de manière à bénéficier aux États africains sans se soumettre aux agendas de l'une ou l'autre des parties.

Cette étude utilise une analyse comparative pour examiner les avancées en IA des deux puissances et identifier les lacunes de leur rivalité, ainsi qu'une analyse statistique pour déterminer laquelle détient un avantage compétitif, sur la base d'indicateurs quantitatifs. Elle intègre également une étude de cas pour illustrer des exemples concrets des conséquences de cette rivalité, notamment dans le contexte africain.

Les résultats montrent que les États-Unis disposent de plus d'opportunités pour remporter cette course, grâce à leurs capacités technologiques. Cependant, cette rivalité a des implications multidimensionnelles pour les États africains, telles que L'exploitation des données et Les divergences réglementaires et Certains aspects positifs, comme le potentiel transformateur de l'IA pour le développement africain.

En conclusion, l'étude réaffirme que le non-alignement constitue une voie plus pragmatique pour l'Afrique dans la gestion de ses partenariats étrangers, tout en soulignant qu'il est impératif de développer les capacités nécessaires en IA pour renforcer l'autonomie stratégique du continent.

Mot-clés : *la rivalité, systèmes d'intelligence artificielle, les Etats Unis, La Chine, États africains.*

Acronyms

AI	*Artificial Intelligence*
ML	*Machine Learning*
DL	*Deep Learning*
RMA	*Revolution in Military Affairs*
IOT	*Internet of Things*
NSS	*National Security Strategy*
ANNs	*Artificial Neural Networks*
ES	*Expert Systems*
NLP	*Natural Language Processing*
GPT	*General Purpose Technology*
ANI	*Artificial Narrow Intelligence*
AGI	*Artificial General Intelligence*
ASI	*Artificial Super Intelligence*
NN	*Neural Networks*
RAI	*Responsible AI*
DoD	*Department of Defense*
TSMC	*Taiwan Semiconductor Manufacturing Company*
RMA	*Revolution in Military Affairs*
UAV	*Unmanned Aereal Vehicle*
LAWS	*Lethal Autonomous Weapons Systems*
GPU	*Graphic Processing Units*
DPI	*Digital Public Infrustructure*
BRI	*Belt and Road Intiative*
DSR	*Digital Silk Road*

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Introduction

Contrary to Francis Fukuyama's prophesy in 1989 that the fall of communism signaled "the end of history," that is, the end point of mankind's ideological evolution and the universalization of Western liberal democracy as the final form of human government, the world is witnessing the return of great power rivalry in international politics. As the world moves deeper into the era of great power competition, this becomes an even more important era to watch. After four decades of largely cooperative interactions, the U.S. and China have been embroiled in what the 2017 U.S. National Security Strategy (NSS) refers to as Great Power competition. In this competitive contest of contemporary Great Powers, both states now focus ever more intently on the quest to attain and sustain leadership in innovative technologies.

Throughout history, technology has played a significant role in international relations. Technological development is an important factor underlying much of humanity's social, economic, and political development. Beginning with the earliest tool industries when the first Industrial Revolution (1IR) utilized water and steam to mechanize production, the Second Industrial Revolution (2IR) used electric power to create mass production, assembly lines, and the division of labor ; the Third Industrial Revolution (3IR) witnessed the development of semiconductors, information technology, personal computers, the Internet, and automated production. The 4IR is based on technologies such as 5G, Blockchain, Internet of things, Artificial Intelligence) and infrastructures developed in the 3IR but uses them in entirely new ways. Among the most critical emerging innovative technologies is that of Artificial Intelligence (AI), it is more than just science fiction, it is science fact, and it progresses every single day. The United States and China today compete over the future of AI. The field of Artificial Intelligence exemplifies this requirement.

Third-party states believe that AI technology increases options in their pursuit of the goals of the state but also complicates their decision-making, Policymakers explicitly link the need for technology adoption with external pressures. As Joseph Stalin said in 1931: "We are 50 or 100 years behind the advanced countries. We must make good this distance in 10 years. Either we do it, or we shall go under." In this context, African States view the Sino-American rivalry in AI as a catalyst to bolster their own AI capacities, emphasizing the development and the deployment of robust AI systems across the continent.

Significance of the study

- *Two recent developments have amplified the significance of this struggle: the war in Ukraine, which has vividly illustrated how AI, particularly in the form of AI-enhanced drones, can be weaponized, underscoring the technology's lethal potential in modern warfare; and the November 2022 launch of OpenAI's ChatGPT.*
- *"…It happened gradually, then suddenly…" This famous quote from Ernest Hemingway's novel, The Sun Also Rises could be used to describe some of the world's most profound technological changes. Small advancements accumulate and then all of a sudden, the world is a different place. That could describe the world before and after the birth of the internet and could now be applied to Artificial Intelligence, which has 'gradually, then suddenly' burst onto the scene after nearly a century of research.*

- *These are modern interpretation of the Peloponesian war as an inevitable result of the rising power of the Athenians instilling fear in the Spartans and forcing them to go to war. the problem is more complex and should not be reduced to a competition between two athlets with relatively equal chances in terms of physical endurance.*

Factors influencing topic selection

Self-related factors:

- *My desire to choose A topic out of my Confort zone.*
- *It influences our existence as individuals, societies, Public and Private.*
- *It is personally meaningful considering my hobbies related to AI as I am a Gamer while I am fostering my technical skills in programming (Python, Java).*

Topic related factors:

- *Awareness of AI and its significance. Paraphrasing Jacques Chirac statement, speaking about global warming at the 2002 Earth Summit, declared 'Our house is burning and we are looking elsewhere,' I could write about AI that we are about to experience a major societal and geopolitical revolution and that we are not paying attention to It.*
- *The luck of breadth and depth of the leading intellectual debates about AI*

- *One of the most important aspects of AI is that it is a multi-use technology. Like electricity it can be applied in lots of different ways, to lots of different scenarios.*

- *Global competition for influence is closely interwoven with the technological dimension of American-Chinese rivalry, it is about dominance in the digital age.*

Literature Review

In order to highlight the significance of this research. It is important to refer to some of the major scholarly works

- ***China and America's Tech War from AI to 5G***

In his research paper China and America's Tech War from AI to 5G, Abrams examines how Sino-U.S. geopolitical competition has increasingly centered on the performances of the two countries' technology sectors and their ability to dominate development of critical next generation technologies. He analyzes and compares the strengths of China and the U.S., ranging from the ability to produce and attract talent, to the degree of government support and the scale and funding for technological research. Abrams reviews and weighs important technology areas such as green energy, artificial intelligence, Quantum Computing, and 5G will likely have, the means both parties have exercised to gain advantages, and the consequences of leadership for the county who attains it.

Theoretical Gap: *Theory should be applied to certain research issues to generate new insights; there is a lack of theory; thus, a gap exists. Our research will fill this gap by using theories of International Relations to make a sense of the exciting rivalry between the U.S. and China over AI to determine the roots of competitive behavior in AI technology.*

- ***Impact of Artificial Intelligence in Arms Race, Diplomacy, and Economy: A Case Study of Great Power Competition between the US and China***

Abdul Rauf, Sajid Iqbal confirmed in their academic work, intiteled Impact of Artificial Intelligence in Arms Race, Diplomacy, and Economy: A Case Study of Great Power Competition between the US and China that in the contemporary era, the demand for Artificial Intelligence (AI) is paramount, with existing applications in weak AI seen in products like smartphones, employing features such as Siri, voice recognition, and image recognition. The proliferation of AI extends beyond consumer goods to impact the arms race, diplomacy, and the economy. They believe that The emergence of advanced AI models like ChatGPT has intensified the global AI competition among states and tech companies. While nations integrate AI into military technologies, concerns arise about the implications of Artificial General Intelligence (AGI). However, the Scholars debate its potential role in global dominance, job

displacement, and economic impact. Despite predictions of job creation, the shift towards AGI requires careful consideration to ensure positive outcomes rather than detrimental consequences for humanity's future in the realm of Artificial Intelligence.

Research Gap: *Our study seeks to study the implications of Sino-American rivalry in AI on third-party states, including African states as a case study which appears to be comprehensive and trigger the technonationalism within African states.*

- ***Analysing the US-China "AI Cold War" Narrative***

An academic work of both Richard Heeksa & Yujia Heb from the Centre for Digital Development, University of Manchester,they reaffirmed that Discussions about artificial Intelligence (AI) are gaining prominence in the recent revival of "cold war" narratives comparing US-China relations today to the historical rivalry between the US and the Soviet Union. Drawing on a review of existing academic and other relevant literature, this paper examines how the "AI cold war" narrative is justified, and numerous ways that it can be challenged. It argues that the framing is largely driven by the securitisation of AI: the discursive process in which state actors and policy pundits view AI innovations' dual-use capabilities as key to national security and ideological competition in the rivalry between a hegemon and a rising power. However, critics posit that the narrative exaggerates China's AI capabilities, promotes commercial interests of tech firms and defence contractors, creates self-reinforced militarisation, and undermines the potential for international research and regulatory cooperation. While the outcome for the cold war/arms race narrative – China's AI capability vis-à-vis the US currently or in future – is much debatable, the framing prompts scholarly interests about the implications for national AI policy and firm innovation strategies, third party state strategies in AI development, and AI governance. This paper concludes by inviting scholars to rethink the affective power of narratives and contribute research and narrative analysis that allow for the articulation of perspectives from third countries

Methodological Gap: *The study of the American-Chinese rivalry in AI necessitates a quantitative comparative approach to better position each rival in the AI realm. There is also an evidence gap; results of this study must be updated with recent numbers and statistics like our research statistics based on Stanford Index 2024. The results could be contradictory when examined with old statistics; the reason why this master's thesis is renewed with the latest updates.*

Objectives of the Study

- *To bring a geopolitical reflection on a technical subject and build a shared understanding of AI within the Political Sciences and International Relations elites.*
- *To analyze the various ways in which states deploy AI technology across different sectors*
- *To investigate the nature of the US-China rivalry in AI, identifying each nation's positional advantages*
- *To analyze the competitive dynamics between the US and China in AI research, development, and deployment, and assess the broader consequences of this rivalry for African states.*

Problem Statement

This research aims to answer the following questions:

Main problem:

To what extent does the Sino-American rivalry in Artificial Intelligence reflect the broader implications of AI advancement for African States?

Subordinate Questions:

- *What are the core elements that drive the development of Artificial intelligence?*
- *In which domains is the competition between the US and China in AI most intense?*
- *What are the potential risks stemming from the US- China AI rivalry?*
- *What policy framework is needed for African community, to maximize the benefits and minimize the risks of AI development?*

Hypotheses

Main hypothese

The more China and the United States are involved in a fierce competition, the more African states are forced to develop their AI and be cautious considering infrastructural, financial, and digital skills barriers.

Subordinate hypotheses

- *The core elements of AI development extend beyond AI engineering, like computing power and talent pools.*
- *The states can deploy AI technology at different levels, considering AI characteristics that offer reasoning, pattern recognition, decision-making, and prediction.*
- *The US and China are vying in several areas, such as R&D, technological advancement, military and economic sectors, which is driven by values, influence, and legitimacy.*
- *The competition fuels an arms race dynamic, increased dependencies, erosion of global cooperation, and ethical concerns. which will reinforce the technology divide as developing countries face infrastructural, financial, and digital skills barriers.*

Limitations of the Study:

Time and Space Limitations: *Limitations include excluding other AI powers like Japan, India, or the EU. It focuses only on the United States and China as main players in the AI realm during the the period from 2017, with the announcement of the U.S. National Security Strategy, to January 2025, with the emergence of DeepSeek, which has been described as a "Spoutnik Moment" for American AI. While emphasizing the African continent as a space of influence.*

Methods and Data Collection Tools:

In this section, the methodological considerations of this thesis will be underlined and explained to check the validity of the research hypotheses

Comparative method : *The need to look at indicators of similarity and, dissimilarity between the American startegy in AI and the Chinese New Generation national strategy helps understand the key areas of competition over AI inculding their AI policies intiative and regulatory framework as well as goverment investements and the ethical guidelines for both states. Compare the development and deployment of AI-powered military technologies, such as autonomous weapons systems. Thus the emphasis on similarities and differences may lead to similarities or being seen as norms and dissimilarities as 'deviations' from the norm what consequently shows the possibilty of cooperation and the risks of deviations.*

Statistical Method : *The statistical method uses categories and variables that are quantifiable or can be represented by numbers. The following subcategories are used to be measured and compared to identify a nation's positional advantages and which side is "winning" the strategic competition over this emerging technology:*

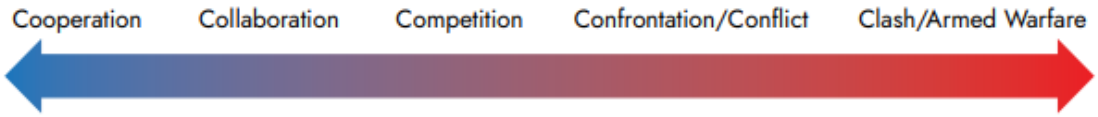
- *Research and development investments*
- *Number of AI patents filed*
- *Number of AI publications in top academic journals*
- *Government funding for AI initiatives*
- *Talent pool (number of AI researchers and engineers)*

Case Study Method : *This research incorportes African landscape as a case study to illustrate specefic instances of AI rivalry and decoupling between the two powers, while it is important to mention that the analysis, focuses on areas of influence within a regional analysis rather than a state by state analysis.*

The descriptive and analytical approach : *was used to analyze data and information available from various sources, including reports, press articles, and academic research.*

Research Terminology:

Competition and Rivalry: *Competition in the international realm involves the attempt to gain advantage often relative to other believed to pose a challenge or threats through the self interested pursuit of contested goods such as power, security, wealth and influence .“Competition” is not a dirty word or an illicit concept. It is not the opposite of cooperation. Competition is just that: to compete. Competition is indeed a very healthy part of human life. it is hardwired into American DNA, and Americans believe that competition brings out the best in them.*



Competition is not the same as rivalry. Rivalries are especially intense competitions, typically involving relatively equal contestants, and most often contested over regional or global primacy of some kind. Whereas competition in the broadest sense refers to the generalized reality of world politics, rivalries are specific bilateral contests between opposing powers.One factor seems especially critical to the existence of a rivalry: Both states involved must believe that they are engaged in one. True rivalries emerge when each state believes that the other poses a determined threat to its interests, goals, and values, for example, that “rivalries consist of two states in competition that possess the expectation of future conflict.

Artificial intelligence: *AI as “the capacity of computers, or other machines, to exhibit intelligent behaviour”. This means AI systems appear to think, learn and act like humans and in some cases exceed the capabilities of humans. AI systems can analyse vast amounts of data, solve complex problems, make decisions and perform creative tasks.*

Internet of Things: *The Internet of Things (IoT) refers to a network of physical devices, vehicles, appliances, and other physical objects that are embedded with sensors, software, and network connectivity, allowing them to collect and share data.IoT devices are used to monitor a wide range of parameters such as temperature, humidity, air quality, energy consumption, and machine performance. This data can be analyzed in real time to identify patterns, trends, and anomalies.*

Blockchain: *Blockchain is one of the most recent technologies in the domain of security, tractability, and transparency, for managing any digital asset transaction, as well as for physical assets and agreements. Blockchain is shorthand for a suite of*

distributed ledger technologies that can be programmed to record and track anything of value, such as financial transactions, medical records, land titles, and so on. Blockchain technology is based on the centuries-old method of the general financial ledger. In simplified language, it is a digital ledger which holds the records of all sorts of transactions that happen in a peer-to-peer network. This technology is assumed to 'cut out the middleman' from any sort of transaction or transfer of digital assets. This is a much more secure and decentralized medium. Financial institutions are exploring the possibilities of using this technology to ensure secure transactions. Blockchain is the technology that enables the existence of cryptocurrency (among other things).A cryptocurrency is a medium of exchange such as the US dollar, but is digital and uses cryptographic techniques and its protocol to verify the transfer of funds and control the creation of monetary units.

5G: *5G is the 5th generation mobile network. It is a new global wireless standard after 1G, 2G, 3 G, and 4G networks. 5G enables a new kind of network designed to connect virtually everyone, including machines, objects, and devic*

PART ONE

THEORETICAL FRAMEWORK OF ARTIFICIAL INTELLIGENCE : WHAT IS AI ANYWHERE ?

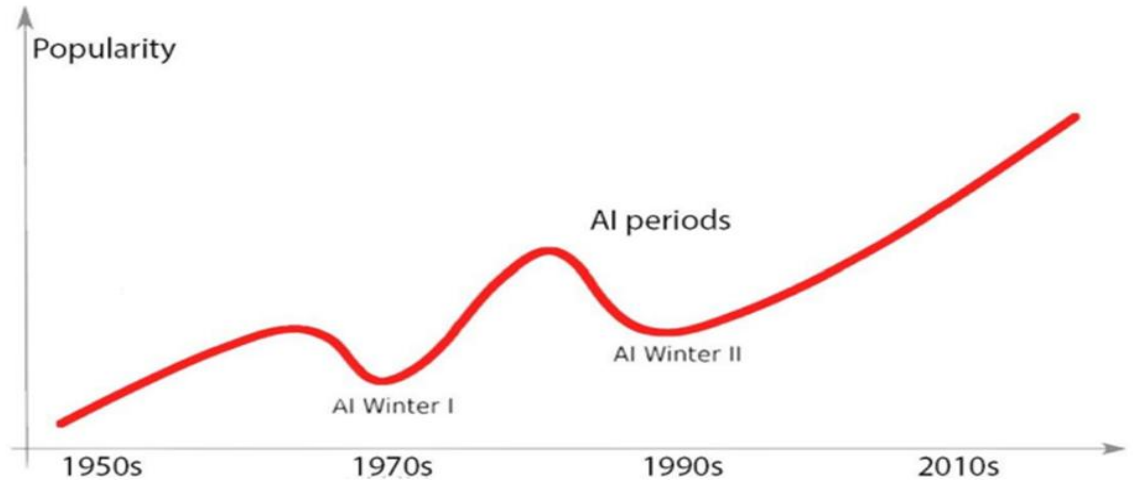
1.1 Introduction to the technical landscape of AI

1.1.1 The historical evolution of AI :

This subsection aims to show how earlier attempts at mechanizing intelligence raised several questions that were to become controversial and much-debated issues in AI research; in other words ,its aims to discover its evolution from early theoretical concepts to practical applications .

Throughout history, humanity has aspired to create a helper—a machine that can operate with human-like proficiency. In Greek mythology, Hephaestus, the god of craftsmanship, created automatons that could carry out human functions, including the formidable bronze giant Talos, who guarded the coasts of Crete against invaders[1]*. The ancient philosopher Aristotle (384-322 BCE) also envisioned automation but regarded it as an unattainable dream, which made reliance on slavery necessary for people to experience leisure*[2]*. The algorithm proposed by Aristotle was later put into practice 2300 years later by Newel and Simon in their GPS program, exemplified by the logical deduction, "Socrates is a man; all men are mortal; thus, Socrates is mortal." René Descartes appeared to regard the concept of a "mechanical man" more as a metaphor than a feasible reality*[3]*.*

Figure 1: Illustrative visualization of AI periods



Source : OECD

[1] *Henry Kissinger, Eric Schmidt, and Daniel P. Huttenlocher, The Age of AI: And Our Human Future, Paperback edition (London: John Murray, 2022).*
[2] *Nils J. Nilsson, The Quest for Artificial Intelligence (Cambridge University Press, 2009).*
[3] *Bruce G Buchanan, "A (Very) Brief History of Artificial Intelligence," n.d.*

As noticed in Figure 1, artificial intelligence evolution has recognized three main paradigm shifts. To analyze this evolution and discover the past AI development contexts[1]*, it is necessary to highlight the main AI periods.*

1.1.1.1 AI Foundations (1950s – 1970s) :

In 1950, Alan Turing released the paper "Computing Machinery and Intelligence." The main focus of this work was the pivotal question: Can machines exhibit thought? This led to the establishment of the well-known Turing test, He introduced an 'imitation game' in which a human judge would evaluate text-based dialogues with an unseen participant, who could either be a human or a machine. At its inception, the Turing Test represented a revolutionary approach that shifted* [2]*The conversation from abstract philosophical debates to something that could be empirically assessed. It enabled researchers to start measuring "intelligence" in a way that had not been explored previously. Although the Turing Test is often misunderstood as a measure of human-like consciousness, it is more effectively seen as an assessment of a machine's capacity to execute tasks in a human-like manner.In this way, it emphasizes outcomes rather than methods*[3]*. The initial "AI era" commenced with the Dartmouth conference in 1956. John McCarthy, who coined the term Artificial Intelligence, is regarded as the founding figure of AI for his contributions to computer science. He organized a groundbreaking conference at Dartmouth College (USA) called 'The Dartmouth Summer Research Project on Artificial Intelligence*[4]*,' which is largely seen as the inception of AI as a field. This gathering ignited excitement and led to significant advancements in AI in the subsequent years. In the United States, the driving forces remain geopolitical. It involves outpacing the USSR technologically. The 'Sputnik moment' arrived in 1957. Americans were shocked and scared to learn that the USSR, previously viewed as technologically inferior, had successfully launched a satellite into space and had intercontinental ballistic missiles capable of carrying nuclear warheads. This meant they could reach American territory, which had historically been considered secure, with only Canada and Mexico as neighbors, neither of which presented a military threat*[5]*.*

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[1] Blagoj Delipetrev, Chrisa Tsinaraki, and Uroš. Kostić, *AI Watch, Historical Evolution of Artificial Intelligence: Analysis of the Three Main Paradigm Shifts in AI* (Luxembourg: Publications Office of the European Union, 2020).
** Alan Turing who was a British mathematician. He decoded the German Enigma machines during the Second World War (which were considered impossible to crack)*

[2] *Bernardo Gonçalves, "Passed the Turing Test: Living in Turing Futures," Intelligent Computing 3 (January 2024): 0102, https://doi.org/10.34133/icomputing.0102.*
[3] Kissinger, Schmidt, and Huttenlocher, *The Age of AI*.
[4] " La Conférence de Dartmouth, naissance de l'Intelligence Artificielle (c©AAAI, AI magazine, vol. 27, 4, 2006)accessed February 5, 2025, https://denisevellachemla.eu/transc-dartmouth.pdf.
[5] Mijanur Rahman, "Foundations of Artificial Intelligence," n.d.

1.1.1.2 The First AI Winter (1973-1980):

The term AI winter refers to a time of diminished interest from consumers, the public, and private sectors in AI, resulting in reduced research funding that leads to fewer advancements. The initial AI winter began in the 1970s, triggered by unmet expectations, grand hopes, and financial troubles. In 1973, the UK's Lighthill Report criticized the stagnation in AI research, prompting significant funding cuts for AI initiatives in the UK[1]*. Concurrently, AI faced insurmountable technological challenges, primarily due to limitations in computing power, memory, and processing speed that were simply inadequate at the time. Computers lacked sufficient memory to store the vast amounts of data necessary for developing complex rule-based systems and did not possess enough processing power to solve problems promptly. As a result, both private investors and the government turned away from AI, withdrawing their financial support due to the high costs compared to the seemingly low returns. The U.S. government displayed minimal interest in continuing its funding for AI research. Initial challenges arose because many early programs had little to no understanding of their subject matter, relying instead on basic syntactic manipulations. A notable incident occurred in early machine translation projects, which were heavily funded by the U.S. National Research Council to accelerate the translation of Russian scientific papers following the Sputnik launch in 1957, but all government funding for academic translation initiatives was ultimately withdrawn. Nonetheless, this era compelled researchers to reassess their methodologies and laid the groundwork for future advancements*[2]*.*

1.1.1.3 The Boom Years:

During the 1980s, the emphasis within artificial intelligence transitioned to symbolic AI and the development of "expert systems." An expert system is a category of software that utilizes the knowledge and experience of specialists in a particular field. By analyzing this expertise, the expert system can deliver valuable advice and make decisions similar to those of a qualified professional[3]*. The main idea was to transform the knowledge of human experts into a computer-readable format and share it.As software was deployed across a wide range of personal computers. By 1985, investments in AI expert systems in the United States had exceeded $1 billion*[4]*. Nearly*

[1] Onome, “The Untold History of AI,” *AutoGPT* (blog), July 18, 2024, https://autogpt.net/the-untold-history-of-ai/.
[2] “The-Evolution-of-AI-Technology.Pdf,” accessed February 6, 2025, https://tnfarmbureau.org/wp-content/uploads/2023/07/The-Evolution-of-AI-Technology.pdf.
[3] Buchanan, “A (Very) Brief History of Artificial Intelligence.”
[4] Delipetrev, Tsinaraki, and Kostić, *AI Watch, Historical Evolution of Artificial Intelligence*.

every significant corporation in the U.S. had created its own AI department and was in the process of either implementing or investigating expert systems[1].

1.1.1.4 The Second AI Winter (from the late 1980s to the early 2000s) :

The emergence of expert systems, intended to mimic human expertise within certain areas, initially appeared to be promising. However, the shortcomings of these systems became evident as they faced challenges with the complexities of real life and needed significant manual adjustments[2]*. Furthermore, systems like XCON*[3] *proved to be quite cost-efficient. Hans Moravec noted in 1988 that "it is relatively simple to make computers perform at an adult level on intelligence assessments or in games like checkers, but it is challenging or unfeasible to provide them with the abilities of a one-year-old regarding perception and movement*[4]*." Similarly, there was a decline in articles related to AI that began in 1987, reaching a low point by 1995*[5]*.*

1.1.1.5 Modern AI :

Substantial advancements were made following this period. The technological revolution of the 1990s, especially in computing, sparked a revival in artificial intelligence research, thereby fulfilling the long-cherished aspirations of scholars in this field. In 1997, IBM's supercomputer Deep Blue triumphed over Garry Kasparov, the reigning chess champion. The rise of connectionism and artificial neural network technologies, coupled with remarkable increases in computer processing power, enabled the development of deep learning, which is distinct from traditional machine learning, and helped establish AI as a legitimate domain for expertise and inquiry[6]*. The 2000s signified a shift from theoretical research to the widespread incorporation of AI across different sectors, propelled by the emergence of big data and significant advancements in computing infrastructure. The rapid escalation of digital information from social platforms, sensors, and mobile devices opened new avenues for AI applications. Big data functioned as the essential resource for training sophisticated AI models, resulting in systems that were more accurate and reliable. Beginning in the 2010s, AI became a significant focus for major technology companies. From 2012 to 2015, Google poured investments into numerous experimental AI initiatives. In 2013,*

[1] Buchanan, "A (Very) Brief History of Artificial Intelligence."
[2] Onome, "The Untold History of AI."
[3] Rahman, "Foundations of Artificial Intelligence."
[4] Rafael B. Audibert et al., "On the Evolution of A.I. and Machine Learning: Towards a Meta-Level Measuring and Understanding Impact, Influence, and Leadership at Premier A.I. Conferences" (arXiv, January 8, 2024), https://doi.org/10.48550/arXiv.2205.13131.
[5] Sebastian Schuchmann, "History of the Second AI Winter," *Towards Data Science* (blog), November 28, 2019, https://medium.com/towards-data-science/history-of-the-second-ai-winter-406f18789d45.
[6] Pascal Boniface, *Géopolitique de l'intelligence artificielle: comment la révolution numérique va bouleverser nos sociétés* (Paris: Eyrolles, 2021).

Facebook launched the Facebook Artificial Intelligence Research program, encompassing several laboratories within the United States. France, and Canada, and was led until 2018 by one of the French specialists in artificial intelligence, Yann Le Cun. Artificial intelligence is no longer just a research field; it has entered the public debate. Later, it has played a significant role in helping humanity become more advanced and equipped than ever before. It can be noted that it has broadened the spectrum of its applications from 'the soil to space'[1].

We have claimed that A1 is existing, but we have not said what it is…

[1] Moumita Ghosh and A. Thirugnanam, "Introduction to Artificial Intelligence," in *Artificial Intelligence for Information Management: A Healthcare Perspective*, ed. K. G. Srinivasa, Siddesh G. M., and S. R. Mani Sekhar, vol. 88, Studies in Big Data (Singapore: Springer Singapore, 2021), 23–44, https://doi.org/10.1007/978-981-16-0415-7_2.

1.1.2 Definitional and Conceptual Understanding of AI :

It is often neglected that in scientific discussions there are (at least) two types of definitions: a dictionary definition is descriptive as it summarizes the existing usage of the term, while a working definition is prescriptive as it specifies a proposed usage of the term.

1.1.2.1 Dictionary definition:

The Oxford English Dictionary describes AI as "the ability of computers or other machines to demonstrate intelligent behavior." This definition primarily addresses AI as a combination of two interconnected concepts: intelligence and an artificial entity[1].

Intelligence generally refers to "the capacity to solve complex problems." Consider the most intelligent individual you know. What characteristics lead you to describe this person in that way? Is she a quick thinker, capable of absorbing and applying new knowledge instantly? Is he exceptionally creative, capable of generating unique ideas that might not cross your mind? Perhaps she is highly observant and notices the smallest details in her surroundings. Or maybe he is deeply empathetic and perceives how you are feeling even before you realize it yourself. Human intelligence encompasses a broad range of skills, displaying attributes such as logical reasoning, spatial awareness, and emotional insight. Whether we excel in mathematics or possess strong interpersonal skills, we must employ cognitive functions like working memory, sustained attention, categorization, and pattern recognition to navigate and thrive in our daily lives. The exploration of intelligence is among the oldest fields of study. For more than two millennia, philosophers have sought to comprehend how perception, learning, memory, and reasoning can, or should, be achieved. With the introduction of functional computers in the early 1950s, many believed that these new "electronic super-brains" had limitless capabilities for intelligence. "Faster Than Einstein" was a common headline. AI is envisioned as computer systems that share certain similarities with the human mind in a certain sense[2] *Although a computer and a human mind cannot be the same in every way.*

1.1.2.2 Working definitions:

According to the father of AI, John McCarthy[3]*, AI is "The science and engineering of making intelligent machines, especially intelligent computer programs" the pioneer of AI sees Artificial Intelligence as branch of computer science, similar to how*

[1] "2024-Wttc-Introduction-to-Ai.Pdf," accessed February 9, 2025, https://cdn-dynmedia-1.microsoft.com/is/content/microsoftcorp/microsoft/final/en-us/microsoft-brand/documents/2024-wttc-introduction-to-ai.pdf.

[2] "Noor-Book.Com الذكاء الاصطناعي مقدمة قصيرة جدا," n.d.

[3] Wolfgang Ertel, *Introduction to Artificial Intelligence* (Springer, 2018).

International Relations is a branch of Political Sciences. However, International Relations as a scholarly discipline focuses on understanding the behavior of states in their interactions with other political entities. AI, on the other hand, is a field of research aimed at developing machines capable of performing tasks that usually require human intelligence, including learning, reasoning, problem-solving, perception, and language comprehension. Each of these tasks employs various AI techniques, which are regarded as the fundamental subfields of AI, such as computer vision, machine learning, natural language processing, and more.

Knight & Rich, 1991 : the study of how to make computers do things which at the moment, people do better.

Lugar and Subbtlfield, 2008: the branch of computer science that is concerned with the automation of intelligent behavior[1].

African Union: "AI refers to computer systems that can simulate the processes of natural intelligence exhibited by humans where machines use technologies that enable them to learn and adapt, sense and interact, predict and recommend reason and plan, optimise procedures and parameters, operate autonomously, be creative and extract knowledge from large amounts of data to make decisions and recommendations for the purpose of achieving a set of objectives identified by humans[2] *".*

All the aforementioned definitions share one common denominator, namely AI is an other field of study which simply focus on creating machines capable of performing tasks that typically require human intelligence such as learning, reasoning, problem-solving, perception and language understanding,each of which requires some AI techniques which are considered to be the core subfields of AI such as Computer vision , machine learning, Natural language processing and so on.

Russel and Norvig, 2010: the study and design of rational agents is a system that perceive its environment and take actions that maximize its chances of success… the two researchers classify previous definitions of AI into two-by-two matrix[3].

[1] Mohamed El-Had, "Artificial Intelligence Background, Definitions, Challenges and Benefits," *مجلة الجمعية المصرية لنظم المعلومات وتكنولوجيا الحاسبات* 31, no. 31 (May 1, 2023): 124–32, https://doi.org/10.21608/jstc.2023.297957.

[2] "44004-Doc-EN-_Continental_AI_Strategy_July_2024.Pdf," accessed May 6, 2025, https://au.int/sites/default/files/documents/44004-doc-EN-_Continental_AI_Strategy_July_2024.pdf.

[3] El-Had, "Artificial Intelligence Background, Definitions, Challenges and Benefits."

Table1: *Two-by-Two matrix of AI definitions*

A system that acts rationally	***A system that thinks rationally***
A system that acts humanly	***A system that thinks humanly***

Source: *Author's own elaboration*

The table outlines the four classical perspectives of defining AI, which could be either acting/thinking humanly, indicating that those systems behave like a human; for instance, talking and moving, which mainly relate to the AI machines, while thinking humanly involves decision-making, problem-solving, and so on. Or, bring rationality to the thinking and behavioral process , like because it is not a matter of thinking or acting like a human, and it is not the ultimate goal; however, AI agents need to follow logic and reasoning rules.artificial intelligence is as a family of general-purpose technologies, any of which may enable machines to perform tasks normally requiring human or biological intelligence, especially when the machines learn from data how to do those tasks.

1.1.2.3 Operational Definition:

There is no mutually agreed definition of AI but within the framework of this thesis, AI refers to computer systems that can simulate the processes of natural intelligence exhibited by humans where machines use technologies that enable them to learn and adapt, sense and interact, predict and recommend reason and plan, optimise procedures and parameters, operate autonomously, be creative and extract knowledge from large amounts of data to make decisions and recommendations for the purpose of achieving a set of objectives identified by humans.

1.1.3 Artificial Intelligence Types:

Artificial intelligence can be categorized into at least seven different types: three based on capabilities and four focused on functionality, which loosely align with Maslow's hierarchy of needs, along with two based on how AI systems learn[1].

1.1.3.1Capability-based types include:

Artificial Narrow Intelligence (ANI) or Weak AI:

Currently, all AI falls under the category of ANI. This type of AI is designed for specific tasks and cannot perform beyond what it was trained for[2], *such as image recognition, spam filtering, recommendation systems, facial recognition, and Google Translate. At this point, these machines lack the ability to think; they simply execute a predefined set of actions.*

Artificial General Intelligence (AGI) or Strong AI:

The concept of generalization in AI is crucial for both domain-specific tasks and for achieving human-level intelligence[3]*. AGI systems have not yet been realized but are a significant focus of AI research and could integrate AI with robotics, enabling systems to think and carry out physical tasks. They could solve complex issues without the need for pre-programming like ANI mandates; conduct information searches globally; utilize sensors and the Internet of Things (IoT) to learn; make phone calls and conduct interviews; draw logical conclusions; and modify or enhance their own code to improve their intelligence. Some experts believe this could occur within a decade, whereas others are skeptical that AGI will be achievable for many more years, if at all. Despite the lack of consensus among AI researchers, significant milestones in AGI development include the introduction of Generative Pre-trained Transformer (GPT) models and advanced information retrieval systems like DeepSeek and ChatGPT*[4].

Artificial Superintelligence (ASI):

This refers to AGI that becomes so sophisticated that it can establish its own goals and strategies without human awareness or comprehension. Elon Musk argues that the greatest existential issue we face is how the emergence of ASI may or may not align

[1] "Artificial-Intelligence-Types.Pdf," accessed February 10, 2025, https://blogs.bmc.com/artificial-intelligence-types/?print-posts=pdf.
[2] "GDC-Submission_the-Millennium-Project.Pdf," accessed February 12, 2025, https://www.un.org/digital-emerging-technologies/sites/www.un.org.techenvoy/files/GDC-submission_the-millennium-project.pdf.
[3] Jim Mitre and Joel B Predd, "Artificial General Intelligence's Five Hard National Security Problems," n.d.
[4] Jun Cui, "A Comparative Study on the Development of ChatGPT and DeepSeek AI Models in General Artificial Intelligence Technologies," 2025, https://doi.org/10.13140/RG.2.2.19380.77443.

with humanity[1]*. He believes the Singularity is not only foreseeable but inevitable. However, many factors remain unknown.The potential outcomes could include the collapse of civilization and even the extinction of humanity. He noted that even if all governments acknowledged the threat and sought to avert it, they would still be unable to do so*[2]*. Science fiction has depicted scenarios where AI turns against its creators, but a more plausible risk is that AI may misunderstand human commands because of its fundamental lack of context*[3]*.*

1.1.3.2 Functionality-based types :

- ***Reactive Machines AI :***

The earliest types of AI systems have very limited capabilities. The most basic stage of any AI system is reactive machine AI. For instance, a machine learning algorithm that receives a human face as input and produces a box around it to identify it is an example of simple reactive machine AI. This model does not retain any inputs or engage in learning like Netflix's recommendation system or traffic management solutions[4]*.*

- ***Limited memory AI:***

Limited memory AI has the capability to retain past information, utilizing that knowledge to enhance its predictions. An example of limited memory AI is self-driving cars.

- ***Theory of mind:***

This form of AI starts to engage with human thoughts and emotions; ChatGPT is approaching the characteristics of a theory of mind AI. If you express gratitude for its assistance, it will graciously acknowledge the compliment and show a willingness to help further. Additionally, you can share your frustration, and it will seem to empathize.

[1] "Superintelligence: Science or Fiction? | Elon Musk & Other Great Minds - YouTube," accessed February 12, 2025, https://www.youtube.com/watch?v=h0962biiZa4.

[2] "Noor-Book.Com الذكاء الاصطناعي مقدمة قصيرة جدا."

[3] Thomas Coyne, "How the Enlightenment Ends - The Atlantic," *The Atlantic*, n.d.

[4] Tulsi Pawan Fowdur et al., *Artificial Intelligence, Engineering Systems and Sustainable Development: Driving the UN SDGs* (Emerald Group Publishing, 2024).

- ***Self-aware AI:***

This type of AI is only a theoretical concept and primarily appears in science fiction, where machines have overtaken the world, serving as a hypothetical scenario depicted in films and stories[1].

1.1.4 Artificial Intelligence Techniques:

Artificial Intelligence can be used to solve real-world problems by implementing the following processes/ techniques:

1.1.4.1 Machine Learning :

In simple terms, machine learning is the most popular technique of predicting the future or classifing information to help in decision-making, it is not directly programmed to solve the problem but develops its own program or model based on a large number of examples[2]*, contatry to traditional programming].It is one of the applications of AI where machines are not explicitly programmed to perform certain tasks; rather, they learn and improve from experience automatically. Deep Learning is a subset of machine learning based on artificial neural networks for predictive analysis. There are various machine learning algorithms, such as Unsupervised Learning, Supervised Learning, and Reinforcement Learning. In Unsupervised Learning, the algorithm does not use classified information to act on it without any guidance. In Supervised Learning, it deduces a function from the training data, which consists of a set of an input object and the desired output. Reinforcement learning is used by machines to take suitable actions to increase the reward to find the best possibility which should be taken in to account*[3].

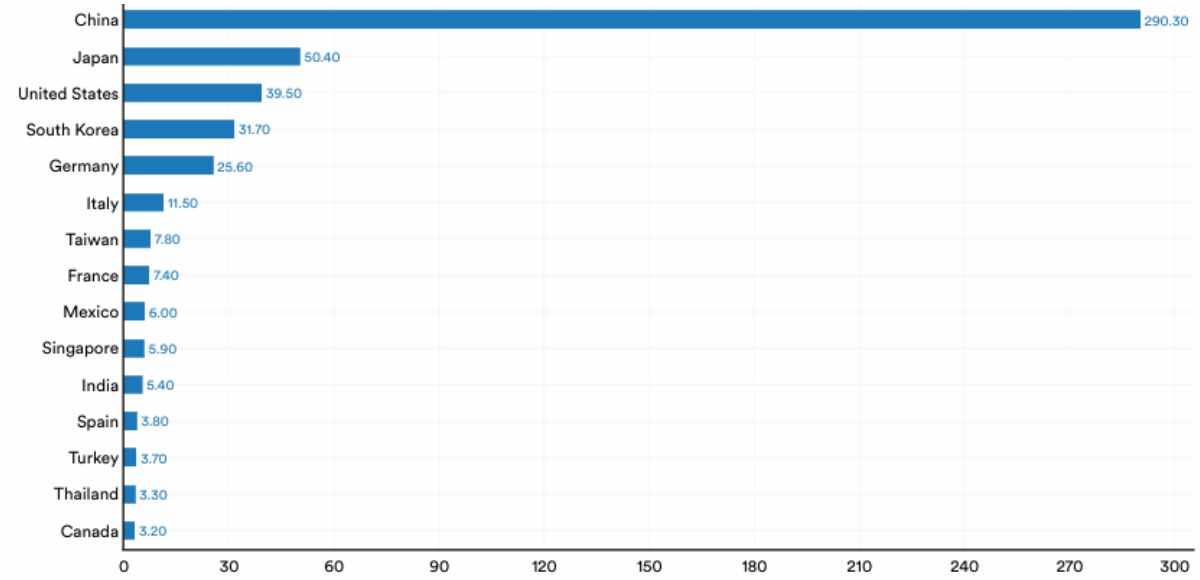
1.1.4.2 Automation & Robotics :

The purpose of Automation is to get the monotonous and repetitive tasks done by machines which also improve productivity and in cost-effective and more efficient results. Many organizations use machine learning, neural networks, and graphs in automation. Such automation can prevent fraud issues while financial transactions online by using CAPTCHA technology. Robotic process automation is programmed to

[1] Fowdur et al.
[2] T. V. Geetha and S. Sendhilkumar, *Machine Learning: Concepts, Techniques and Applications* (CRC Press, 2023).
[3] Massih-Reza Amini, *Apprentissage machine: de la théorie à la pratique* (Eyrolles, 2015).

perform high-volume repetitive tasks which can adapt to the change in different circumstances[1].

Figure2: *Number of industrial robots installed by country, 2022*



Source:*Oxford Insight*

Data on robot installations at a country level can indicate the extent to which different nations focus on incorporating robots into their economies. In 2022, China topped the global charts with 290,300 industrial robot installations, which is 5.8 times greater than Japan's 50,400 and 7.4 times higher than the United States' 39,500. South Korea and Germany ranked next with 31,170 and 25,600 installations, respectively[2].

1.1.4.3 Natural language processing :

It is the interactions between computers and human language where the computers are programmed to process natural languages. Natural language processing (NLP) enables computers to understand, interpret, generate, and transform text. Current state of-the-art models, such as OpenAI's GPT-4 and Google's Gemini, are able to generate fluent and coherent prose and display high levels of language understanding ability[3].

[1] Fouad Sabry, *Robótica Autónoma: ¿Cómo Aparecerá Un Robot Autónomo En La Portada de La Revista Time?* (One Billion Knowledgeable, 2021).
[2] "HAI_2024_AI-Index-Report," n.d.
[3] John I. Tait, *Charting a New Course: Natural Language Processing and Information Retrieval.: Essays in Honour of Karen Spärck Jones* (Springer Science & Business Media, 2005).

Figure3: *A sample output from GPT-4*

Source: *AI Index 2024*

1.1.4.4 Computer vision :

Machines can capture visual information and then analyze it. Here cameras are used to capture the visual information, the analogue to digital conversion is used to convert the image to digital data, and digital signal processing is employed to process the data. Then the resulting data is fed to a computer. In machine vision, two vital aspects are sensitivity, which is the ability of the machine to perceive impulses that are weak and resolution, the range to which the machine can distinguish the objects. The usage of machine vision can be found in signature identification, pattern recognition, and medical image analysis[1].

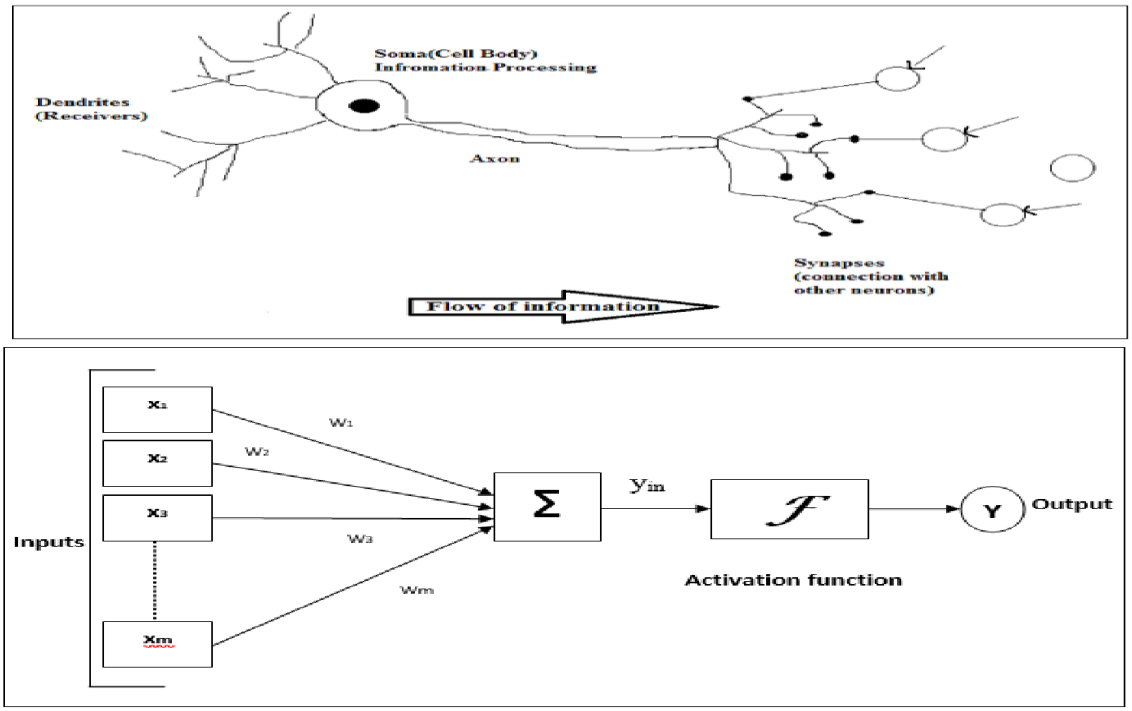
1.1.4.5 Neural Networks:

NNs are biologically inspired systems consisting of a massively connected network of computational "neurons" organized in layers. By adjusting the weights of the network, NNs can be "trained" to approximate virtually any nonlinear function to a required degree of accuracy. NNs typically are provided with a set of input and output exemplars. A learning algorithm (such as back propagation) would then be used to

[1] "Computer Vision: Algorithms and Applications - Richard Szeliski - Google Livres," accessed April 14, 2025, https://books.google.dz/books?id=bXzAlkODwa8C&pg=PA689&dq=computer+vision&hl=fr&newbks=1&newbks_redir=0&sa=X&ved=2ahUKEwir5qOZ5deMAxVvaqQEHdJaN1AQ6AF6BAgKEAM#v=onepage&q=computer%20vision&f=false .

adjust the weights in the network so that the network would give the desired output[1]*, in a type of learning commonly called supervised learning.*

Figure4: *A comparison between biological neuron and Artificial neuron*



Source: *Cambridge*

As shown in the two figures, Artificial neural networks (ANNs) are simplified computational models inspired by the structure of biological neural networks BNNs. In BNNs[2]*, informations flows from the dendrites to the soma, then travel along the axon to the synapses, enabling communication with other neurons. the artificial neuron mimic this process by receiving weighted inputs, computing a sum, and applying an activation function to produce an output, this simplified model is inspired by the early work of McCulloch ans Piits*[3]

[1] Yoshua Bengio, Aaron Courville, and Ian Goodfellow, *L'apprentissage profond* (MASSOT EDITIONS, 2018).
[2] "CSC 401.Pdf," accessed February 9, 2025, https://nacosadsu.org.ng/main/docs/400L/CSC%20401.pdf.
[3] Ronald Chrisley and Sander Begeer, *Artificial Intelligence: Critical Concepts* (Taylor & Francis, 2000).

1.1.5 Practical applications of AI :

AI is increasingly viewed as a collection of General Purpose Technologies (GPTs), resembling the significance of the combustion engine, electricity, or the Internet in several respects. GPTs are innovations that have the potential to enhance significantly productivity across various industries, including defense, while also fundamentally altering social structures and personal lifestyles. By leveraging its capabilities in pattern recognition and information processing, AI can aid in alleviating poverty and enhancing health care, education, environmental conditions, and economic development. The adoption of AI systems across all fields is essential and has a direct impact on a nation's standing in AI, as historical industrial revolutions have demonstrated through the Theory of General Purpose Technology Diffusion, representing a crucial phase of technological advancement[1]*, leading us toward the goal of general-purpose AI.*

1.1.5.1 Military and Defense : AI and RMA.

The incorporation and application of AI in military contexts could significantly shape the future of combat, whether on the tactical level (where reinforcement learning techniques might create innovative strategies in simulated scenarios), operational level (as robots, swarms, and autonomous technologies can accelerate the tempo of warfare), or strategic level. Currently, uncrewed robotic systems are being utilized in record quantities and with increasing autonomy across conflict zones such as Ukraine[2]*, Israel on Gaza, and the Red Sea. These developments have sparked discussions regarding the implications and potential directions of algorithmic warfare, often referred to as 'intelligentised'. Sun Tzu remarked that the art of warfare* [3]*is crucial to the state's interests and that it is a matter of life or death, leading to either safety or destruction. Military AI must take into account a variety of existing uses, which could be more effectively classified in line with Sun Tzu's principles of warfare, despite their origins in a time of swords and spears; nonetheless, Sun Tzu's insights possess a timeless significance.*

[1] Jeffrey Ding, *Technology and the Rise of Great Powers: How Diffusion Shapes Economic Competition* (Princeton University Press, 2024).

[2] Emmanuel Ogiemwonyi Arakpogun et al., "Artificial Intelligence in Africa: Challenges and Opportunities," in *The Fourth Industrial Revolution: Implementation of Artificial Intelligence for Growing Business Success*, ed. Allam Hamdan et al., vol. 935, Studies in Computational Intelligence (Cham: Springer International Publishing, 2021), 375–88, https://doi.org/10.1007/978-3-030-62796-6_22.

[3] "Sun Tzŭ, The Art of War, translated by Lionel Giles, 1910.

- ***Flexibility :***

For a rapid and flexible response to the evolving conditions of the battlefield, drones, or UAVs, exemplify this principle of warfare due to their quick deployment capabilities. AI enhances this functionality by analyzing vast quantities of data; for example, AI can redirect drones during missions to counter emerging threats, thus maintaining the element of surprise.

- ***Information and Intelligence:***

This principle plays a vital role in military strategy, aiming to comprehend both one's own capabilities and those of the opponent. Drone warfare combined with AI increasingly promotes the gathering and analysis of data; modern drones, outfitted with sophisticated sensors and cameras, gather information regarding enemy movements, terrain, and anticipate enemy actions, which improves situational awareness and allows commanders to make rapid, informed choices. Deep neural networks are currently utilized for image classification in drone video feeds as part of the Defense Department's Project Maven[*1]*, assisting humans in processing the extensive amounts of data that are collected.*

- ***Deception:***

The significance of deception is evident in contemporary warfare through the use of decoy drones and campaigns of misinformation. AI algorithms are capable of simulating various scenarios to create false targets, enticing enemy forces into traps, which manipulates enemy perception. For example, in March 2022, an AI-generated video depicted Ukrainian President Volodymyr Zelensky appearing to surrender to Russian forces. This serves as evidence that generative AI can be employed to influence politics, markets, and public opinion[2]*.*

- ***Geographical control:***

Artificial intelligence can evaluate topographical information to identify the best routes for drone deployment, making use of natural cover to reduce exposure to enemy defenses. By emphasizing the importance of resource conservation and efficient utilization, AI enhances resource allocation by pinpointing the most effective use of drones. Given that the U.S. government cannot monitor every mile or examine every container, AI systems, especially when combined with unmanned aerial vehicles

[*] Project Maven is the first activity of an "Algorithmic Warfare" initiative in the U.S. military.

[2] Hervé Tourpe, "Promesses et périls de l'intelligence artificielle," n.d.

(UAVs) and ground robots, can assist in border surveillance through advancements in automated monitoring[1].

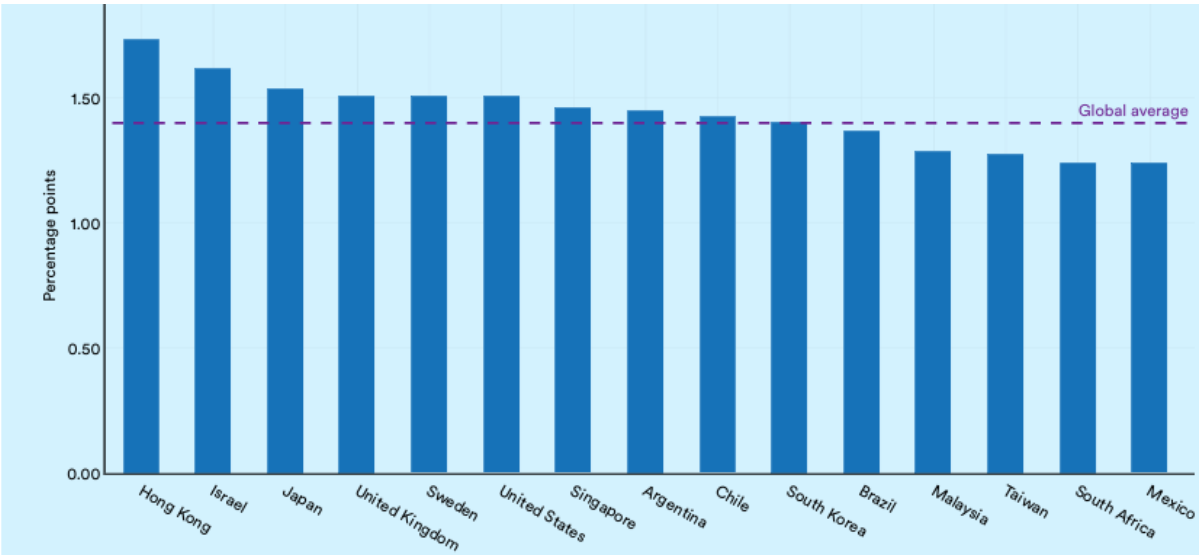
- ***Leadership:***

The integration of AI in military operations necessitates adept leadership to ef fectively manage and coordinate these technologies. Commanders must comprehend the capabilities and limitations of AI and drones to ensure their strategic and ethical implementation. Sun Tzu advocates for achieving victory through indirect tactics. Weapon systems capable of identifying and engaging targets without human involvement are identified as lethal autonomous weapon systems (LAWS). It is projected that fully autonomous combat robots, categorized as LAWS, could be developed within the next 20-30 years. Currently, research and development in robotics indicate that these combat machines have a certain level of autonomy and can function without human oversight[2]*. This capability assists in target identification and engagement using the appropriate munitions. Recent evaluations have demonstrated that AI can make more judicious decisions than human operators in scenarios with incomplete or flawed information*[3]*. AI holds significant potential to aid defense leaders in enhancing their forces' preparedness by collecting and integrating data and conducting predictive analysis to address issues before they escalate into critical situations*[4]*. Armed forces are now equipped with unmanned aerial vehicles, ground systems, and marine platforms featuring AI-powered capabilities, which align with the foundational beliefs of Spaykman's naval power, Haushofer's terrestrial capability, and Mahan's aerial strength. Additionally, nations are investigating ways to introduce autonomy to systems related to nuclear forces*[5].

[1] Michael C. Horowitz et al., "National Security-Related Applications of Artificial Intelligence," Artificial Intelligence and International Security (Center for a New American Security, 2018), https://www.jstor.org/stable/resrep20430.3.
[2] Ahmad Khan, Irteza Imam And Adeela Azam, "Role of Artificial Intelligence in Defence Strategy: Implications for Global and National Security," *Strategic Studies* 41, no. 1 (May 9, 2021): 19–40, https://doi.org/10.53532/ss.041.01.0058.
[3] Sun Tzŭ, The Art of War, translated by Lionel Giles, 1910.
[4] Horowitz et al., "National Security-Related Applications of Artificial Intelligence."
[5] Ahmad Khan, Irteza Imam And Adeela Azam, "Role of Artificial Intelligence in Defence Strategy."

1.1.5.2 Economy : AI, Invisible hand and knowledge-based economy

Figure5: *Estimated impact of AI adoption on annual productivity growth over ten years*



Source: *Oxford Index 2024*

The adoption of AI could boost productivity by 1.5 percentage points per year over the next decade, many countries will benefit from AI-driven productivity growth, certain geographic areas, like Hong Kong, Israel, and Japan, are especially well-positioned[1].

AI could significantly alter the labor market in ways never experienced before[2]*. In numerous sectors, ranging from finance to manufacturing, the invisible hand has not been sufficient to guarantee widespread benefits for some time now. It's nearly impossible to discuss economics without referencing Adam Smith. Many of his notions, such as the division of labor and the concept of the invisible hand*[3]*, are often taken for granted. How might Adam Smith have reacted to the rise of this new "artificial hand"? A key idea in this work is that a nation's wealth is measured by the living standards of its population, which can be improved by increasing productivity, defined as the output produced per worker. AI could indeed play a significant role in reversing this trend,*

[1] Michael Chui et al., "The next Productivity Frontier," n.d.
[2] "Rééquilibrer l'intelligence artificielle," 2023.
[3] "An Inquiry Into the Nature and Causes of the Wealth of Nations - Adam Smith - Google Livres," accessed February 15, 2025, https://books.google.dz/books?id=C5dNAAAAcAAJ&pg=PP7&source=kp_read_button&hl=fr&newbks=1&newbks_redir=0&redir_esc=y#v=onepage&q&f=false.

as it has the potential to enhance productivity by automating certain cognitive processes.

Furthermore, AI is spearheading the development of a new economic model focused around data, referred to as the data economy[1]*, where data is emerging as a vital production factor, working alongside labor and physical capital. Nevertheless, the introduction of AI brings forth questions and worries regarding its effects on labor markets. The automation of routine activities and the rise of AI-driven systems pose risks of disrupting conventional employment trends, leading to concerns about job loss and increased income inequality*[2]*.*

In the competitive balance of the pre-AI economy, individuals either seek out production opportunities independently or become part of structured organizations to make the best use of their time and expertise. These organizations operate under a management by exception approach: less knowledgeable individuals act as "workers" who tackle production tasks, while those with greater knowledge serve as "solvers" who focus on helping workers with the unique challenges they cannot address[3]*.*

[1] "Data Capitalism," accessed April 15, 2025, https://datacapitalism.d4bl.org/?utm_source=chatgpt.com.
[2] Arakpogun et al., "Artificial Intelligence in Africa," 2021.
[3] Enrique Ide and Eduard Talamas, "Artificial Intelligence in the Knowledge Economy" (arXiv, February 24, 2025), https://doi.org/10.48550/arXiv.2312.05481.

1.1.5.3 Policy and Government:

Governments hold various positions concerning AI, acting as enablers, financiers, regulators, and also as users and, in some cases, developers. While the ongoing global discussion about AI has predominantly emphasized governments' regulatory role in shaping and reacting to AI application[1]*. AI can become a vital enabler of effective governance. Governments and organizations are progressively adopting AI to enhance public services. Open data is crucial in a democracy as it bolsters democratic institutions*[2]*. One in four Europeans would be open to allowing AI to make significant political decisions in their nation. A specific instance is the "Amelia" platform created in France, which addresses citizens' inquiries about administrative procedures. AI plays a considerable role in fostering sustainable development*[3]*.*

Advancements in natural language processing enable sentiment analysis to specifically target certain ideological groups. Google's introduction of political interest ad targeting aimed at both "left-leaning" and "right-leaning" demographics for the first time in 2016 represents a movement in this direction. By employing a systematic approach to identify, analyze, and interpret emotional elements within text, natural language processing can function as a tool for propaganda. Deep fakes[4]*—AI technologies are now capable of creating realistic-sounding synthetic voice recordings of any individual who has a sufficiently large voice training dataset available. This capability is increasingly applicable to video as well. By utilizing data analytics and machine learning methodologies to uncover fraud and evaluate risks to the public sector's integrity by spotting anomalies or suspicious trends,*

[1] "Global Trends in Government Innovation 2023," OECD, May 15, 2023, https://www.oecd.org/en/publications/global-trends-in-government-innovation-2023_0655b570-en.html.

[2] Collectif, *L'Internet et la démocratie numérique* (Presses universitaires de Perpignan, 2017).

[3] "Before_and_Beyond_Artificial_Intelligence_Opportun," n.d.

[4] "Black Communication in the Age of Disinformation: DeepFakes and Synthetic Media - Google Livres," accessed April 15, 2025, https://books.google.dz/books?id=nLLFEAAAQBAJ&pg=PA54&dq=deep+fake&hl=fr&newbks=1&newbks_redir=0&sa=X&ved=2ahUKEwjb-f_k7tmMAxWbVqQEHUvnMmIQ6AF6BAgLEAM#v=onepage&q=deep%20fake&f=false.

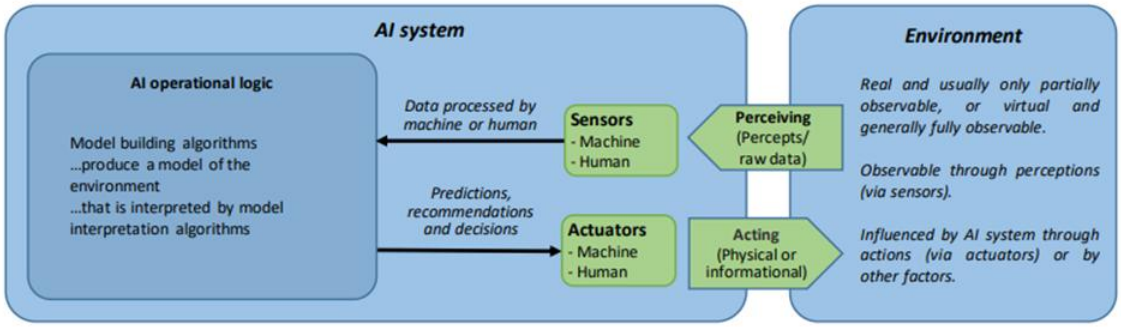
1.2 Foundational Pillars of AI Engineering and Development

In the development of AI systems, several foundational components are indispensable that encompass the technical aspects, like human expertise, and some ethical and regulatory considerations, forming the backbone of AI system development.

1.2.1 AI System: from a black box to a glass box

The conceptual framework of an AI System is initially illustrated through the overarching structure of a generic AI system, as depicted in (figure 6). We aim to demystify the workings within the AI black box and transform it from a 'black box' into an 'AI glass box').

Figure 6 : *Conceptual view of an AI system*



Source: *OECD*

As indicated in figure 6, an AI system is comprised of three core components: sensors, operational logic, and actuators, which serve as the foundational elements of AI capabilities and are central to national AI strategies. Sensors gather raw data from the surroundings, while actuators function to alter the state of the environment. The true strength of an AI system lies within its operational logic. Given a specific set of aims and drawing from the input data provided by sensors, the operational logic generates outputs intended for the actuators. These outputs manifest as recommendations, predictions, or decisions capable of impacting the state of the environment.In the context of the AI race, data is crucial; sensors serve as the primary mechanism for data collection . Regardless of the type, whether cameras, microphones, or more specialized tools, The operational logic simply refers to the algorithms responsible for processing that data, and this is a significant aspect of the AI race:

determining who can develop the most sophisticated algorithms and when and how. This is particularly pertinent for the demand for efficient algorithms targeting specific national objectives, such as autonomous weaponry. Actuators can be either software or hardware that interacts with the environment, which is vital for military strength concerning the application of AI-powered warfare that is reshaping the future of conflict[1].

An agent can be defined as something that perceives its surroundings through sensors and influences that environment through actuators. This basic concept is represented in Figure A human agent utilizes eyes, ears, and other sensory organs as sensors, while hands, legs, mouth, and various other body parts serve as actuators. In contrast, a robotic agent may use cameras and infrared range finders as sensors and employ different types of motors as actuators[2].

1.2.2 Data: The Fuel that Drives AI

"Data is the new oil" is a phrase often associated with the digital age. Data is the fuel behind modern computing and AI algorithms[3], *allowing them to learn, find relationships in data and make informed predictions and decisions*[4]. *estimates indicates that by 2025 the volume of data produced in the world each year could be 175 zettabytes (up from less than 1 zettabyte a year generated in 2010, which is a 175 x increase in the volume of data in just 15 years)with the U.S. hosting 10x more data centres than any other country in the world*[5]. *AI methods are progressively utilizing vast amounts of alternative data sources and analytics known as 'big data' to enhance predictability and performance automatically through experience and information, without explicit programming by humans. The defining features of big data are commonly referred to as the '4Vs': volume (quantity of data); velocity (rapid processing and analysis of real-time data); variety (diverse data types), and veracity (accuracy of data, reliability of sources, and truthfulness)*[6].

[1] OECD, *Artificial Intelligence in Society* (OECD, 2019), https://doi.org/10.1787/eedfee77-en.
[2] OECD.
[3] "2024-Wttc-Introduction-to-Ai.Pdf," accessed February 9, 2025, https://cdn-dynmedia-1.microsoft.com/is/content/microsoftcorp/microsoft/final/en-us/microsoft-brand/documents/2024-wttc-introduction-to-ai.pdf.
[4] "Stuart Russell, Peter Norvig-Artificial Intelligence_ A Modern Approach-Prentice Hall (PDFDrive).Pdf," accessed February 11, 2025, http://repo.darmajaya.ac.id/4836/1/Stuart%20Russell%2C%20Peter%20Norvig-Artificial%20Intelligence_%20A%20Modern%20Approach-Prentice%20Hall%20%28%20PDFDrive%20%29.pdf.
[5] Artificial Intelligence: Threats and Opportunities," European Parliament, 2023."Stuart Russell, Peter Norvig-Artificial Intelligence_ A Modern Approach-Prentice Hall (PDFDrive).Pdf."
[6] "Big Data: Concepts, Methodologies, Tools, and Applications: Concepts ... - Google Livres," accessed May 13, 2025, https://books.google.dz/books?id=BKEoDAAAQBAJ&pg=PA1050&dq=big+data+PDF&hl=fr&newbks=1&newbks_redir=0&sa=X&ved=2ahUKEwiUiIa9g6GNAxVwTqQEHcigMUcQ6AF6BAgGEAM#v=onepage&q=big%20data%20PDF&f=false.

Figure 7: *Big data sources*

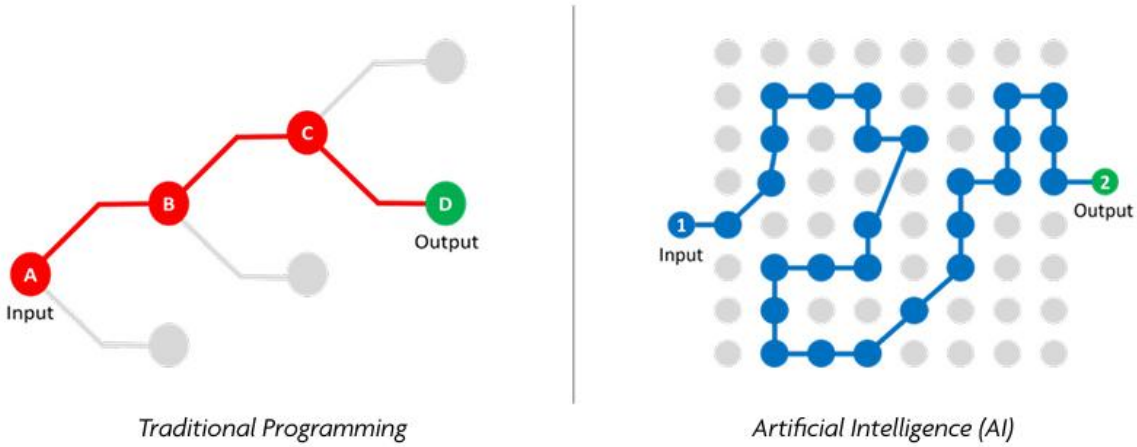
Source: *Dell Technologies.*

Traditional Big data sources include structured data like daily market data , alternatives, on the other hand, encompass emerging data types such as social media data. These sources are often unstructured or semu-structured and require advanced analytics and has no value if not processed, offering new opportunities for innovation and competitive advantage. Big data, in the most generic sense, "refers to very large datasets with complex structures, with high volume of data mass, high velocity of data flow and high variety of data types"[1]

[1] "Big-Data-Compilation-Sdg-Indicators-Arab-Region-Challenges-Opportunities-Arabic.Pdf," accessed April 23, 2025, https://www.unescwa.org/sites/default/files/pubs/pdf/big-data-compilation-sdg-indicators-arab-region-challenges-opportunities-arabic.pdf.

1.2.3 Algorithms and Models: The brain of AI

Figure 8: *Traditional Programming vs Artificial Programming*



Source: *Microsoft*

Unlike traditional programming, AI systems are not programmed through a detailed set of instructions; instead, they learn to address problems by analyzing training data. Traditional programming entails embedding human knowledge and experience into a defined set of rules that a computer follows, which makes the machine seem to respond intelligently. These rules, known as algorithms, direct computers on how to execute tasks, often represented in an 'IF-THEN-ELSE' format similar to decision tree models. A n AI model serves as an algorithm that is trained to identify patterns and generate predictions or decisions based on input data"[1]

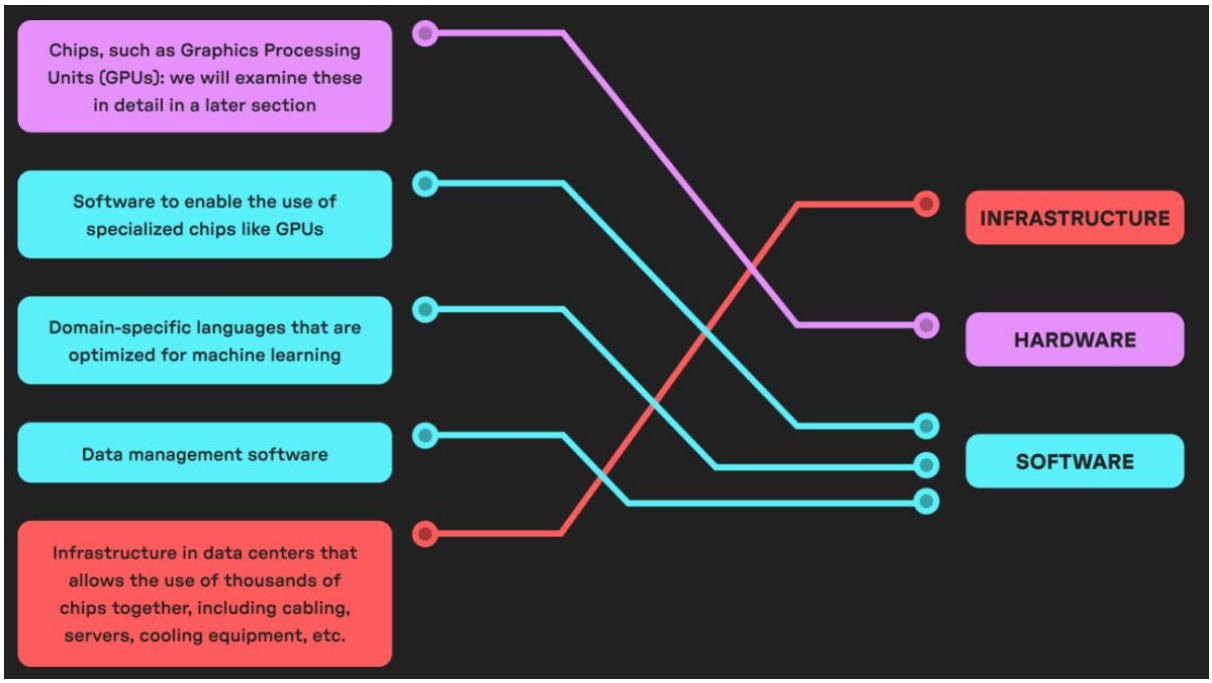
1.2.4 Computing Power: a fundamental necessity for developing large-scale AI

Grasping the impact of computational infrastructure on the political economy of artificial intelligence is crucial, as it determines who can create AI, the types of AI that are developed, and the beneficiaries of that process. It shapes the levels of consolidation within the technology sector. As Elon Musk stated, "GPUs are currently much more difficult to obtain than drugs[2]*."*

[1] "2024-Wttc-Introduction-to-Ai," n.d.

[2] "GPUs Are Currently Much More Difficult to Obtain than Drugs." -," accessed May 13, 2025, https://www.google.com/search?q=GPUs+are+currently+much+more+difficult+to+obtain+than+drugs.%E2%80%9D&rlz=1C1GCEU_enDZ1161&oq=GPUs+are+currently+much+more+difficult+to+obtain+than+drugs.%E2%80%9D&gs_lcrp=EgZjaHJvbWUyBggAEEUYOTIHCAEQIRiPAjIHCAIQIRiPAtIBBzQwNGowajSoAgCwAgE&sourceid=chrome&ie=UTF-8#fpstate=ive&vld=cid:81580bee,vid:nxbZVH9kLao,st:0.

Figure 9: *Computing power diagram*



Source: *AI Now Instisut*

When we use the term "compute," we sometimes refer to the number of calculations required for a specific task, such as training an AI model. Other times, "compute" pertains exclusively to hardware, like chips[1].

Chips are categorized based on their function. Analog chips are used to capture real-world wave signals such as those used in sound amplification, energy regulation, some sensors, and surveillance equipment. The most sophisticated category is logic chips, which process data and conduct computing functions, with applications in smartphones, AI and advanced computing, and the automotive industry. Logic chips are differentiated further based on performance, which is related to the distance between circuits, or nodes. Generally, chips below the 10-nanometer node threshold are considered advanced, with smaller nodes allowing for more transistors to be packed onto a chip to increase computational speed and power. However, "compute" is often utilized to describe a system that encompasses both hardware and software. This limitation creates significant market power for the small number of companies that have gained control over these resources—chip manufacturers like the Taiwan Semiconductor Manufacturing Company; chip designers like Nvidia; and cloud service providers like Google, Microsoft, and Amazon—the largest of which also manage extensive platform ecosystems that allow them to access data and numerous

[1] "Computational Power and AI - AI Now Institute," accessed May 13, 2025, https://ainowinstitute.org/publications/compute-and-ai.

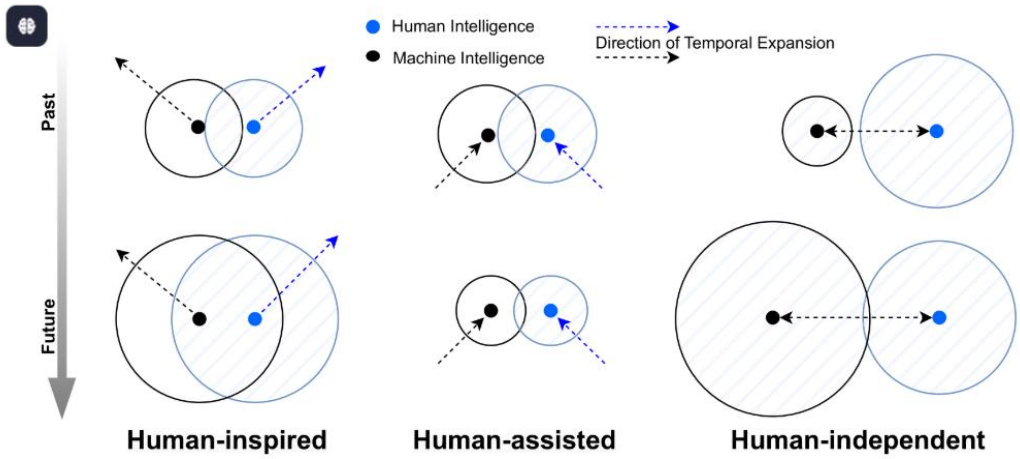
opportunities to monetize AI, holding a first-mover advantage in large-scale artificial intelligence[1].

1.2.5 Expertise and Governance: Human and Ethical Considerations

- ***Human Expertise:***

As John F. Kennedy famously stated, "The human mind is our fundamental resource," highlighting that innovation in AI originates from our creativity and primarily aims to meet our needs. Plato also said, "Necessity is the mother of invention." With the increasing number of technological innovations, it's essential to establish regulations regarding the legal access and utilization of these advancements. As discussed in the section on the historical development of AI, the continuous progress of AI technologies and digital learning methods raises important questions about the role of humans in guiding these developments. Although contemporary AI systems demonstrate extraordinary capabilities in automation, decision-making, and specific problem-solving, the crucial role of human involvement and oversight is clear in determining the future direction of next-generation AI systems, which have long drawn inspiration from human ingenuity since their inception.

Figure 10: *Categorization of human-centered intelligences and associated subcategories.*



Source :*Arxiv.org*

The intentional integration of human-centered questions is crucial for the progress of modern AI systems, especially in light of the recent impressive advances in machine

[1] "Computational Power and AI - AI Now Institute."

learning and computer vision that are not necessarily focused on human needs[1]*. In the realm of human-assisted intelligence, the overlap tends to decrease over time, leading to more specialized support from either humans or machines, which in turn encourages the creation of hybrid systems. Lastly, in the context of human-independent intelligence, the inherent characteristics of machine intelligence develop without restrictions, leading to a divergence in the core principles that govern both human* [2]*and machine intelligence as the limitations imposed by hardware become increasingly varied. People have been enhancing the intelligence of machines and vice versa.*

- ***AI governance:***

If you manage a risk better than your competitors, then it's an opportunity. – George Gorman, Zip Co. Approaching AI safety and responsible AI necessitates joint efforts from multidisciplinary communities such as AI, software engineering (SE) and governance, Based on HTI's investigation of governance practice locally and internationally, we have identified eight essential components of AI governance. These include accountability, oversight, roles and responsibilities; governance structures; people, skills, values, and culture; principles and policies, practices, processes and controls; supporting infrastructure; stakeholder engagement, co-design and impact assessment; monitoring, reporting and evaluation.

Figure 11: *Inclusive AI governance framework*

Source : *Governance Institute of Australia*

The figure presented highlights the essential components required for responsible and ethical governance of AI, emphasizing the importance of top-level guidance to ensure

[1] "What Is Human-Centered AI (HCAI)? — Updated 2025," The Interaction Design Foundation, accessed May 13, 2025, https://www.interaction-design.org/literature/topics/human-centered-ai.
[2] "Symbiotic Logic: Co-Evolution of Human-AI Thought through Mutual Error Correction" by Smith Lee :: SSRN," accessed May 13, 2025, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5207130.

that AI systems are in harmony with ethical standards and value systems. This entails tackling possible risks such as bias and complying with legal and regulatory standards, showcasing the importance of engaging multiple stakeholders[1].

[1] "Ai-Governance-Snapshot---Essential-Components-of-Ai-Governance.Pdf," accessed April 15, 2025, https://www.uts.edu.au/globalassets/sites/default/files/2024-01/ai-governance-snapshot---essential-components-of-ai-governance.pdf.

Results and Findings of the First Part:

To sum up this section, we have gotten to the following findings:

- *Artificial intelligence is not a new technology. The algorithms used today have been in existence for several decades. What is new is the confluence of three key elements, which are the advent of voluminous amounts of data, the ability to train the existing algorithms with vast amounts of data samples, and the use of modern computing, particularly Graph Processing Units (GPUs).*
- *Despite the setbacks, the AI Winters provided valuable lessons that helped shape the future of AI research; the challenges faced during the AI Winters highlighted the need for interdisciplinary collaboration. Advances in fields such as computer science, neuroscience, and cognitive science contributed to more robust AI research. The AI community learned the importance of setting realistic expectations and communicating the limitations of AI technologies. The realization that AI needed more data and computing power led to investments in these areas. The development of more powerful processors and the availability of large datasets fueled the resurgence of AI in the 21st century*

- *AI architecture constitute of well designed systems, big data capacity and storage, algorithms and models in addition to computaltional power and human experise and mainly ethical and regulatory guidlines governing the establishment and the spill over of this technology.*

Part Two

Sino-American Rivalry: The Politicization of AI

"Artificial intelligence is the future, not only for Russia, but for all humankind, Whoever becomes the leader in this sphere will become the ruler of the world."

Russian President Vladimir Putin, 2017, labs of Silicon Valle

2.1 The U.S. and PRC: Understanding the Character of a Rivalry

Since the end of World War II, American dominance has established a new global framework that not only mirrors but also formalizes many characteristics of the American system in other nations, even though the United States often holds a dominant position. However, in light of its actual and potential rivals, such as China, it cannot disregard how its policies impact its standing among other nations[1].

2.1.1 The evolution of U.S.-Chinese relations:

During World War II, the United States and China collaborated against Japan, which temporarily improved their relationship. However, after the war, the Chinese Civil War broke out between the Communist Party, led by Mao Zedong, and the Nationalist Party. The Communist victory in 1949 led to the establihment of the People's Republic of China, which the U.S. initially did not recognize due to its support for Taiwan. Formal recognition of the PRC by the United States took place in 1979, marking the beginning of diplomatic relations between the two countries. Over the following decades, the economic ties between the U.S. and China grew considerably. China's economic reforms, initiated by Deng Xiaoping in the late 1970s opened the doors for foreign investment and trade. This shift resulted in a significant increase in trade between the two nations, with China becoming a major manufacturing hub and the U.S. its main trading partner. Despite the trade benefits, tensions began to arise over issues such as intellectual property theft, restricted market access, and currency manipulation. The U.S. accused China of unfair trade practices that negatively impacted American businesses and workers, leading to trade disputes and tariffs imposed by both sides. As China's economic and military power has grown, its assertiveness on the world stage has also risen. This has led to increased competition between the U.S. and China for influence in Asia and other regions. Tensions have escalated over issues such as territorial claims in the South China Sea, Taiwan's status, and human rights concerns. Nonetheless, the United States and China are also deeply interlinked through various networks of dependence in fields like commerce, tourism, migration, telecommunications, technologies, and some areas of security. These connections are mutually beneficial and provide tangible advantages for the United States. This web of relationships forms the genuine basis of the Sino-American relationship and helps mitigate the strains experienced in other areas. They represent a reality that cannot be ignored[2].

[1] John J. Mearsheimer, *The Tragedy of Great Power Politics* (W. W. Norton, 2001).
[2] Dr Aftabuddin Ahammad, "America-China Conflict: An Overview," n.d.

2.1.2 Theories explaining the Rivalry

International politics, like all forms of politics, revolves around a contest for power. Regardless of the ultimate objectives of international politics, the immediate goal is always power. Statesmen and nations may ultimately pursue freedom, security, prosperity, or power itself. They might articulate their objectives through the lens of a religious, philosophical, economic, or social ideal. They may expect this ideal to come to fruition either through its inherent strength, through divine intervention, or through the natural progression of human events. However, whenever they attempt to achieve their goals through the means of international politics, they do so by seeking power[1]*. In the context of U.S.-China rivalry, this relationship exemplifies a scenario where "one key actor desires something perceived as scarce due to the belief that other actors share the same desire." To rationalize this aspiration, there are a few theories that explain this situation, such as the power transition theory, and hegemonic stability theory. Recognizing the essence of competition begins with the acknowledgment that competition exist.*

2.1.2.1 Sino-American rivalry through the lens of hegemonic stability theory:

Hegemony refers to a scenario where one dominant state exerts control over weaker states[2]*. The concept of "hegemony" outlines the attributes of a hegemonic state within the global framework*[3]*. It highlights the fundamental conditions necessary for a state to qualify as a hegemon, focusing on four core elements of structural power, which can be viewed as the foundational aspects of hegemony, represented by security, production, finance, and knowledge*[4]*. It is clear that the integration of military-security, productive-economic, financial-commercial, and knowledge-technological factors is crucial for creating a hegemonic economic landscape*[5] *that enabled the establishment of US dominance through Bretton Woods institutions like the IMF and World Bank, , largely through both coercive and non-coercive methods due to its extensive power capabilities*[6]*.*

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[1] Mearsheimer, *The Tragedy of Great Power Politics*.

[2] Barbara Lippert, Volker Perthes, and Stiftung Wissenschaft Und Politik, "Strategic Rivalry between United States and China: Causes, Tragectories, and Implications for Europe," *SWP Research Paper*, 2020, 4/2020, https://doi.org/10.18449/2020RP04.

[3] "مفهوم الهيمنة في نظريات العلاقات الدولية," n.d.

[4] States and markets : Strange, Susan, 1923-1998. (1994). In *Internet Archive*. London ; New York : Pinter Publishers ; New York, NY : Distributed in the USA and Canada by St. Martin's Press.

[5] "Book Review: China–US Competition: Impact on Small and Middle Powers' Strategic Choices," n.d.

[6] Samuel P Huntington, "The Clash of Civilizations and the Remaking of World Order," n.d.

Hegemonic state as "a state that is so powerful that it is able to control all other countries into its power system[1]*."the power system of American worldwide is manifested in numerous areas such as military hegemony through NATO for instance, in addition to economic hegemony through Bretton Woods institutions, U.S. dollar dominance and some cultural aspects of hegemony such cinematographic production (Hollywood) since The dominance of the ruling class manifests in two different ways: it is reflected in hegemony and intellectual or moral leadership*[2]*. The rise of China is possibly challenging the traditional dominance of the United States in the international system*[3]

The concept of hegemonic stability is attributed to Charles Kindleberger, who pointed out in one of his books that the pre-1914 economic system was not self-regulating as previously thought. Instead, it was the dominant financial power of Great Britain that played a key role in mitigating the problems of international cooperation caused by the operation of the gold standard. Britain was able to pursue this policy because it aligned with its own objectives, which required the stability of the system as a whole. Moreover, the other international units at the time were fully capable of dealing with Britain's dominant role. According to this interpretation, the instability and chaos that spread throughout the world in the 1930s were the result of the erosion of British hegemony and the decline of its economic power, as well as the absence of a new international power to assume the hegemonic role and thus lead the global economy[4]*.*

- ***America's Road to Hegemony:***

The American Navy began to contest the idea that Britain "rules the waves," a stance later justified by America's supposed "manifest destiny." World War I marked the first time the United States projected significant military power into Europe, transporting hundreds of thousands of troops across the Atlantic and highlighting its emergence as a formidable player on the international stage. The conflict also spurred America's inaugural diplomatic initiative to apply its principles in addressing Europe's international challenges. Woodrow Wilson's renowned Fourteen Points introduced American idealism into European geopolitics, bolstered by American military strength.

[1] "Understanding AMERICAN HEGEMONY.Pdf," accessed April 19, 2025, https://eprints.uad.ac.id/37467/1/Understanding%20AMERICAN%20HEGEMONY.pdf.

[2] "أنطونيو غرامشي حول الهيمنة الثقافية.. ما هي وكيف تعمل؟," accessed April 19, 2025, https://tadween.alhadath.ps/article/167041/أنطونيو-غرامشي-حول-الهيمنة-الثقافية-ما-هي-وكيف-تعمل؟.

[3] "The Rise of China: The International Hegemonic Stability and the Consequences of Chinese and American Power Strategies," n.d.

[4] Matthias Matthijs, "Hegemonic Leadership Is What States Make of It: Reading Kindleberger in Washington and Berlin," *Review of International Political Economy* 29, no. 2 (March 4, 2022): 371–98, https://doi.org/10.1080/09692290.2020.1813789.

From that point forward, Europe became increasingly the target of global power dynamics rather than a driving force in them. The following fifty years were characterized by the rivalry between the United States and the Soviet Union for global dominance. With the collapse of its rival, the United States found itself in an unparalleled position, becoming the first and only true global power. This American hegemony has led to a new international order that not only mimics but also embeds many characteristics of the American system abroad. Key elements include a collective security framework with integrated command and forces (such as NATO and the U.S.-Japan Security Treaty); regional economic partnerships and specialized global cooperative organizations (including the World Bank, IMF, and WTO); processes focused on consensus decision-making, which, despite being led by the United States, still emphasize collaboration; a preference for democratic participation in essential alliances; and an embryonic global constitutional and judicial framework (featuring institutions from the World Court to special tribunals for prosecuting Bosnian war crimes)[1]*. Although it can be argued that China, like all former aspiring hegemons, has a strong inclination to become a genuine hegemon.The current global landscape is no longer characterized as China's world or tianxia 天下*[2]*. America's ongoing insistence on establishing global dominance based on a universal standard of fundamental American values continues*[3]*.*

Figure2.1: *Degrees of Revisionism*

Source:*RAND*

[1] Helmut Schmidt and Zbigniew Brzezinski, "The Grand Chessboard: American Primacy and Its Geostrategic Imperatives," *Foreign Policy*, no. 110 (1998): 179, https://doi.org/10.2307/1149289.

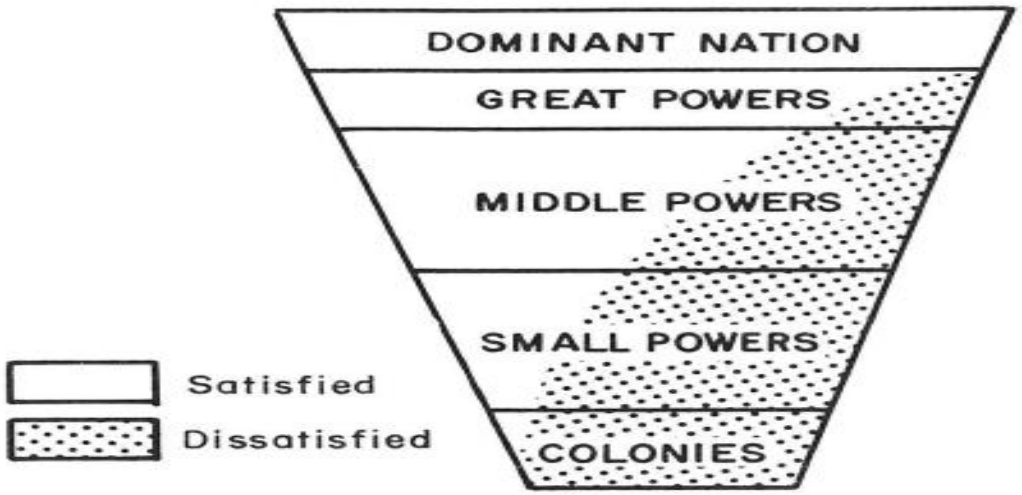
*天下 means "all under heaven" or "the world," traditionally referring to the entire realm or the known world under the emperor's rule in classical Chinese political philosophy.

[3] Jin Kai, *Rising China in a Changing World: Power Transitions and Global Leadership* (Springer, 2016).

A revisionist state, contrasted with status quo states that are content with the current system and its associated balances of power and influence—is a valuable concept for understanding the level of competitive intensity that China and Russia may bring to global politics. Revisionists aim for change, though the specifics of that change and the extent of their assertiveness can vary widely. It is crucial to note that hegemons blame revisionists, portraying them as embodiments of evil[1]*. Meanwhile, the United States often speaks one way but acts differently, a tendency that policymakers in other nations have frequently commented on regarding U.S. foreign policy. English speakers excel at disguising their self-serving national interests as if they were working toward the common good. This form of hypocrisy is a distinct and characteristic trait of the Anglo-Saxon mindset*[2]*.*

2.1.2.2 Sino-American rivalry through the lens of power transition theory:

Figure 2.2: *Hierarchical distribution of power in the international order*



Source: Organski

Organski categorized states into four primary groups based on their degree of ower and their level of satisfaction. This classification emphasizes that using power alone is inadequate for distinguishing the positions of states regarding influence. It is essential to consider both "power" and "contentment with the existing conditions in the international context." For instance, China is a powerful nation yet feels dissatisfied

[1] Michael Mazarr et al., *Understanding the Emerging Era of International Competition: Theoretical and Historical Perspectives* (RAND Corporation, 2018), https://doi.org/10.7249/RR2726.
[2] Mearsheimer, *The Tragedy of Great Power Politics*.

as it recognizes a disparity between its potential power capabilities and the amount of influence it holds in the current international system.

- ***China's Rise:***

"Greater China" is thus not simply an abstract concept. It is a rapidly growing cultural and economic reality and has begun to become a political one[1]*. however, china is not rising but returning; it is simply regaining the predominance it used to have*[2]*, pointing out that the Roman and the Chinese empires emerged almost simultaneously*[3]*. it is important to note that China has various means of influence and expansionism aimed at reshaping Western narratives to its favor.*

In this context, the literature on strategy both within and outside the United States is divided regarding the effects and implications of "Chinese growth" for American global hegemony. The debate revolves around two main schools of thought:
The first school, which supports the "Chinese threat theory"—sometimes referred to as the "dragon slayers"—argues that China, given its capabilities, can indeed pose a challenge to American hegemony. This view, which aligns with the "pessimistic realist paradigm" that has /long influenced U.S. foreign policy circles, maintains that it is necessary to take all possible measures to contain China before it reaches the level where it could compete with American power in managing international affairs. This is especially pertinent as warnings increase that if China continues to grow at its current pace, it will eventually become a hostile power .
The second school consists of those sometimes called the "panda huggers," who believe that China cannot present a significant challenge to American power, especially considering that Washington maintains more than major military commands spread across the globe—including in regions adjacent to China—and possesses the largest military budget in the world, which is unlikely to be surpassed in the near or medium term[4]*.The rapid integration and growth of China have significant repercussions not only on the United States but also on the rest of the world*[5]*.*
The power transition theory, which has been widely debated in both nations in recent years, influenced public discussions through the concept known as "Thucydides Trap". It refers to the historical pattern of a rising state challenging the ruling power's order — Sparta's challenge to Athens' or Germany's challenge to Britain's – which in both instances resulted in hegemonic and major war[6]

[1] Huntington, "The Clash of Civilizations and the Remaking of World Order."
[2] Kai, *Rising China in a Changing World*.
[3] Schmidt and Brzezinski, "The Grand Chessboard."
[4] "تأثير-الصعود-الصيني-على-النظام-الدولي-في-ظل-الهيمنة-الأمريكية (1)," n.d.
[5] "Arora.Pdf," accessed April 20, 2025, https://www.imf.org/external/pubs/ft/fandd/fre/2010/12/pdf/arora.pdf.
[6] Steven E Lobell, "Can the United States and China Escape the Thucydides Trap?," n.d.

Nations often justify their actions on the global stage by claiming they are aimed at maintaining or restoring the balance of power[1]*. Conversely, when a nation seeks to undermine the policies of another nation, it typically labels those actions as a threat to or a disruption of the balance of power. In the United States, the emergence of China is generally perceived as a threat to America's dominant position within the international system. Although the notion of inevitable Chinese economic and military growth leading to a relative decline in U.S. power is based on dubious assumptions and forecasts*[2]*.*

When a rising power threatens an established power, regardless of its intentions, it creates such structural tension that violent conflict becomes the norm. The United States and China, too, can avoid war only if they internalize two difficult truths: first, if they continue on their current trajectory, war between them in the coming decades is not just possible, but much more likely than many are willing to admit. Second, war is not inevitable—history shows that dominant great powers are capable of managing their relations with rivals. As George Santayana noted, only those who learn nothing from history are condemned to repeat it[3]*.*

The U.S. China rivalry is generally described as Cold War 2.0 The Cold War describes a struggle stemming from ideological disagreements, conducted through means that do not involve prolonged military engagement and typically without breaking off diplomatic ties[4]*. the contest between the United States and the Soviet Union represented the fulfillment of the geopoliticians' fondest theories: it pitted the world's leading maritime power, dominant over both the Atlantic and the Pacific Oceans, against the world's leading land power, paramount on the Eurasian heartland*[5]

The Cold War describes a struggle stemming from ideological disagreements, conducted through means that do not involve prolonged military engagement and typically without breaking off diplomatic ties. the contest between the United States and the Soviet Union represented the fulfillment of the geopoliticians' fondest theories: it pitted the world's leading maritime power, dominant over both the Atlantic and the Pacific Oceans, against the world's leading land power, paramount on the Eurasian heartland While the U.S.-China competitive rivalry is not exactly the same as Cold War 1.0, it is worthwhile to revisit and "dust off " the previous toolboxes and playbooks used by the United States during the Cold War[6]*. Some Chinese tactics—such as "united front" and disinformation operations, technological and other types of*

[1] Hans J Morgenthau, "Politics Among Nations The Struggle For Power And Peace," n.d.
[2] Lippert, Perthes, and Stiftung Wissenschaft Und Politik, "Strategic Rivalry between United States and China."
[3] Allison Graham, *Vers La Guerre: L'Amérique et La Chine Dans Le Piége de Thucydide* (Odile Jacob, n.d.).
[4] Michael W. Doyle, *Cold Peace: Avoiding the New Cold War* (Liveright Publishing, 2023).
[5] Schmidt and Brzezinski, "The Grand Chessboard."
[6] David Shambaugh, "China Is the Challenge of Our Time—and the United States Must Get to Grips with the Totality of the Competitive Challenge in All Its Dimensions.," n.d.

espionage, cultivating intelligence assets in the U.S. government, development of asymmetric weapons, global military deployments, cultivation of client states and proxies, and two-against-one "strategic triangle" maneuvering—were all staples of the USSR/CPSU, and our tactics for combatting them vis-à-vis China could benefit from drawing on earlier experiences and practices. In many real ways, the organization and behavior of the Chinese communist party-state remains a Soviet byproduct (I have always told my students: "to understand China, you need to understand the Soviet Union first")[1].

2.1.3 Rivalry Dimensions

2.1.3.1Economic Dimension:

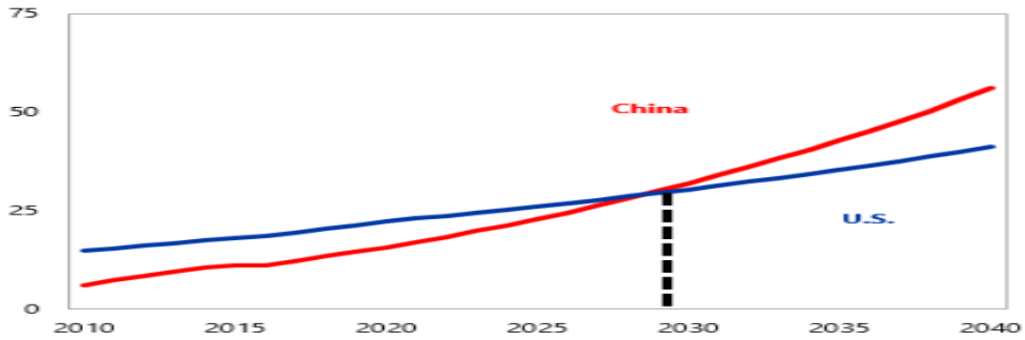
The United States differentiates between economic competition with nations that adhere to fair and free market principles and those that disregard such practices. "We will engage in competition with nations that share similar values, especially in areas where trade imbalances are present, while acknowledging that this competition is beneficial when countries maintain fair and reciprocal relationships. The United States will initiate enforcement measures when countries breach the rules to obtain an unfair advantage[2]*".*

The economic relationship between the U.S. and China can be categorized into three main areas: first, the relative scale of their economies, which is crucial for global geopolitics and is mainly influenced by the overall size and growth trajectory of each country's economy; second, the level of economic interdependence between the two nations, particularly through trade and investment; and third, the technological relationship, which has faced increasing challenges in recent years, especially due to the rise of dual-use technologies[3]*.*

[1] Shambaugh.
[2] "NSS-Final-12-18-2017-0905.Pdf," accessed March 1, 2025, https://trumpwhitehouse.archives.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf.
[3] "U.S. - China Relations for the 2030s," n.d.

Relative Economic Scale: *The economic power of a nation is a crucial factor in its power on the global political stage*[1].

Figure2.3: *China's GDP could overtake the United States by 2030*



Source: *IMF*

China puts into action its ambitious initiatives outlined in "Made in China 2025." This strategy is part of a series of programs designed to modernize the Chinese economy, aiming to circumvent the so-called "middle income trap" and transition to a "high-income economy" by creating its own products. From the viewpoint of the US economy, "Made in China 2025" seeks to alter the dynamics of global markets in essential sectors. China's industrial policy ultimately aims to cultivate not just "national" but also "global champions."It was inevitable that China would significantly outpace the United States in terms of economic strength. Naturally, forecasting economic developments for the next ten or twenty years is challenging; however, in light of the economic turmoil triggered by COVID-19, it appears increasingly probable that the United States and China will maintain a similar economic standing in the foreseeable future[2].

The Trade and Investment*: On the one hand, The United States has gained from greater economic integration with China. Despite a recent drop in trade between the two countries, the US sent $106 billion in goods and $57 billion in services to China in 2019. However, the situation is more complex than merely exports to China: American households and consumers have enjoyed lower prices on imported products from China. Companies have also reaped the benefits of affordable raw materials that have enhanced their competitiveness, while globally interconnected supply chains have*

[1] Morgenthau, "Politics Among Nations The Struggle For Power And Peace."
[2] "U.S. - China Relations for the 2030s."

increased efficiency and reduced production costs for American businesses. This has allowed US companies to expand and create jobs within the country[1].

On the other hand, China's non-liberal economic strategies and America protectionism do not automatically lead to an unavoidable separation[2]*.even with the higher tariffs imposed raised to 145%*[3] *The Chinese finance ministry stated, "Regardless of whether the U.S. persists in implementing increased tariffs, it will ultimately lack economic rationale and will be regarded as a joke in the history of the global economy*[4]*." Numerous academic and industry research efforts have demonstrated that the trade conflict has negatively impacted US GDP growth, welfare, and employment*[5].

2.1.3.2 Technological Dimension: The Quest for Global Technological Supremacy

Technology is, indeed, a crucial factor in influencing relationships between countries, it influences the Hierarchy in Global Relations. Major powers, especially, strive intensely to uphold their dominant position by leveraging their technological advantages[6]*.The rivalry over cutting-edge technology is likely to persist as a source of tension between the United States and China for many years, influenced by the effects of artificial intelligence, advanced biotechnology, quantum computing, and other technologies on economic and military strength*[7].

Scholars in the field of international relations have long noted a connection between significant technological advancements and the ascension or decline of great powers. Robert Gilpin highlighted that major technological breakthroughs enable new nations to attain political dominance, although, over time, these technological skills and creativity spread to other nations[8]*. When the Trump administration announced the resurgence of great power rivalry, it also underscored the technological aspect of this competition. The United States, it claimed, needed to maintain its "competitive advantage," particularly concerning "emerging technologies vital for economic*

[1] "The US-China Economic Relationship," n.d.
[2] "U.S. - China Relations for the 2030s."
[3] Anniek Bao, "China Strikes Back with 125% Tariffs on U.S. Goods as Trade War Intensifies," CNBC, April 11, 2025, https://www.cnbc.com/2025/04/11/china-strikes-back-with-125percent-tariffs-on-us-goods-starting-april-12.html.
[4] "国务院关于印发新一代人工智能发展规划的通知_科技_中国政府网," accessed April 23, 2025, https://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm.
[5] "The US-China Economic Relationship."
[6] Mohan Malik, "Technopolitics: How Technology Shapes Relations Among Nations," n.d.
[7] "U.S. - China Relations for the 2030s."
[8] Robert Gilpin and Jean M. Gilpin, *Global Political Economy: Understanding the International Economic Order* (Princeton: Princeton University Press, 2011).

prosperity and security[1]*." For Chinese leadership, the goal is to "catch up and surpass" Western nations in the realm of advanced technology. In two addresses in 2013, Chinese President Xi Jinping emphasized this as a critical aspect of global politics. He asserted that a significant reason Western nations were able to dominate the world in modern history was due to their possession of advanced technology. He further stated, "On the international stage, lacking core technological advantages means lacking political influence." Since China lagged behind Western countries, especially the United States, in crucial technologies, Xi*[2] *believed this necessitated an "asymmetrical strategy of catching up and overtaking" aimed at establishing China as a technological leader by 2050.*

The U.S.-China competition over emerging technologies is a critical and multifaceted strategic rivalry shaping the global technological landscape and international power balance.

- ***5G : The opening shot in the struggle***

Table 2.1: *Status of the 5G Security Competition Between China and the United States*

5G Architecture	Huawei	United States
Network infrastructure	A_M	D_M
Mobile devices	D_M	A_T
Mobile device OS	D_M, D_T	A_M, A_T
Microchip design	D_T	A_M, A_T
Microchip foundry	D_M, D_T	D_T

Source: *RAND*

Dark green indicates that the country has a strong advantage in that area. Light green indicates that the country has a slight advantage in that area. Yellow indicates that the country relies on foreign third-party suppliers in that area because it lags in that area but has access to products made by foreign suppliers,The United States, under Trump, aims to undermine China both economically and technologically. Therefore, it is not a coincidence that Huawei is at the forefront of the conflict; Michael Pillsbury from the Hudson Institute, an advisor to the Trump administration, expressed it succinctly, saying, "The Americans are not going to relinquish global technological dominance without a confrontation, and the indictment of Huawei marks the first move in that

[1] "NSS-Final-12-18-2017-0905.Pdf."

[2] "Xi's Full Speech on Science & Tech on May 28," accessed May 13, 2025, https://www.pekingnology.com/p/xi-jinpings-speech-on-science-and.

battle." From the Trump administration's perspective, the issue with Huawei revolves around who will dominate the information systems in upcoming 5G networks. This is perceived as a zero-sum competition. In May 2019, the US Department of Commerce added the company to its so-called "Entity List" after President Xi Jinping of China met with Trump at the end of June 2019. The intense lobbying by the US semiconductor sector did not escape the notice of the Trump administration. These companies, responding to Beijing's suggestion that China would also create a list of unreliable suppliers, were worried they could lose access to the Chinese market, which they have pursued for years without achieving a satisfactory resolution[1]

2.2 AI Arms Race: How the Two Superpowers Approach Technological Innovation

AI arms race term introduce a securitisation of narrative – framing relations as an issue of national security and seeing the other state as an external threat of sufficient magnitude to require adoption of exceptional measures—defining an armsrace, as it can often be confused with military competition[2]*. What makes this AI race particularly compelling is the stark contrast in how the two superpowers approach technological innovation. The Final Report issued by the US National Security Commission on Artificial Intelligence in 2021 characterizes China as a "competitor," if not a frontrunner, in AI advancements when compared to the United States. The report establishes a fundamental understanding of the US-China AI rivalry: ". . . we must prevail in the AI contest that is heightening strategic competition with China. The plans, resources, and progress of China should be a source of concern for all Americans*[3]*.*

2.2.1 Technopolitical Spheres of the AI Arms Race

the technopolitical spheres refers to the areas where digital tools are used for the to empower oneself and influence of other in the race for AI supremacy, which can be seen in the industry, innovation, and deployment.

2.1.1 .1Development:

The competition for leading AI technologies hinges on effectively integrating key technologies and foundational elements such as advanced microchips; computational resources, like cloud computing services; well-structured algorithmic models; and extensive, rich datasets for training these models. However, there remains a disparity between China's AI development and that of more developed countries, as it is still

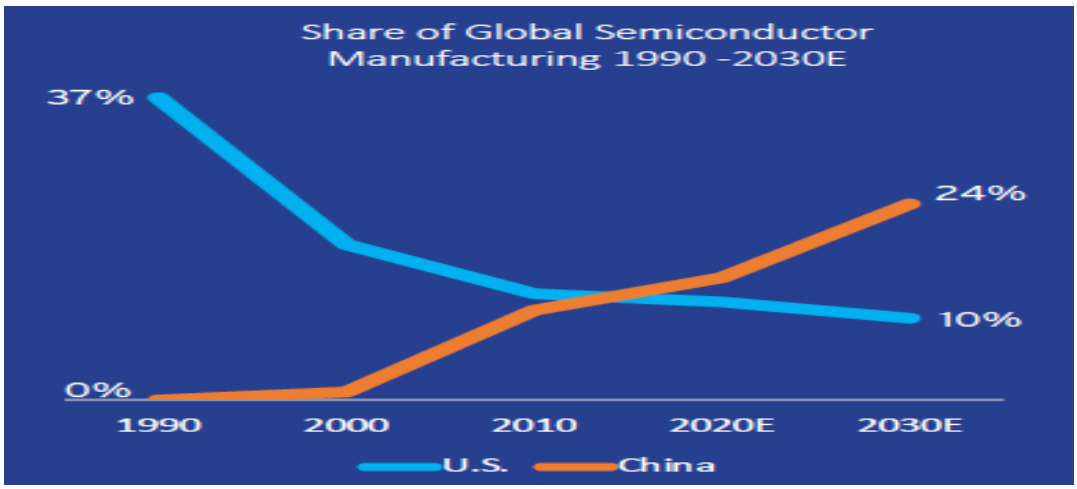
[1] Daniel Gonzales et al., "Securing 5G: A Way Forward in the U.S. and China Security Competition," n.d.
[2] Vanja Roković, "Back to the Future: The US-China AI Arms Race?," 2024, 97–123, https://doi.org/10.18485/iipe_dijalozi_kina.2024.4.1.ch5.
[3] Jieruo Li, "Artificial Intelligence Technology and China's Defense System," n.d.

lacking in significant original contributions in fundamental theories, core algorithms, critical hardware, high-performance chips, important products and systems, basic materials, components, software, and interfacese[1]

Semiconductor industry:

Advanced semiconductors are key to AI capabilities due to their role in accelerating processing speeds and harnessing the computational power .

Figure2.4: *Global Semiconductor Manufacturing 1990/2030*



Source: *Semiconductor Industry Association*

It is essential to note that the U.S. was once the leading manufacturer of chips, but over time it has diminished in scale; its factories accounted for 37% of global chip production in 1990, which fell to 19% by 2000 and 13% by 2010. These semiconductors necessitate specialized factories that require substantial financial investment to operate. The U.S. depends on Taiwan for high-tech chips, while companies like NVIDIA and AMD are leaders in the design of advanced chips, which are primarily produced by TSMC, the most advanced semiconductor manufacturer responsible for over 90% of cutting-edge chip production. Consequently, the political tensions among China, the U.S., and Taiwan raise concerns about potentially losing Taiwan, viewed by many U.S. policymakers as a representation of liberalism and democracy, especially since China maintains its claim of sovereignty over Taiwan and calls for reunification, whether through peaceful means or force. This situation could severely threaten the supply of these chips to the U.S. The United States has aimed to safeguard its

[1] "国务院关于印发新一代人工智能发展规划的通知_科技_中国政府网."

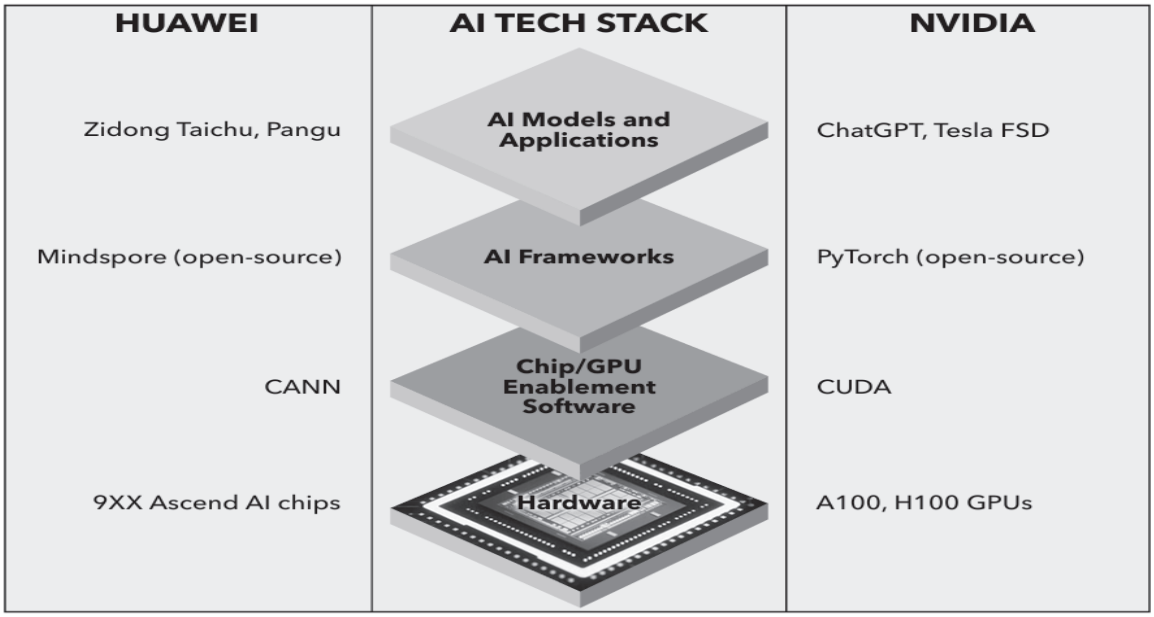
technological edge[1]*. Meanwhile, China has been heavily investing in its own semiconductor sector to enhance its AI capabilities and reduce reliance on global supply chains, promoting self-sufficiency as part of a broader strategy to achieve AI dominance*[2]*.*

NVIDIA and AMD lead chip design, with TSMC handling manufacturing, while the U.S. and its allies strive to preserve their dominance through measures like export controls to undermine China's access to high-end chips. Historically, the United States has implemented export restrictions during the Cold War and the post-Cold War period, often withholding its most advanced technologies even from close allies. Beijing should recognize this situation as a reality rather than an unreasonable or unjust attack on China's national development. Although China has made substantial investments in its domestic semiconductor sector via the government-backed Integrated Circuit Industry Investment Fund (often referred to as "the Big Fund"), which has generated $47.5 billion to support the industry, it continues to encounter significant challenges in surpassing the United States. China has made progress in narrowing the gap in cutting-edge GPU semiconductors essential for AI training. Huawei's Ascend 910B AI chip reportedly achieves up to 80% of the performance of NVIDIA's products. In August 2024, the Wall Street Journal indicated that Huawei is nearing the release of a new AI chip, the Ascend 910C, which it claims rivals NVIDIA's technology. Nevertheless, Huawei has experienced production delays with these chips, and additional U.S. restrictions might hinder its access to the necessary machine components and memory chips for its AI hardware[3]*.*

The United States' apprehensions regarding artificial intelligence and China have primarily concentrated on the accessibility of advanced semiconductors. However, similar to many cutting-edge technologies, AI is driven by a "stack" that includes a combination of hardware, software, and services. Policymakers have given significantly less attention to the other components of the AI stack. NVIDIA stands out in the AI industry not just because of its GPUs, but also due to its CUDA software, which, as noted, "In 2006, the creation of our CUDA programming model and Tesla GPU platform opened up the parallel-processing capabilities of the GPU to general-purpose computing." Referred to as its "secret sauce" or "moat," CUDA is NVIDIA's proprietary "AI software ecosystem" that enables developers to leverage the parallel computing capabilities of NVIDIA's GPUs for AI development[4]*.*

[1] "Executive Order on Maintaining American Leadership in Artificial Intelligence – The White House," accessed April 27, 2025, https://trumpwhitehouse.archives.gov/presidential-actions/executive-order-maintaining-american-leadership-artificial-intelligence/.
[2] "U.S.-China Competition in Emerging Technologies," n.d.
[3] "U.S.-China Competition in Emerging Technologies."
[4] "U.S.-China Competition in Emerging Technologies."

Figure 2.5: *A Comparison of Nvidia and Huawei's AI teck Stacks*



Source: *uscc.gov*

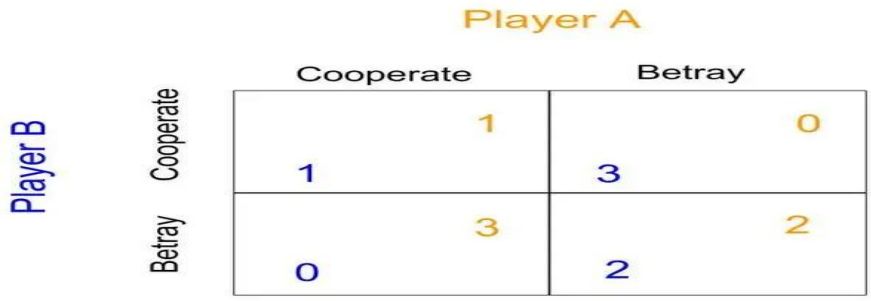
The diagram illustrates the various software technologies (middle to upper layers) that are either directly managed or optimized for the chip-based hardware from NVIDIA or Huawei (bottom layer). CANN and CUDA are the proprietary software frameworks from Huawei and NVIDIA, respectively, needed to harness the parallel processing capabilities of their chips. MindSpore (Huawei) and PyTorch (PyTorch Foundation) are open-source AI frameworks that either depend on or are best optimized for CANN and CUDA, respectively. Lastly, Pangu (Huawei) and ChatGPT (OpenAI) serve as examples of technologies developed or improved upon using these AI frameworks.

In the immediate future, Huawei is still lagging behind NVIDIA and its comprehensive AI hardware/software "stack." NVIDIA has created 600 AI models, and currently, four million developers utilize the CUDA software for AI training. Chinese programmers have raised concerns regarding Huawei's CANN, citing widespread issues related to bugs, software glitches, and general shortcomings compared to NVIDIA's CUDA. Huawei aims not only to compete in advanced semiconductors but also to create its own "flywheel" to challenge NVIDIA's dominance. Similar to NVIDIA, Huawei's AI "tech stack" is built upon its hardware, specifically the Ascend family of AI chips, with a CUDA-like software layer known as CANN situated above it. China is continuously exploring both legal and illegal avenues to obtain semiconductor manufacturing equipment. By itself, China is unlikely to achieve significant advancements in high-end AI chips, especially with current technology. SMIC and Yangtze Memory Technologies Corp (YMTC) remain reliant on Western equipment for the production of more

advanced semiconductors. Unless China can overcome the "yield" challenges associated with using outdated equipment to manufacture cutting-edge semiconductors, it is improbable that it will produce AI-quality chips in the quantities required for the anticipated massive demand in AI[1].

While the world's most advanced semiconductors are crucial for progress in AI, "legacy" semiconductors play a vital role in a wide array of other technologies. Legacy chips are ubiquitous and necessary, as they can be found in nearly every electronic device, including automobiles, military jets, drones, medical devices, smartphones, computers, industrial machinery, scientific equipment, communication devices, sensors, and beyond. Legacy chips have served as a significant technological asset supporting Russia's conflict with Ukraine. A vast network of unlawful exporters based in China and various other nations has reportedly sent about $4 billion worth of prohibited integrated circuits to Russia since the onset of the invasion, contributing to "China's rise as the leading chip supplier to Russia."At present, the legacy semiconductor supply chain is relatively varied, yet China already holds a significant position within it. By the end of 2023, China represented 31percent of the worldwide legacy chip production, and it is expected that in a few years, it will become the top global producer of 200 mm to 300 mm semiconductors. If history is any indicator, once China's extensive new semiconductor manufacturing capacity becomes operational, the country might inundate the global market with inexpensive legacy semiconductors, causing prices to decline[2].

Figure2.6: *Prisoner's Dilemma Game Matrix*



Source: Library Fiveable

In the semiconductor competition modeled as a game between Player A (the U.S.) and Player B (China), both players face strategic choices shaped by their interdependence

[1] "U.S.-China Competition in Emerging Technologies."
[2] "U.S.-China Competition in Emerging Technologies."

and conflicting interests. Player A (the U.S.) opts for partial decoupling by imposing export controls and restricting advanced chip and equipment sales to Player B (China), aiming to slow China's technological rise and protect its own leadership. Player B (China), in response, pursues a self-supporting strategy focused on developing domestic semiconductor production and innovation to reduce reliance on imports.
This interaction creates a repeated game dynamic characterized by tit-for-tat and trigger strategies, where each player's moves influence the other's future actions. If the cost for China to produce intermediate semiconductor inputs is relatively low, China will intensify self-reliance efforts, while the U.S. maintains restrictions to contain China's progress. Conversely, if production costs are high and the technology gap remains large, China may continue importing critical components, and the U.S. may lean toward maintaining freer trade.

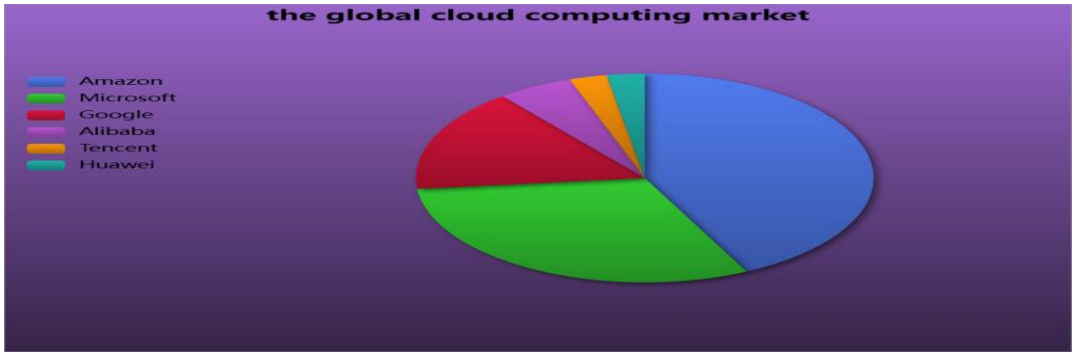
- ***Computing Power:***

Specialists evaluate that a key reason for the position of U.S.-based firms—such as OpenAI, Google, and Meta—as leading entities in the worldwide AI arena is their advantageous access to computing resources. In comparison to their U.S. counterparts, various Chinese AI companies face challenges in securing funding and computational power. China introduced a three-year strategic plan[1].

- ***Cloud Computing:***

One essential component of computing is cloud computing. Cloud computing provides access to computing power for a broader user base from a distance.

Figure2.7: *The Global Cloud Computing market*



Source: *Author's own elaboration using AI*

[1] "U.S.-China Competition in Emerging Technologies."

U.S. companies are currently at the forefront of the global cloud computing sector, with Amazon holding a 32 percent share, Microsoft at 23 percent, and Google commanding 12 percent, together accounting for 67 percent of the global market. China has the second-largest cloud market in the world, but its top three cloud firms represent only about 8 percent of the global market share, with Alibaba leading at 4 percent, followed by Tencent and Huawei, each with 2 percent.

- ***Data storage:***

China has translated big data most commonly as 大数据 (da shuju)—a term that not only stays true to the literal word-for-word translation of the English term, but retains the same meaning in the Chinese system.

The role of big data storage in the broader big data value chain is changing and has become a crucial aspect of the rivalry[1]*. By 2025, it is expected that China will produce more data than the United States, generating 48.6 zettabytes compared to an anticipated 30.6 zettabytes for the United States. To manage and store this volume of data in both countries will necessitate a significant amount of physical infrastructure and energy. In response to these challenges, China is working on expanding its data storage capabilities while also improving the electrical infrastructure layout for data centers. This development aligns with the government's initiative, which considers cloud technology vital to China's national security, technological advancement, and economic objectives. Prominent governmental bodies such as the State Council and MIIT have emphasized the importance of cloud adoption as a major aspect of strategic "five-year plans" aimed at guiding the future of technology and the economy.*

China is altering a significant portion of its domestic development strategy to establish the infrastructure necessary for computing, data center capacity, and electrical power needed for advanced technologies like AI. Current projections suggest that China's domestic data centers currently use approximately 200 terawatt hours (TWh) of electricity, expected to increase to about 300 TWh by 2025 and 380 TWh by 2030. Access to computing through cloud services complicates and globalizes the U.S.-China competition in AI. Cloud computing serves as an efficient means to bypass export restrictions on advanced chips, as it provides remote access to the computing power offered by these chips. Since the chips themselves are not exported as part of a cloud service, export controls may not apply at all. For instance, Chinese firms affected by

[1] Martin Strohbach et al., "Big Data Storage," in *New Horizons for a Data-Driven Economy*, ed. José María Cavanillas, Edward Curry, and Wolfgang Wahlster (Cham: Springer International Publishing, 2016), 119–41, https://doi.org/10.1007/978-3-319-21569-3_7.

U.S. sanctions have found ways to access restricted U.S. AI technology through third-party cloud service providers and rental agreements[1].

The United States has started to investigate methods to counter China's utilization of cloud computing for gaining access to AI technologies, but the current solutions face considerable shortcomings. To begin with, preventing Chinese firms from establishing AI infrastructure outside China and using it there (or making it accessible within China) entails existing export controls on advanced semiconductors that also apply to Chinese entities operating abroad. Additionally, "U.S. persons" authority would restrict U.S. cloud service providers from knowingly offering services that contribute to certain identified national security threats, including aiding Chinese entities in obtaining access to advanced semiconductor technology. Furthermore, on a case-by-case basis, the U.S. government seems to leverage various tools to encourage domestic tech providers and their potential foreign partners—who wish to access top-tier semiconductor technology—to adopt measures that exclude Chinese entities. Lastly, the U.S. has introduced "know your customer" regulations and reporting obligations for domestic cloud providers when their services are utilized by foreign entities for training large AI models. However, each of these regulations or proposals has limitations regarding scope, coverage, and comprehensiveness—for example, they may only apply to Chinese companies, only to U.S. firms, or only on a case-by-case basis. Currently, there is no all-encompassing authority similar to export controls for broadly limiting access to cloud services that depend on U.S. technology[2].

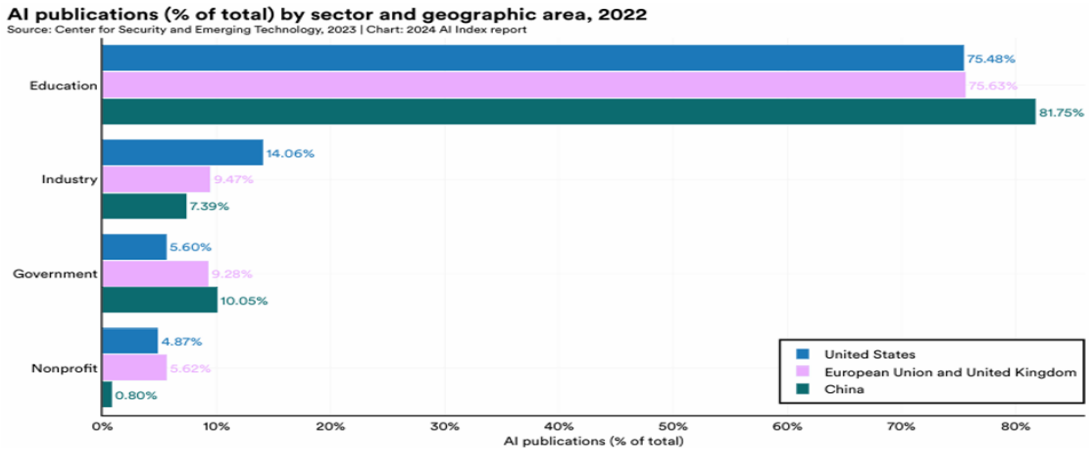
[1] "U.S.-China Competition in Emerging Technologies."
[2] "U.S.-China Competition in Emerging Technologies."

2.2.1.2 Innovation and Development:

- ***AI academia :***

The basis of technological knowledge is built upon scientific research.

Figure2.8: *AI publication by sector and geographic area*



Source: *Artificial Intelligence Index Report 2024, Stanford University (2024).*

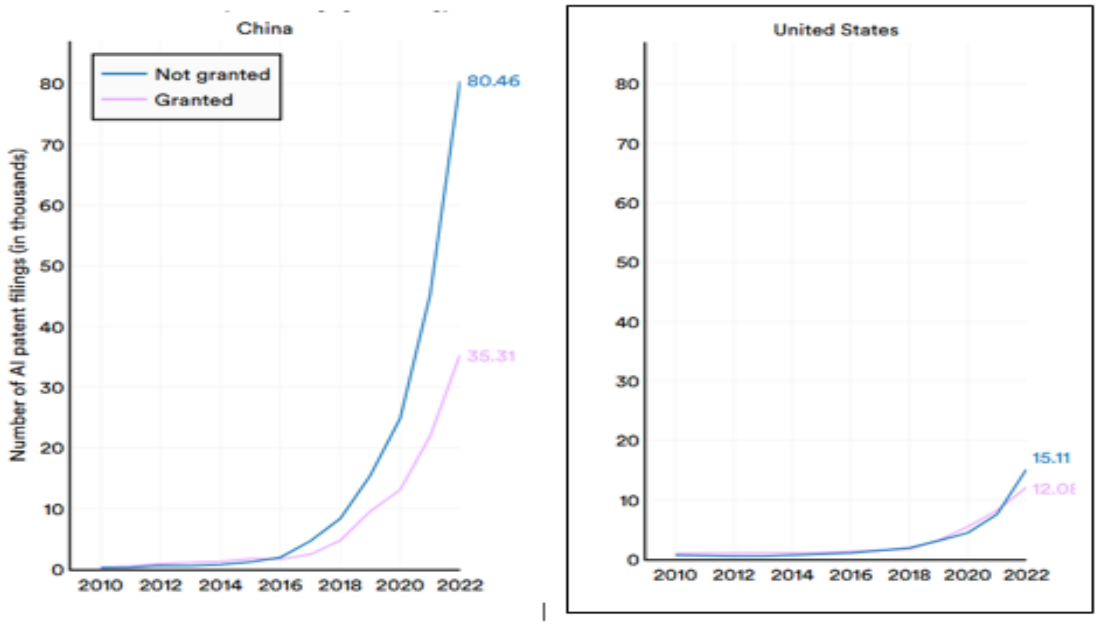
China has generated a greater volume of scholarly research in AI compared to the U.S. However, in 2020, China surpassed the U.S. for the first time in the percentage of citations for AI-related jornals. "Citations assess the novelty and impact of the ideas you present — it's not merely about having a large number of researchers producing publications."

- ***AI Talent and Patent:***

According to a survey, there are about 1.9 million AI engineers worldwide, among whom one million are working in the United States, and only 50,000 work in China.The U.S. leads in AI talent due to the research ecosystem which attract tech talents, tech companies like Google, Open AI, Microsoft, Meta offer high-paying jobs, while the United States has historically benefited from Immigration policy due to the openess policy and freedom of information. In addition to U.S. support for higher education in STEM fields, and incentives for startups and corporations that push the boundaries of AI technology. By fostering a climate of innovation, as a longterm tradition, the United States lays great emphasis on basic research studies , leaving all others far behind it in human resources and intellectual resources[1]

[1] "Wang-Chen-2018-Rising-Sino-u-s-Competition-in-Artificial-Intelligence-1," n.d.

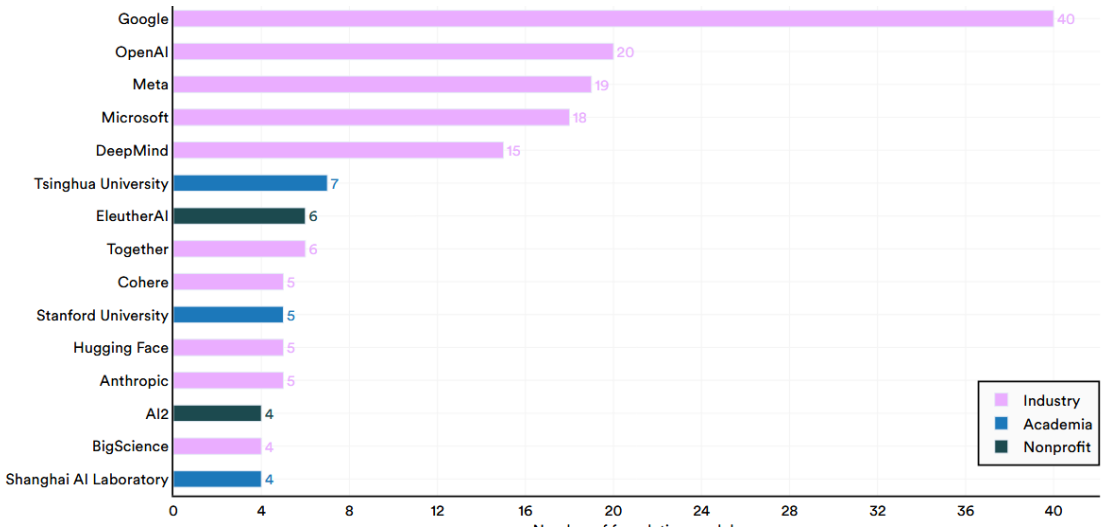
Figure2.9: *AI patents by application status by geographic area, 2010–22*



Source: *Artificial Intelligence Index Report 2024, Stanford University (2024).*

China excels in AI patent filings, as illustrated in the figure. This substantial volume of AI patents stems from the principle of prioritizing "quantity over quality," as the Chinese government mandates certain universities to require students to file patents for graduation. Additionally, many patents in China are utility models, which tend to be less expensive and simpler to obtain, whereas the U.S. concentrates on costly models and innovative, high-impact inventions.

Fig2.10:*Number of foundation models*[*1] *by organization, 2019–23*



Source: *Artificial Intelligence Index Report 2024, Stanford University (2024).*

AI giants like Deep Mind and Open AI in the U.S. and Tencent, Alibaba and Baidu in China, drive AI innovation and influence international policies[2] *Even the individuals like Elon Musk CEO of Tesla and SpaceX, has been a vocal advocate for both the advancement and cautious development of AI, he co-founded OPENAI,, it is crucial to point out that recently Musk is trying to policing himself in the federal government*[3] *The reason American firms leads in terms of foundational models comes down to a mix of historical, structural, and cultural factors, the early lead in AI and the lead in AI workforce and labs; AI companies had begun springing up in the United States since 1991, while the first Chinese AI company* [4]*was set up only in 1996. and the open source models contrary to chinese firms often keep models closed or proprietary.*

[*]A foundation model is similar to a general-purpose brain, which is a large AI model usually trained using billions or even trillions of data that can be applied for many tasks like chatbots.

[2] Boniface, *Géopolitique de l'intelligence artificielle*.
[3] *Elon Musk at the White House: FULL NEWS CONFERENCE*, 2025, https://www.youtube.com/watch?v=ThjwjSNzye0.
[4] "AI in China: Sketchy Prehistories," accessed May 13, 2025, https://dsprojects.lib.cuhk.edu.hk/en/ai-in-china-sketchy-prehistories/.

- ***Generative AI:***

The third aspect of AI rivalry is the quality of generative AI models. Generative AI models can transform algorithms into various forms of content, including text, images, audio, video, and code. While evaluating AI models "is an art, not a science ... making direct comparisons between Chinese models and global frontrunners challenging," most experts maintain that the United States has a current advantage over China in this area. Chinese companies are making dedicated efforts to develop generative AI models that match the sophistication of those produced by U.S. firms. The AI development environment in China is varied, with around 50 Chinese companies working on AI models as of June 2024, unlike the smaller group of major companies in the United States that concentrate on creating models like those from OpenAI, Google, and others. With the advancement of cutting-edge models and the upcoming release of models like GPT-5, analysts claim that benchmarking continues to be a dynamic challenge, which may also make it difficult for Chinese AI firms to establish metrics for evaluating their own capabilities.Even though the US currently leads in generative AI, China's introduction of the "AI+" initiative demonstrates its ability to adopt a long-term perspective, a challenge that Western countries frequently face. This approach might allow China to narrow the disparity and potentially even exceed the US in AI advancements, thus raising the stakes of this competition to unprecedented levels[1].

As the U.S. and China vie for dominance in AI technology, concerns have emerged regarding whether open source AI models might be granting Chinese companies access to advanced AI capabilities that they might not otherwise possess, enabling them to catch up to the U.S. more swiftly. The discussion around open versus closed source models is highly active within the industry, apart from the issues surrounding China's access to such technology. Proponents of open source models argue that they foster quicker innovation by allowing a broader audience to modify them, improve upon them, and link them with third-party software and hardware. Open model supporters further claim that these models diminish market concentration; enhance transparency for evaluating biases, data quality, and security risks; and generate more societal benefits by broadening technology access. On the other hand, advocates for closed source models contend that these models are better equipped to safeguard safety and thwart misuse, ensure faster development timelines, and aid businesses in maintaining a competitive edge in bringing their innovations to market. In the context of the U.S.-China technology rivalry, however, a significant distinction arises: open models provide Chinese and Chinese AI firms access to crucial U.S. AI technology and

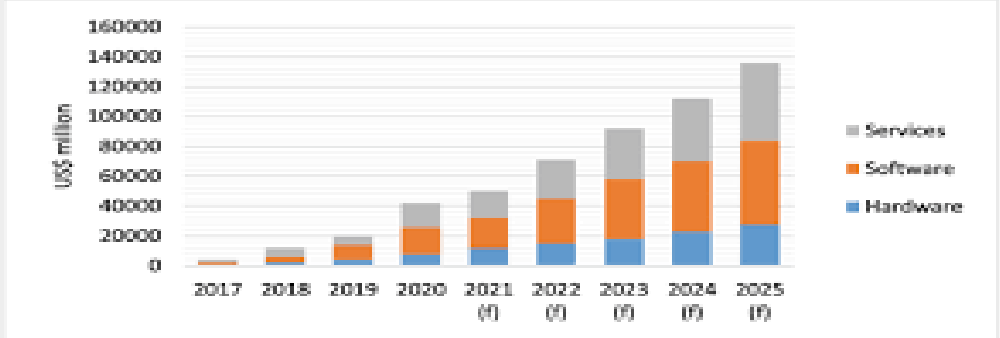
[1] "U.S.-China Competition in Emerging Technologies."

simplify the process for Chinese companies to build upon U.S. innovations. In July 2024, OpenAI, a closed model, restricted China's access to its services. Such a step wouldn't have been feasible with an open model; open models inherently remain accessible for Chinese actors to utilize, investigate, learn from, and expand upon. Indeed, early advancements in China's AI models have been grounded in U.S. technology—as noted by the New York Times in February 2024, "Even as [China] races to build generative A.I., Chinese companies are relying almost entirely on underlying [open model] systems from the United States." At the World Artificial Intelligence Conference in Shanghai in July 2024, Chinese entities presented AI models they claimed could compete with leading U.S. models. During the conference, "a dozen technologists and researchers at Chinese tech firms stated that open-source technologies were a crucial factor in the rapid progress of China's A.I. development. They viewed open-source A.I. as an avenue for the country to take the lead." The U.S.-China race in AI technology hinges on who can gather and assemble expansive, high-quality datasets and create economic incentives and frameworks for data sharing. Access to proprietary data across various sectors is becoming an increasingly vital source of competitive advantage, as superior outcomes can be achieved with more relevant, real-world data used to train the AI models, significantly impacting the pace and cycle of innovation. With the growing significance of data to governments, corporations, and future technologies like generative AI and large models, data is rapidly becoming the "new oil" that fuels both AI and the global economy[1].

- ***AI investments:***

China's approach is marked by centralized planning, where direct state investment is directed toward particular AI initiatives.

Fig2.11: *China Government AI investment*

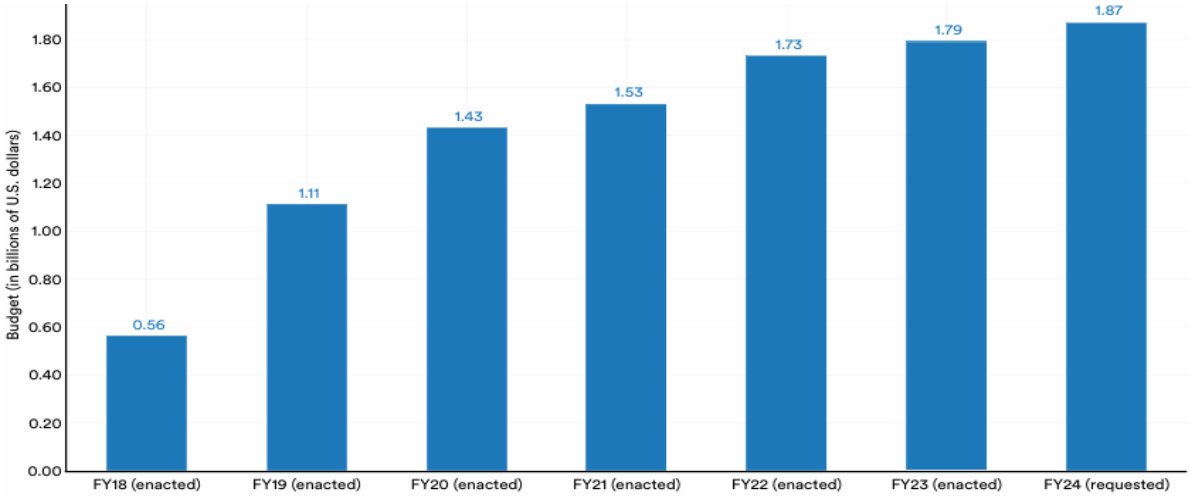


Source : *ResearchGate*

[1] "U.S.-China Competition in Emerging Technologies."

In terms of artificial intelligence projects, $14 billion is planned to be spent on projects by China, which is an increase of nearly 50% in just five years.

Fig. 2.12: *U.S. Federal NITRD budget for AI, FY 2018/24*

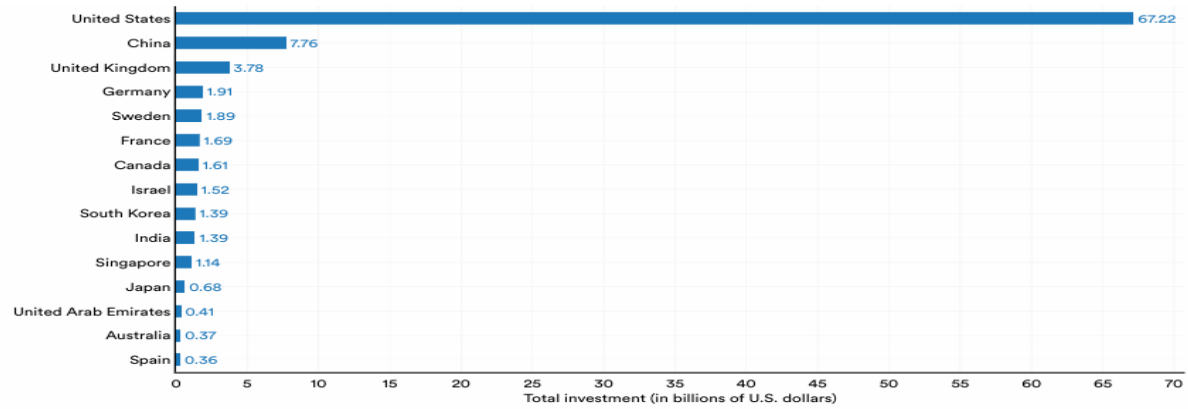


Source: *Artificial Intelligence Index Report 2024, Stanford University (2024).*

While in the U.S. more than 18 billions dollars has already spent during fiscal year 2024. This huge investment indicates that the U.S. can never feel entirely secure in a world of competing units[1]*, the security dilemma framework may provide an important lens for those in the Chinese and US governments who wish to see the development of artificial intelligence as a force for good.They are driven toward acquiring more and more power for themselves using AI capabilities.*

[1] Nicholas J. Wheeler, "`To Put Oneself into the Other Fellow's Place': John Herz, the Security Dilemma and the Nuclear Age," *International Relations* 22, no. 4 (December 2008): 493–509, https://doi.org/10.1177/0047117808097313.

Fig. 2.13: *Private investment in AI by geographic area, 2023*



Source: Artificial Intelligence Index Report 2024, Stanford University (2024).

In comparison, the US has mainly depended on private companies to propel AI progress. Numerous technologies crucial for national security operations are owned by private companies. The Department of Defense and various other agencies will forge strategic collaborations with U.S. firms to better align private sector R&D efforts with key national security needs. there are many differences in AI development strategies between them, showing the traditional differences between the industrial policies of both countries. In general, the United States encourages the full participation of all actors including businesses, academics, policy makers, consumer organizations, and other representatives of the civil society; China, in contrast, places AI development within its longstanding tradition of centrally-planned engineering

2.2.1.2. Assessment index for international competitiveness of AI industry

Table 2.2: *Assessment index for international competitiveness of AI industry*

Secondary index	Tertiary index	China	USA
Infrastructure	Number of cellular mobile telephones (millions)	1605	404.49
	Number of fixed or pipeline broadband access (millions)	731.18	130.15
	Cloud computing industry score index	43.7	82
	Large-scale data center share of the world's total	8%	44%
Human resources	Index of skilled graduates	59.1	71.2
	Total number of AI professionals	18232	28536
	Number of AI talent	977	5158
	Active citizens' ability to use digital technologies	61	71.2
Intellectual resources	Number of AI patents (PCT)	2568	10892
	Number of AI research paper output	369588	327034
	Share of the world's total in the number of AI research paper output institutions	5%	43%
	Number of colleges and universities with AI majors	20	168
Capital resources	Percentage of GDP for the number of domestic credit to private sectors	155.1	190.2
	Venture capital availability index	57	70.6
	Private AI investments share of the world's total	60%	29.1%
	Number of AI unicorns	12	16
Demand	GDP (billion USD)	13610	20540
	PLI (OECD = 100)	62	114
	Complexity index of consumer	58.2	68.8
	Consumer's confidence in AI	87	53
	Number of AI companies	1011	2028
Corporate strategy/ competitors	Professional management	59	78.9
	Salary-productivity relationship	60.5	71.1
	Percentage of GDP for R&D costs	2.1%	2.7%
	AI companies embracing disruptive ideas	53.8	68.1
	Competition distortion caused by subsidies	51.7	58.3
Policies and regulations	Number of AI policies	6	5
	Adaptability of legal frameworks to digital	59.5	78
	Business models	58.3	
	Patent protection	57.9	78.3
	Government long-term vision		66.2
Opportunities	International invention cooperation index	19.7	100
	Scale of digital economy (billion USD)	4729	12340.8
	5G patents share of the world's total	34%	14%

Source is IMF, OCED, and Statista.

Source : IMF, OECDand Statista

Calculation of the mean and standard deviation for each indicator. The importance of Mean and Standard Deviation in Competitive analysis reveals in mean ability to to provide an overall view of the performance of each country in each indicator, while the standard deviation measures the variability of the data around the mean, indicating the stability of each country's performance ; if the standard deviation is low, the

peformance is stable and consistent but if the standard deviation is high, the performance is volatile and inconsistent, which may negatively affect competitiveness[1].

The following formulas where used to calculation process :

Mean (μ)=n∑xi

Where:

- *∑xi\sum x_i∑xi = sum of all values in the dataset,*
- *nnn = total number of values.*

Standard Deviation σ=N∑(xi−μ)2

Where:

- *σ\sigmaσ = standard deviation of the population,*
- *xix_ixi = each individual value,*
- *μ\muμ = mean of the population,*
- *NNN = total number of data points.*

1. *Infrastructure :*

Indicator	*China*	*USA*
Mean	*596,97*	*165 ,16*
Standard Deviation	*649,45*	*141,51*

   - *China has a higher mean due to its vast number of mobile and broadband users, but the high standard deviation indicates uneven distribution and quality of infrastructure.*
   - *The USA has a more stable and evenly distributed infrastructure network*

2. *Human Resources :*

[1] Tianyu Dong and Lingxing Meng, "Assessment of International Competitiveness of AI Industry Based on Positive and Negative Ideal Points Weighting Method," ed. Sang-Bing Tsai, *Mobile Information Systems* 2021 (September 25, 2021): 1–9, https://doi.org/10.1155/2021/9119262.

Indicator	*China*	*USA*
Mean	*4832.28*	*8459.10*
Standard Deviation	*7745.39*	*11775.96*

- *The USA outperforms in AI talent numbers, but its high standard deviation suggests inequality in talent distribution across different regions .*
- *China has a lower mean but more consistency in human resource availability.*

3. *Intellectual Resources :*

Indicator	*China*	*USA*
Mean	*93045.25*	*84534.25*
Standard Deviation	*159665.44*	*140076.54*

- *China has slightly higher mean, reflecting strong AI research output, but the higher standard deviation suggests inconsistency in research quality.*
- *The USA has a similar performance but a more stable research output distribution.*

4. *Capital Resources :*

Indicator	*China*	*USA*
Mean	*71.03*	*76.48*

Standard Deviation	*52.13*	*68.68*

- *China has heavily relies on investment, but there is significant variation due to government intervention.*
- *The USA has high investment levels but also experiences fluctuations between public and private sectors*

5. *AI Demand :*

Indicator	*China*	*USA*
Mean	*2965.64*	*4560.76*
Standard Deviation	*5334.68*	*8025.24*

- *AI demand in China is increasing but unstable due to economic and regulatory factors*
- *The USA has a much higher demand but experiences extreme fluctutions, indicating uncertainty in future market stability*

6. *Corporate strategy and competition :*

Indicator	*China*	*USA*
Mean	*45.42*	*55.82*
Standard Deviation	*21.90*	*27.37*

- *China has a strong strategy but fluctuates due to government influence.*

- *The USA has a more stable system, but intense competition leads to performance variations among companies.*

7. *Policies and Regulations :*

Indicator	*China*	*USA*
Mean	*45.43*	*78.45*
Standard Deviation	*22.77*	*0.45*

- *China has inconsistent policies that impact AI development.*
- *The USA has a stable and clear policies that support sustainable growth.*

8. *Opportunities :*

Indicator	*China*	*USA*
Mean	*1593.90*	*4174.00*
Standard Deviation	*2216.15*	*5822.42*

- *China has significant potential but struggles to fully utilize AI opportunities.*
- *The USA has a higher mean but extreme disparities in opportunity distribution across sectors.*

2.2.1.3 Deployment:

- ***Military Sphere:***

In the post-Cold War era, with national security concerns and economic influences guiding numerous actions, attaining military superiority continues to be the highest priority[1]. An analysis of various models regarding the defense budget of the People's Republic of China (PRC) suggests that Beijing's actual spending may exceed its announced public defense budget by 40% to 90%, potentially resulting in total defense expenditures ranging from approximately $330 billion to $450 billion for 2024. Despite the significant disparity between China's and the US's defense budgets, China's military spending has increased tenfold from 1991 to 2019, whereas the US's spending has only risen by 23%[2].

China Pursues AI for military applications the PLA's modernization, informatisation, and intelligentization are also planned.the US adopted the first DoD Artificial Intelligence Strategy in 2018[3]The PLA viewing warfare as occurring in the physical domain (物理域), information domain (信息域), and cognitive domain (认知域)[4],The PRC is prioritizing the development of AI-enabled capabilities in all of these areas because of its belief that AI is leading to the next revolution in military affairs.In order to achieve the desired level of AI integration that the PLA is aiming for, Beijing acknowledges the necessity of tapping into advancements from its commercial and academic sectors. By the year 2030, the PLA plans to implement various capabilities related to "algorithmic warfare" and "network-centric warfare," which will operate at different degrees of human-machine collaboration. CCP leaders are confident that AI and machine learning will improve information, surveillance, and reconnaissance functions, as well as introduce a variety of new defense technologies, such as autonomous and precision-strike weapons. The PRC is focusing on developments in autonomous vehicles, predictive maintenance, logistics, and automated target recognition.

Reading between the lines, China's development of AI and its application of such technologies to military affairs impacts on many regional and international issues. It has actively expanded its military presence in the Pacific region, primarily through the development of military bases, port facilities and infrastructure projects. Examples include the construction of military installations in the South China Sea, the

[1] Kanij Fatima Maisha, "AI & Arms Race: The Rivalry Between the U.S. & China in the Field of Tech Supremacy," n.d.
[2] Nathan Beauchamp-Mustafaga, "Exploring the Implications of Generative AI for Chinese Military Cyber-Enabled Influence Operations: Chinese Military Strategies, Capabilities, and Intent," n.d.
[3] Daniel Araya and Alex He, "United States-China Multilateralism in the Age of Military AI," no. 309 (2024).
[4] Beauchamp-Mustafaga, "Exploring the Implications of Generative AI for Chinese Military Cyber-Enabled Influence Operations: Chinese Military Strategies, Capabilities, and Intent."

establishment of a military base in Djibouti, and increased naval activity in the Indian and Pacific Oceans. These military bases allow China to have a permanent presence in strategic areas near the Red Sea and the Gulf of Aden. This gives China easier access to important maritime routes, especially in the context of protection against piracy and security of energy resources[1]*The catalyst for the fact and the direction of China's military modernisation was its internalisation of lessons taken from the precision and mobility capabilities the United States used to great effect in the 1991 Gulf War*[2]

- ***Economic Competitiveness:***

Through the integration of AI into its economic framework, the U.S. aims to enhance productivity, create novel markets, and maintain its economic dominance. This encompasses the implementation of AI in various industries, including manufacturing, healthcare, finance, and transportation, to ensure the U.S. economy stays competitive globally. Significant advancements by Chinese AI companies, such as the introduction of DeepSeek's sophisticated, cost-effective language model, have prompted swift responses in international financial markets. The Department of Commerce should refrain from imposing overly restrictive export limitations on AI technologies, as this could greatly diminish the commercial prospects for U.S. technology firms to market their AI-driven products and services. Should the Department of Commerce enforce stringent export controls, companies from other nations would likely fill the void, resulting in decreased revenue that could otherwise finance further research and development in the U.S. companies[3]

- ***Regulation and Standards:***

Strengthen research on legal, ethical, and social issues related to AI, and establish laws, regulations and ethical frameworks to ensure the healthy development of AI[4]*. The U.S. is working to establish regulatory frameworks that ensure the ethical development and deployment of AI. By setting standards for data privacy, algorithmic transparency, and accountability, the U.S. seeks to create a trustworthy environment for AI innovation.*

On the other hand, China is actively involved in shaping the global regulatory and ethical frameworks that will govern AI usage. China has opted for a more practical

[1] Muhammad Ferdy Aditya, Khoirul Amin, and Devy Indah Paramitha, "China's Military Engagement in The Pacific Region: Implications For Australia's Defence and National Security Policy," n.d.

[2] Dr Melanie W Sisson, "Artificial Intelligence, Geopolitics, and the US-China Relationship," n.d.

[3] Daniel Castro, Michael McLaughlin, and Eline Chivot, "Who Is Winning the AI Race: China, the EU or the United States?," n.d.

[4] "国务院关税税则委员会关于调整对原产于美国的进口商品加征关税措施的公告," accessed April 20, 2025, https://gss.mof.gov.cn/gzdt/zhengcefabu/202504/t20250411_3961823.htm.

and state-managed method for regulating this technology within its territory. The country has put forth a concept of AI governance that focuses on national security and social control, utilizing AI to bolster surveillance and maintain internal order. This approach contrasts with Western frameworks, which typically emphasize individual rights and privacy, resulting in disagreements in international discussions regarding global AI regulation, where it is asserted that AI must operate under principles of transparency, fairness, and accountability to mitigate risks such as algorithmic bias and privacy infringements. Furthermore, China was among the first nations to enact legislation on generative AI, just a short time after the launch of ChatGPT. Initially, the focus was on distinct pieces of legislation for various types of AI products, leading to China having separate regulations for algorithmic recommendation services compared to deepfakes or generative AI in 2023. In contrast, Trump is likely to favor diminishing government involvement in AI, advocating for a more market-driven and less regulated environment to promote innovation and competition. Historically, Trump's administration has been marked by a tendency towards deregulation, and his perspective on AI is expected to align with this approach[1]*.If liberal democracies fail to create norms and standards for AI, China is likely to step in to occupy that space. Although many consider techno-democratic partnerships to be the optimal approach for establishing sustainable AI norms and standards, it's important to recognize that national interests may not consistently coincide, even among allied liberal democracies.*

China have seen a proliferation of hard laws and ethics principle-sets that show that the Chinese Good AI Society is a stable yet innovative one intending to lead globally. China began its AI regulation with an attitude of cautious innovation and used "fragmented authoritarianism" to delegate AI development to local governments and see what approaches bubbled to the top while explicitly aiming for global leadership, including in development, standards, and ethics

[1] David Krause, "Artificial Intelligence and the Changing Political Landscape: The Impact of Trump's Return on AI Governance and Policy" (SSRN, 2024), https://doi.org/10.2139/ssrn.5018240.

2.3 Shifting Landscape in Dialogue Between the US and China

In fact the United States and China have much more to gain from cooperation than from competition[1]***.*** *At the same time, another perspective suggests that AI does not inherently represent a new "battlefield" between China and the United States. As noted by Elsa B. Kania, "Artificial intelligence remains a domain of cooperation and competition between China and the United States*[2]*." Many researchers even contend that the interaction between China and the U.S. in the AI space is more cooperative than adversarial. In fact, certain studies indicate that American technology leaders excel in foundational technologies, while Chinese firms possess robust technological capabilities in specialized areas such as image recognition, speech recognition, and autonomous vehicles. To put it another way, the AI advancements of China and the United States can be mutually beneficial. The collaboration between the two nations yields more significant AI research outcomes, exemplified by the movement and cooperation of cross-border AI scientists. The NSCAI final report mentions that "the connections between American and Chinese scholars, innovators, and markets are profound, frequently advantageous, and contribute to the progress of AI." Cooperation can help ease perceptions and policies on both sides. At a minimum, it can diminish the likelihood of worst-case scenarios. Ideally, it can foster a shared interest that alleviates distrust. The United States recognizes that taking unilateral action in AI could result in global fragmentation and pushback. Consequently, it actively collaborates with international partners, allies, and multilateral organizations to establish shared principles for AI usage. This includes initiatives to coordinate on research, align regulatory strategies, and work together on addressing global challenges through AI. a shared ecognition that global governance of AI is needed*[3]***.**

[1] Joseph S Nye Jr, "The Future of Power," n.d.

[2] Yuna Wong et al., *Deterrence in the Age of Thinking Machines* (RAND Corporation, 2020), https://doi.org/10.7249/RR2797.

[3] Ingvild Bode, "AI Technologies and International Relations: Do We Need New Analytical Frameworks?," *The RUSI Journal* 169, no. 5 (July 28, 2024): 66–74, https://doi.org/10.1080/03071847.2024.2392394.

2.3.1 Core Challenges in the US-China AI Cooperation.

Competition in the AI Sector:

US-China industry relationship that continues to grow more competitive.

Value System:

Diverging values between the CCP and liberal democracies represent the greatest obstacle to U.S.-China collaboration or cooperation on AI. Today, the gulf between these values is widening. While AI itself does not have values, competition involving technology is not value neutral. Collaboration between the U.S. and China in AI applications now occurs in academia[1]*; however, national security concerns and growing mistrust between those nations puts even these in jeopardy***.**

Donald Trump's return:

The Trump administration is set to speed up the advancement and implementation of AI without essential safeguards to protect individuals from potential risks. Obama established a diversity- and ethics-forward vision that was largely discarded by the Trump administration which, after a period of neglect, initiated policies to promote AI development in line with nebulous "American values." This included minimizing regulation, maximizing innovation, and competing with China, as well as introducing the idea of "trustworthy" AI that prioritized trust for the sake of spreading AI, rather than upholding fundamental rights

Anti-China rhetoric in relation to AI arose during the Trump administration While the Trump administration introduced the idea of "trustworthy" AI to the US Good AI Society, it did not explicitly define "trustworthy" (which appeared only in the title) but laid out nine principles for AI. References to "trust" within the administration outlined how AI should be "used in a manner that fosters public trust" for wide adoption, which contrasts with the Organisation for Economic Co-operation and Development's (OECD) values-based AI principles designed to "promote use of AI that is innovative and trustworthy and that respects human rights and democratic values[2]

[1] Bedoor AlShebli et al., "China and the U.S. Produce More Impactful AI Research When Collaborating Together," *Scientific Reports* 14, no. 1 (November 19, 2024): 28576, https://doi.org/10.1038/s41598-024-79863-5.

[2] Emmie Hine, "Governing Silicon Valley and Shenzhen: Assessing a New Era of Artificial Intelligence Governance in the United States and China," *Digital Society* 3, no. 3 (December 2024): 50, https://doi.org/10.1007/s44206-024-00138-7.

Variances in the Emphasis of AI Regulation

One potential obstacle could be the differing approaches to AI governance between the U.S. and China in three key areas of divergence: variances in the emphasis of AI regulation and contrasts in how international AI governance is enacted[1].

Differences in the Focus of AI Regulation : *In the United States, proposals for AI policy have predominantly concentrated on AI models and systems; in contrast, China's AI policy is largely based on regulating content. Chinese content regulation can often be characterized as political censorship, but it also aims to restrict content that may cause harm to individuals. In the U.S., policy proposals generally demand safety standards from developers of AI models. Numerous proposals contain clauses that enforce increased scrutiny on models trained with a computing power exceeding a certain threshold. This perspective is based on the belief that greater training compute correlates with enhanced model capabilities and associated risks. By concentrating on models and systems, U.S. lawmakers seek to manage the inherent characteristics and potential of AI technologies. Conversely, in harmony with China's historical approach to information control, AI governance in China has traditionally placed greater emphasis on AI outputs (and sometimes the data inputs that lead to those outputs) rather than on the models or systems themselves*[2].

Differences in Approaches to Implementing International AI Governance

China has consistently espoused that the United Nations should serve as the main channel for AI governance development and oversight. The UN's role in global AI governance and potential scope of responsibilities has been debated extensively.The US position on the UN's role in AI governance is more nebulous. Although the Biden administration consistently utilized the UN as a forum to promote resolutions related to AI safety and security, the administration did not officially comment on proposals to establish a new AI agency under the auspices of the UN[3].

[1] *Bridging the Artificial Intelligence Governance Gap: The United States' and China's Divergent Approaches to Governing General-Purpose Artificial Intelligence* (RAND Corporation, 2024), https://doi.org/10.7249/PEA3703-1.
[2] *Bridging the Artificial Intelligence Governance Gap*.
[3] Noelle Camp and Michael Bachman, "Challenges and Opportunities for US-China Collaboration on Artificial Intelligence Governance," n.d.

Results and findings :

- *By the total ranks, the United States is an AI Superpower with no doubt. Among the 8 indexes, the United States ranks first in 6 and the AI index ranked it in the top.*
- *Competition over AI is not zero-sum, in that both nations will derive value from AI growth, but the benefits are not shared equally.*
- *United States Secretary of State Blinken remarked at the beginning or his first official meeting with his Chinese counterpart "The United States relationship with China will be competitive where it should be, collaborative where it can be, adversarial where it must be." AI is one of those areas where the U.S. and China will compete, collaborate, and potentially find themselves in conflict.*
- *If AI innovation continue to grow in China, America will someday become a victim of Sun Tzu's maxim that « to subdue the enemy without fighting is the acme of skill » wherein China as a near-pear rival will defeat the United States before the first military conforntation ever emerges*
- *there is still a gap between China's overall level of development of AI relative to that of developed countries—lacking major original results in the basic theory, core algorithms, key equipment, high-end chips, major products and systems, foundational materials, components, software and interfaces*

Part Three

Navigating the Sino-American AI rivalry : An African prespective

The intensifying rivalry between the United States and China has added a new level of complexity to Africa's position in the rapidly evolving global AI landscape, exposing the continent's existing vulnerabilities to greater digital pressures, which also contribute to a worldwide AI divide that is an emerging challenge intensified by advanced AI systems, making solutions more intricate to tackle[1] *While some critics and tech leaders are calling for a "pause" on AI development. Still, technology has never stopped simply because some people wanted it to*[2]*. The dominance of U.S. and Chinese AI technologies raises concerns about Africa's digital sovereignty. Rather than being drawn into the U.S.-China AI rivalry, Africa is increasingly asserting its participation in the advancement of AI by engaging in active dialogues and devising roadmaps for the development, deployment, and regulation of this technology*[3]

3.1 Implications for African Actors

3.1.1 Political Implications:

3.1.1.1 Implication on digital sovereignty: Data Colonialism

Bodin's idea of sovereignty highlighted the state's ability to operate autonomously, unencumbered by outside interference. His theories played a crucial role in the development of the concept of sovereignty as it would later be defined. This concept was further reinforced by the Treaty of Westphalia in 1648, which characterized sovereignty as the "absolute and unlimited power within a given jurisdiction."[4] *The term "digital sovereignty" thus encompasses the broader idea of the "state's authority and right to manage and control the technology, services, and digital information prevalent within its borders*[5]*.*

[1] "44004-Doc-EN-_Continental_AI_Strategy_July_2024.Pdf," accessed April 9, 2025, https://au.int/sites/default/files/documents/44004-doc-EN-_Continental_AI_Strategy_July_2024.pdf.
[2] "Navigating the U.S.-China AI Competition: An African Perspective – ASCIR," accessed May 8, 2025, https://ascir.org/2025/02/18/navigating-the-u-s-china-ai-competition-an-african-perspective/.
[3] Ayantola Alayande, Samuel Segun, and Leah Junck, "Emerging Technology Policies and Democracy in Africa," n.d.
[4] "TAGP-4_1_Research_Venske_US-China-Techwar.Pdf," accessed May 9, 2025, https://digitalmallblobstorage.blob.core.windows.net/wp-content/2024/03/TAGP-4_1_Research_Venske_US-China-techwar.pdf.
[5] "السيادة-الرقمية-والإستقلال-التكنولوجي-بين-تحديات-الظروف-الوطنية-والدولية-Digital-Sovereignty-and-Technological-Independence-between-the-Challenges-of-National-and-International-Circumstances," n.d.

In the African case, there is a fragmented appropriation and control of data from individuals, often without their explicit consent, through communication infrastructures owned and developed by either Western technology firms or Chinese corporations[1]*. Additionally, it's concerning to note Africa's connection to its own data. A significant amount of the continent's most essential information—pertaining to finances, agriculture, health, and governance—is processed and monetized outside of Africa*[2]*. Consequently, when corporations from AI powerhouses such as the U.S. and China invest in Africa, they are poised to access valuable data that can be utilized to create services and systems to be sold back to African nations*[3]*. For instance, facial recognition technologies operated by companies like Amazon and Google were developed using images of numerous individuals from the African continent without proper consent. Facebook's '10-year challenge' became immensely popular throughout the continent and likely contributed to the improvement of Meta's new AI models*[4]*. The dangers are further exacerbated by Generative AI, which includes risks like disinformation, breaches of data privacy, surveillance, and copyright infringements. According to a Brookings Institution report, '27% of Kenyans use ChatGPT daily', ranking them third globally, after India and Pakistan*[5]*.*

It has been noted that the participation of foreign entities in financing and establishing data centres significantly impacts the data security and privacy of individuals and organizations in Africa[6]*. Senegal became the first country in Africa to adopt the Chinese model of data governance, which mandates that all servers be situated within a nation's borders. The West African nation transitioned all governmental data and digital platforms from external servers to a data centre constructed by Huawei in Senegal. However, this arrangement poses several challenges, as Chinese surveillance technologies jeopardize the cyber sovereignty of African nations, even if China promotes data sovereignty within various global bodies setting digital technology standards. Investigations have revealed that confidential information from the*

[1] Danielle Coleman, "Digital Colonialism: The 21st Century Scramble for Africa through the Extraction and Control of User Data and the Limitations of Data Protection Laws," *Michigan Journal of Race & Law*, no. 24.2 (2019): 417, https://doi.org/10.36643/mjrl.24.2.digital.

[2] David Thomas, "Africa's AI Moment: Innovate, Collaborate or Fall Behind," African Business, April 3, 2025, https://african.business/2025/04/long-reads/africas-ai-moment-innovate-collaborate-or-fall-behind.

[3] "AI Becomes Latest Frontier in China-US Race for Africa - Issuu," accessed May 9, 2025, https://issuu.com/aimediasynapse/docs/synapse_magazine_issue_23_240624_v2/s/52516759.

[4] "Global Center on AI Governance," accessed May 9, 2025, https://www.globalcenter.ai/analysis/articles/africa-s-ai-future-in-the-context-of-the-us-china-ai-race.

[5] Folashadé Soulé, "Navigating Africa's Digital Partnerships in a Context of Global Rivalry," n.d.

[6] "Global Center on AI Governance."

Chinese-built African Union headquarters was being redirected nightly from Addis Ababa to Shanghai. China is not the sole nation engaging in internet surveillance, as US intelligence agencies have also accessed data belonging to millions of individuals worldwide with assistance from American tech corporations. A report from a Nigerian media outlet in 2021 indicated that 70 percent of governmental agencies in Nigeria stored their data on cloud-based servers located overseas. As long as there is a shortage of domestic technological capabilities, achieving data sovereignty will continue to be a challenging objective. According to interviews with relevant actors, African governments tend to be protective of national assets and harbor skepticism towards the motives of specific private sector entities, fearing potential exploitation for profit and excessive profit repatriation. Private sector companies must strive to alleviate government concerns and have a clear understanding of what governments aim to accomplish through their partnerships[1]*. While 31 countries have implemented data protection regulations and 13 have created panels or commissions to evaluate AI strategies and laws, the influence of nations like the US and China, combined with the economic clout of major tech firms, suggests that negotiations and regulatory implementation are most effectively conducted at a regional or continental scale which negatively add a new dimension of complexity to Africa ' dream for integration and complementarity*[2]*.*

3.1.1.2The export of authoritarian regime:

On one hand, the dangers linked to Beijing's control over artificial intelligence, Chinese AI models if asked about sensitive topics Taiwan, they Alter or ignore historical truths to align with the narratives of the Chinese Communist Party, censor replies concerning issues that criticize the Chinese government and demonstrate authoritarian practices by restricting access to historical data. In conrast, responses from U.S.models showcased a stark difference between authoritarian and democratic approaches to AI.U.S.models reliably provided open, fact-based, and comprehensive replies, embodying principles of free speech and truth, even when the content could be interpreted as critical of the United States[3]*.*

On the other hand, China's intensified emphasis on AI technologies for surveillance, particularly through its global Digital Silk Road initiative, raises concerns. The application of facial recognition and other biometric or digital ID technologies is

[1] Soulé, "Navigating Africa's Digital Partnerships in a Context of Global Rivalry."
[2] "Global Center on AI Governance."
[3] "AEP-US-China-AI-Paper-2024-1.Pdf," accessed May 15, 2025, https://americanedgeproject.org/wp-content/uploads/2024/12/AEP-US-China-AI-Paper-2024-1.pdf.

already contentious due to their possible misuse by authoritarian regimes that restriùct human rights, stifle political opposition, and monitor and censor citizens, significantly impacting the democratization process across Africa[1]*. The Chinese governance model poses a threat to African societies as it challenges the inherent multiethnic agreements within post-colonial African states*[2]*. The external influence of AI technologies developed outside Africa may jeopardize national sovereignty, Pan-Africanism principles, and civil liberties*[3]*. One significant consequence for Africa is the potential for AI-driven surveillance to be exploited by authoritarian governments to reinforce their power and suppress dissent. Many African countries bear histories of political instability, and the introduction of advanced surveillance technologies could enable governments to more efficiently monitor and control opposition factions. The danger of AI being harnessed to target political adversaries, human rights advocates, and marginalized groups is a noteworthy concern that calls for careful consideration*[4]*. Countries with democracies that embrace the United States' values of a free and open internet, which fosters freedom of speech and expression, are likely to prefer collaborating with Western companies instead of Chinese ones. In contrast, authoritarian regimes might be more drawn to the latter option to fulfill, rather than confront, their intent to strengthen political power*[5]*.*

3.1.1.3Political Propaganda:

The risks are being deepened by Generative AI, which include disinformation, surveillance, and copyright violations. AI models can shape public opinion by influencing the news, information and entertainment that people have access to. This can influence electoral processes or turn opinion towards certain foreign powers and away from others[6]*.*

[1] "U.S. Development Agencies Should Embrace AI to Transform the U.S.-Africa Relationship | Carnegie Endowment for International Peace," accessed May 9, 2025, https://carnegieendowment.org/research/2024/09/africa-ai-us-development?lang=en.

[2] Samir Bhattacharya, "China Is Exporting Its Model of Political Authoritarianism to Africa," The Strategist, February 16, 2025, https://www.aspistrategist.org.au/china-is-exporting-its-model-of-political-authoritarianism-to-africa/.

[3] "44004-Doc-EN-_Continental_AI_Strategy_July_2024.Pdf."

[4] Praise Adegoke, "Utilization of AI to Solve Security Challenges in Africa: What Africa Can Learn from China and the UK" (SSRN, 2024), https://doi.org/10.2139/ssrn.4989163.

[5] "The Digital Iron Curtain | The Generation," accessed May 15, 2025, https://www.the-generation.net/the-digital-iron-curtain/.

[6] "Will China's Influence in Africa's AI Revolution Undermine Its Sovereignty? | ODI: Think Change," accessed May 9, 2025, https://odi.org/en/insights/opinion-will-chinas-influence-in-africas-ai-revolution-undermine-its-sovereignty/.

3.1.2 Economic Implications:

3.1.2.1Impact on distribution :

The competitive system harnesses the full potential of most African states across all economies. For instance, Facebook has an extraordinary capability to foresee when someone is inclined to take action, or when they are experiencing various emotions, like feeling down—often even before the users themselves realize it. Predictive analytics enables a select few companies to comprehend even the deepest emotions, allowing them to anticipate how these emotions may influence future behaviors. This data is incredibly valuable to countless corporations worldwide and can have significant impacts on the global economy, workforce development, investment strategies—both small and large, resource distribution, advertising, and every aspect of global capitalism[1]*. AI technologies might have limited relevance and yield fewer advantages in African nations due to the scarcity of training data and the tendency of AI developers to focus on applications that reflect their own social and economic environments. This situation could be worsened by the dangers of increased concentration within the AI service provider market, which risks allowing a small number of companies primarily from the U.S. and China to dominate in certain developed countries*[2]*.*

3.1.2.2Job Displacement:

Concerns have been raised that the race to adopt AI could lead to widespread job loss, particularly in less affluent nations. "Given the emerging demographic trends, there is a genuine risk that a considerable segment of the global population—estimated to exceed 35% by 2070 in North and sub-Saharan Africa and in West Asia—might largely miss out on the advantageous aspects of AI," notes D.K. Srivastava, an economist and principal policy adviser at Ernst & Young India. The World Economic Forum (WEF), in its Future of Jobs reports, indicates that AI will produce far more jobs than it eliminates—by 2022, an estimated 75 million jobs are predicted to be lost to automation, while 133 million new positions will be created. However, without

[1] Danielle Coleman, "Digital Colonialism: The 21st Century Scramble for Africa through the Extraction and Control of User Data and the Limitations of Data Protection Laws," *Michigan Journal of Race & Law*, no. 24.2 (2019): 417, https://doi.org/10.36643/mjrl.24.2.digital.

[2] "The Impact of Artificial Intelligence on Productivity, Distribution and Growth: Key Mechanisms, Initial Evidence and Policy Challenges," OECD Artificial Intelligence Papers, vol. 15, OECD Artificial Intelligence Papers, April 16, 2024, https://doi.org/10.1787/8d900037-en.

appropriate measures to educate and retrain the workforce in Africa, there will be a significant lack of talent with the necessary AI skills to occupy the newly created jobs[1].

3.1.2.3Dependency on Digital Infrastructure:

Overall, the dependency approach has become prevalent in the examination of developmental challenges in Africa. One of the central tenets of this approach is that the attainment of political independence by African nations masks the reality of ongoing reliance on the global economic framework. According to the dynamics of power and interests inherent in these dependency relationships, this dependence elucidates the continued underdevelopment on the African continent[2]*. AI without digital public infrastructure (DPI) is akin to constructing skyscrapers on unstable ground. Digital public infrastructure encompasses digital identity systems, payment platforms, and data exchange systems. In the absence of local data centers, domestic AI cloud services, and regional AI computing networks*[3]*, African stakeholders face crucial decisions in shaping their digital infrastructure development, which will determine their future technological independence*[4]*.*

In this context, China is ramping up its technology exports to Africa, it already commands a predominant position in the continent's information and communication technology (ICT) sector. Companies like Huawei and ZTE are among the largest ICT providers in the region, delivering 5G networks, national fiber-optic communication networks, and e-governance solutions[5]*. Many of these initiatives were initiated before the Digital Silk Road (DSR) project, which only commenced in 2015 as part of the Belt and Road Initiative (BRI)*[6]*.*

[1] "70029-Eng_ai-for-Africa-Blueprint.Pdf," accessed May 6, 2025, https://www.bmz-digital.global/wp-content/uploads/2022/08/70029-eng_ai-for-africa-blueprint.pdf.

[2] "مذكرة نهائية.Pdf," accessed May 10, 2025, https://dspace.univ-alger3.dz/jspui/bitstream/123456789/10190/1/%d9%85%d8%b0%d9%83%d8%b1%d8%a9%20%d9%86%d9%87%d8%a7%d8%a6%d9%8a%d8%a9.pdf.

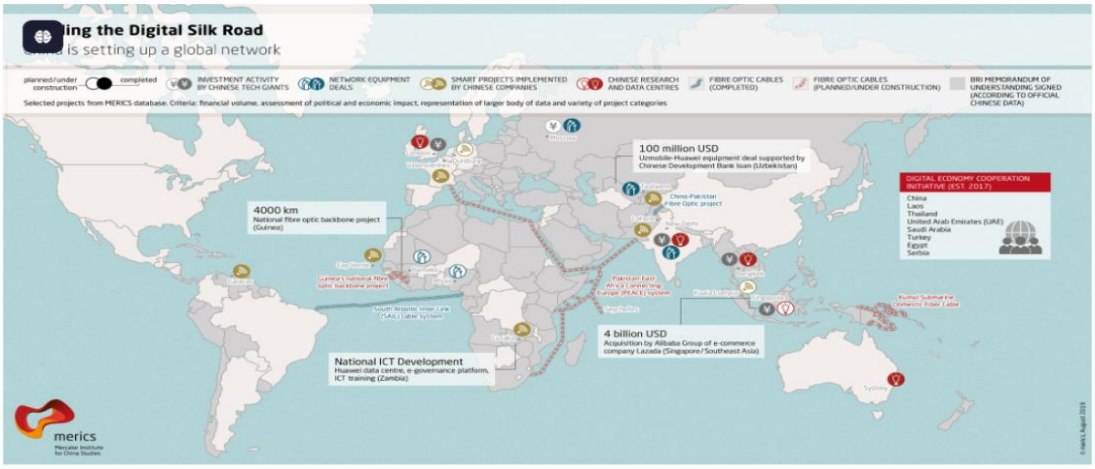
[3] Thomas, "Africa's AI Moment."

[4] Mark Craddock, "The AI Superpower Showdown," *Medium* (blog), March 26, 2025, https://medium.com/@mcraddock/inside-the-us-china-race-for-technological-supremacy-52cb5c3df063.

[5] "Africa-and-the-US-China-Tech-Comp," n.d.

[6] "The Digital Silk Road: China's Technological Rise and the Geopolitics of ... - Google Livres," accessed May 15, 2025, https://books.google.dz/books?id=gXqfEAAAQBAJ&pg=PT47&dq=the+Digital+Silk++road+pdf&hl=fr&newbks=1&newbks_redir=0&sa=X&ved=2ahUKEwiz067Z-6WNAxUJgP0HHcCdMLQQ6AF6BAgEEAM#v=onepage&q=the%20Digital%20Silk%20%20road%20pdf&f=false.

Figure3.1: *China's digital Silk Road*



Source: Hinrich Foundation

China's digital Silk Road extends to Africa. The map highlights projects throughout Africa, including Ethiopia, Kenya, South Africa, and Seychelles, showcasing China's engagement in the development of digital infrastructure on the continent. China prefers to export its ICT to nations with accessible shipping routes, such as Egypt, Morocco, and Algeria. Clearly, Chinese technologies have long dominated the African market, even prior to Beijing adopting a strategic approach to its international expansion in the ICT field. Two primary factors have contributed to this edge: Firstly, Chinese firms provide technological devices at relatively lower prices. Since Africa's digital growth is mainly propelled by mobile phone usage—largely influenced by its youthful population—Chinese companies have managed to supply mobile technology that resonates strongly with this demographic through affordable pricing and features designed specifically for the African market (such as camera quality, battery longevity, audio performance, etc.). The second factor allowing Chinese tech firms to gain traction in Africa is that, despite concerns about the risks posed by Chinese tech, Western alternatives have only recently begun to be perceived as comparably affordable and safe on the continent. As noted in an FP article, "for Africa, Chinese-built internet is better than no internet at all." The main barriers hindering the US from enhancing its technological influence in Africa are funding issues and skepticism among African nations regarding America's long-term engagement commitment[1]*. Furthermore, the Chinese Communist Party (CCP) primarily views Beijing's Digital*

[1] "Assessing U.S.-China Technology Competition in Africa | NSI," accessed May 10, 2025, https://nsiteam.com/social/smaspeakerseries_04april2023/.

Silk Road initiative as a strategy to assert China's "rightful place" in the global technology arena while diminishing Western influence in the sector[1]*. Recently, Washington has also started to adopt a more strategic approach to digital partnerships in the developing world, exemplified by the launch of the Digital Transformation with Africa Initiative (DTA). Significantly, however, American digital technology firms have achieved much greater global penetration and usage compared to their Chinese counterparts. As a result, this competition prompts economic realignment among African actors who increasingly face the challenge of choosing sides in technology adoption, fostering new digital silk roads and silicon corridors*[2]*, which pose serious implications in the context of the global conflict between laissez-faire digital globalization and digital sovereignty in Africa. This circumstance underscores the implications for African nations as they engage with Chinese AI technology. China's ambition to establish control over Africa and emerge as a colonizing presence is evident through its expanding influence in the region through various means, which has undoubtedly affected the region's social and economic dynamics*[3]*.*

3.1.3 Military implications:

The competition between the United States and China propels the development of sophisticated autonomous technologies and AI-driven military capabilities. Caution is necessary to avoid becoming a testing ground for emerging AI technologies. In March 2020, forces supported by Turkey and aligned with the Libyan Government of National Accord used a Kargu-2 autonomous drone made in Turkey to target troops associated with renegade General Khalifa Haftar. This incident marked the first known instance of an AI-based weapon being used to kill in conflict globally, regrettably occurring on the African continent and involving an external actor[4]*. The United States has supplied a variety of counter-terrorism AI tools, particularly in regions such as the Sahel and the Horn of Africa, while this reflects global competition with nations like China and Russia. In this context, AI serves as a means of soft power to cultivate trust and align African military systems with American standards, while also countering extremist organizations like ISIS and maintaining military access at crucial locations like Djibouti to oversee trade routes in the Red Sea and connections to the Middle East.*

[1] "Africa-and-the-US-China-Tech-Comp."
[2] Craddock, "The AI Superpower Showdown."
[3] Hadya Amin, "The Impact of Chinese AI on Developing Countries in Sub-Saharan Africa" (San Francisco State University, 2024), https://doi.org/10.46569/fq978300s.
[4] "Global Center on AI Governance."

The military implications poses a real threat world wide and Africa in particular, for example, The integration and use of AI for military objectives in Nigeria encounter numerous obstacles. To begin with, there is a significant gap in awareness and comprehension regarding AI's potential in the security domain among policymakers and leaders. A large number of them remain unfamiliar with the technology and its functions, which impedes its complete assimilation into current systems. Furthermore, there is a deficit of qualified AI experts in Nigeria. Creating and sustaining AI systems demands proficiency in areas like machine learning, data analysis, and cybersecurity. Without a robust pool of trained experts, effectively deploying AI solutions for national security becomes quite difficult. Moreover, the limited access to quality data presents major challenges. AI depends on extensive amounts of accurate and diverse data to train models and inform decisions. However, Nigeria grapples with data shortages and inconsistencies, hindering the development of effective AI systems[1].

In the context of global rivalry, Beijing is indicating an increase in its ambitions within the Horn of Africa. While China's primary focus in the past decade has been strengthening its military presence in the South China Sea, and its secondary emphasis has been enhancing economic influence and military infrastructure in Pakistan and Sri Lanka, its ambitions in the Horn of Africa have become a significant third priority[2]*. Which returns to the practical notion of "self-help." This could be one reason China is eager to establish a robust military presence in the Horn of Africa as it seeks to protect its interests on the continent. Some strategies that China has utilized include bilateral military exchanges, military assistance, participation in U.N. peacekeeping operations, and more recently, the creation of military bases like that in Djibouti*[3]*. AI would enable China to secure a strategic military edge over the U.S. in the Horn of Africa.*

[1] "IMPLICATION OF ARTIFICIAL INTELLIGENCE ON NATIONAL SECURITY FOR THE NIGERIA SECURITY AGENCIES," *Journal of Terrorism Studies* 6, no. 1 (July 3, 2024), https://doi.org/10.7454/jts.v6i1.1075.

[2] "China Makes a Move on the Horn of Africa," *American Enterprise Institute - AEI* (blog), accessed May 15, 2025, https://www.aei.org/op-eds/china-makes-a-move-on-the-horn-of-africa/.

[3] Ibrahim Sakawa Magara and Hubert Kinkoh, "China's Military Positioning in the Horn of Africa and Its Implications for Regional and Global Security Outcomes," 2020.

3.1.4 Ethical implications:

The international discussion on AI ethics is being conducted without consideration for Africa[1]*. Concepts of AI ethics such as 'bias', 'human rights', 'privacy', 'justice', 'solidarity', 'trust', 'transparency', 'openness', and 'fairness' are interpreted differently across cultures. Without this acknowledgment, Africa risks becoming dependent on foreign AI frameworks that fail to represent its realities, languages, or priorities*[2]*. The ability to influence AI frameworks rather than merely consuming them raises an essential question: how does the continent's diversity in language, ethnicity, culture, and more relate to the ethical considerations of AI? It is important to remember that Africa is a continent, not a single nation, and it is incredibly diverse. Take into account the rich linguistic variety, as there are approximately 1,500 to 2,000 languages spoken in Africa, ranging from Arabic and Berber in Algeria and Morocco to Yoruba, Swahili, Lingala, Wolof, and Kiswahili in various other regions of the continent*[3]*.*

- ***Algorithmic Bias:***

AI bias arises when the results of an algorithm become skewed due to erroneous assumptions based on the data it has been trained on. In certain situations, AI systems might wrongfully label a Black individual as criminal before any trial or suggest a higher risk of reoffending. Such systems frequently marginalize historically underrepresented groups, leading to numerous diversity-related complications[4]*.*

[1] Damian Okaibedi Eke, Kutoma Wakunuma, and Simisola Akintoye, eds., *Responsible AI in Africa: Challenges and Opportunities*, Social and Cultural Studies of Robots and AI (Cham: Springer International Publishing, 2023), https://doi.org/10.1007/978-3-031-08215-3.
[2] Thomas, "Africa's AI Moment."
[3] Eke, Wakunuma, and Akintoye, *Responsible AI in Africa*.
[4] Eke, Wakunuma, and Akintoye.

3.1.5Regularatory Implications

Regulatory Divergence: *There must be difficulties in Creating Appropriate regulatory Frameworks for Africa since that the United States concentrates on regulating the AI models and technical systems themselves, whereas China focuses on regulating digital content and outputs. African nations find it difficult to create AI regulatory frameworks that suit their distinct social, cultural, and economic contexts as a result of this disparity. Some nations might have to decide between two opposing models or try to combine them, which could make laws more difficult to understand and cause implementation delays.moreover, African nations may have a tendency to adopt regulatory models imported from China or the United States due to a lack of local technical and regulatory capabilities. Countries are developing distinct regulatory frameworks aligned with either US or Chinese approaches to AI governance***,*** *African countries need to resist the urge to exclusively adopt Chinese or American AI regulation, governance and norms.*

Looking at two of the most influential philosophies from each country, which inherently inform each country's philosophy of technology, offers a framework for analysis of a high-level overview of each country's approach. Although it obscures some nuances,The Protestant Ethic is often characterized as more individualistic and Confucianism more collectivistic, but both want to benefit "the people". The US's Good AI Society is partially underpinned by the Protestant Ethic. Protestantism,), so material success was a way to show that one was surely saved It thus emphasized the value of individual hard work. During the Industrial Revolution Now, it manifests in AI policy through an internal focus and prioritization of social stabilityin the US, it paired with the technological sublime to influence the US's drive to demonstrate its technological superiority and fostered a sense of American exceptionalism which persists today. Though now secularized, the Protestant Ethic now manifests in the US's historic laissez-faire approach to AI regulation, relying on industry self-regulation and nonbinding initiatives to not hamper innovation This attitude is also seen in digitally expansionist measures aimed at hobbling China's semiconductor industry and insistence that AI must follow superior "democratic values while China's Good AI Society is influenced by Confucianism, but it—and the country as a whole—is not a monolithic embodiment of Confucian thinking. Still, Confucianism, which has been referenced in foreign policy for decades , impacts governance. In antiquity, Confucianism offered advantages in flexibly governing a massive country populated

by groups with different cultures and customs In the Confucian Good AI Society, innovation is harnessed by the government, which issues centralized guidance and funding, while in the Protestant Ethic Good AI Society, it is unleashed with minimal (though increasing) interference[1].

[1] Hine, "Governing Silicon Valley and Shenzhen."

3.2The roots of African AI dependency

The post-Cold War world is split between a post-historical segment and another that remains entrenched in history. The dividing line between these post-historical and historical regions is shifting quickly, making it difficult to define, particularly given the late emergence of industrialization and nationalism in African nations[1]*. Hegel utilizes a particular geographical criterion in his analysis of world history. He claims that "the world's history commenced in the East and culminates in the West, finishing with the Germanic Christian empires," which assigns minimal significance to Africa within his historical framework due to its perceived lack of progress, as it has consistently remained stagnant*[2]*. The Hegelian dialectic serves to exclude Africa from the broader narrative of universal history. For Hegel, any historical narrative ought to view Africa as a region where consciousness has yet to acknowledge any concrete existence, portraying the African as "natural man in his entirely wild and unrefined state." Ironically, African intellectuals who critiqued Hegel found in his arguments all the components necessary to assert and validate the presence of a distinct African civilization*[3]*.*

3.2.1Industrial Concentration

Since the 1980s, a major phenomenon has emerged in developed economies, particularly in the United States: the rise of industrial concentration. This phenomenon, measuring the collective market share held by the largest companies in a given sector, has been largely fueled by the advent and widespread adoption of Artificial Intelligence. Large companies with considerable financial and technological resources have rapidly adopted AI to increase their productivity and profitability. This trend has created an environment where only the largest companies are able to fully exploit the benefits of AI, reinforcing their dominance in the market. The growing use of AI in large companies is partly driven by the high costs associated with developing and operating AI models. The massive investments required to train these models, as well as the ongoing operating costs, have created a barrier to entry for smaller and less financially robust companies. Technology giants such as Alphabet, Microsoft, and

[1] Francis Fukuyama, *The End of History and the Last Man* (New York : Toronto : New York: Free Press ; Maxwell Macmillan Canada ; Maxwell Macmillan International, 1992).
[2] Basile Sede Noujio, “HHeeggeell’’ss PPhhiilloossoopphhyy Ooff HHiissttoorryy--AA CChhaalllleennggee Ttoo Tthhee AAffrriiccaann TThhiinnkkeerr:: TThhee TThhoouugghhtt Ooff LLeeooppoolldd SSeeddaarr SSeengghhoorr,” n.d.
[3] Omotade Adegbindin, “CRITICAL NOTES ON HEGEL’S TREATMENT OF AFRICA” 11 (2015).

OpenAI have already invested considerable sums in developing their own AI technologies, further strengthening their dominant market position. Even if AI costs were to decrease, the advantages in terms of resources and data already accumulated would still confer a disproportionate advantage to large companies[1].

3.2.2The structure of the global capitalist system:

with the domination of of the neoliberal project, it enabled global financial capitalism with its particular capitalist epistemology of quantification of things, knowledge for life became knowledge for profits, Education for living became a commodity for sale, students became customers who needed skills rather than knowledge that is why there is an AI digital skill gap in Africa. Nature became a natural resource available for extraction, extractivism became the main instrument of making wealth, even data is being extracted from Africa by Sino-American tech corporations, African populations generate vast amounts of data used to train AI systems, but the value is captured elsewhere. As well as American Chinese investment in African AI startups or infrastructure is limited and often driven by foreign interests often coming with conditions.The guarantee fact is that Africa and the rest of the global south are hostages of the coloniality of markets; AI in so doing ; this position has been perpetuated by structures, institutions, systems and practices that were established in the time of colonial encounters and those were not changed at independence[2].

3.2.3Structural changes after the decolonization

This factor has led to the emergence of a new pattern of governance in Africa, known as "New Afrocracy." This model preserves the legacy of comprehensive individual rule while, at the same time, allowing for some features of liberal democracy. It is noteworthy here that the West has overlooked these new authoritarian forms of governance in Africa, so long as they do not conflict with the realization of its strategic interests on the continent[3]*. Moreover, many of the African elites who ruled under*

[1] Emmanuel Ogiemwonyi Arakpogun et al., "Artificial Intelligence in Africa: Challenges and Opportunities," in *The Fourth Industrial Revolution: Implementation of Artificial Intelligence for Growing Business Success*, ed. Allam Hamdan et al., vol. 935, Studies in Computational Intelligence (Cham: Springer International Publishing, 2021), 375–88, https://doi.org/10.1007/978-3-030-62796-6_22.

[2] Arakpogun et al.

[3] " الفوضى-العالمية-ودور-إفريقيا-في-إعادة-صياغة-النظام-الدولي, accessed May 16, 2025, Pdf.
https://qiraatafrican.com/wp-content/uploads/2024/01/%D8%A7%D9%84%D9%81%D9%88%D8%B6%D9%89-%D8%A7%D9%84%D8%B9%D8%A7%D9%84%D9%85%D9%8A%D8%A9-%D9%88%D8%AF%D9%88%D8%B1-%D8%A5%D9%81%D8%B1%D9%8A%D9%82%D9%8A%D8%A7-%D9%81%D9%8A-

single-party systems are the same ones who continue to govern (or have governed) under pluralism. Political power in Africa has, to a considerable extent, become akin to "palace politics," focused on achieving the private ambitions of an individual ruler and a group of beneficiaries, rather than achieving genuine development for their peoples. This has made the dilemma of Africa's governing systems at the highest level.

%D8%A5%D8%B9%D8%A7%D8%AF%D8%A9-%D8%B5%D9%8A%D8%A7%D8%BA%D8%A9-%D8%A7%D9%84%D9%86%D8%B8%D8%A7%D9%85-%D8%A7%D9%84%D8%AF%D9%88%D9%84%D9%8A.pdf.

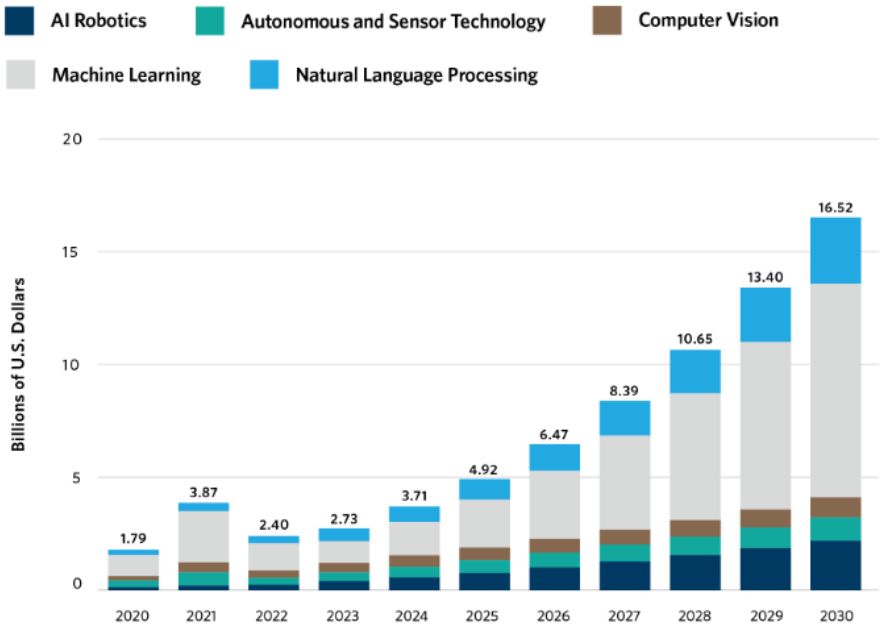
3.3 The African vision: AI for Africa, by Africa

As African nations acknowledge and utilize the possibilities of AI to enhance their growth, it is essential to adopt a comprehensive collaborative strategy to avoid being ensnared in the AI rivalry between China and the United States[1]

3.3.1 Alignment with AU Agenda 2063

A prosperous Africa based on inclusive growth and sustainable development: *According to a study by McKinsey, generative AI has the potential to boost productivity by 40% and contribute approximately US$2.2 to US$4.4 trillion annually to the global economy, which could have significant implications for Africa's economic development. Should Africa manage to capture 5% of this potential, generative AI could contribute anywhere from US$110 to US$220 billion to the continent's GDP each year. Projections suggest that by 2025, the market value of generative AI will reach $60 billion, making up 30% of the total addressable market. AI*[2]

Figure3.2*: Artificial Intelligence Market seize in Africa*



Source : AU AI strategy

[1] "Navigating the U.S.-China AI Competition: An African Perspective – ASCIR," accessed May 9, 2025, https://ascir.org/2025/02/18/navigating-the-u-s-china-ai-competition-an-african-perspective/.
[2] Afiff Di, "2024 Q2: Artificial Intelligence for Development," n.d.

As depicted in the illustration, the direct AI market in Africa, which is presently around $3 billion, is projected to expand by 28 to 30 percent each year for the next few years, ultimately reaching between $16 and $18 billion by 2030[1]*, AI development ensures economic security of all African states as They want to achieve self-reliance rather than remaining dependent.*

A peaceful and secure Africa[2] *: China has made significant strides in developing and deploying AI-based surveillance and predictive policing technologies, which have important consequences for Africa. As African countries work to address security challenges such as terrorism and organized crime, there is a growing interest in adopting advanced AI technologies. The success of the Chinese model in ensuring public safety could serve as a benchmark for African nations looking to enhance their security frameworks. Nevertheless, this approach must be scrutinized within the unique sociopolitical contexts of the African continent. The long-term implications of lethal autonomous weapon systems (LAWS) are generally favorable. These robotic technologies may lead to a reduction in war crimes, resulting in fewer casualties, injuries, and psychological trauma for those involved in conflict.*[3]

Table3.1 : *African Ranks in AI technology*

Country	African Rank	Global Rank	Country	African Rank	Global Rank
Mauritius	1st	61st	Botswana	11th	110th
Egypt	2nd	62nd	Seychelles	12th	112th
South Africa	3rd	77th	Cabo Verde	13th	119th
Tunisia	4th	81st	Algeria	14th	120th
Rwanda	5th	84th	Namibia	15th	125th
Morocco	6th	88th	Uganda	16th	132nd
Senegal	7th	91st	Gabon	17th	135th
Benin	8th	97th	Tanzania	18th	137th
Kenya	9th	101st	Côte d'Ivoire	19th	138th
Nigeria	10th	103rd	Ethiopia	20th	140th

Source : Oxford Insight Index

[1] "U.S. Development Agencies Should Embrace AI to Transform the U.S.-Africa Relationship | Carnegie Endowment for International Peace."

[2] *Agenda 2063: the Africa we want* (Addis Ababa: African Union Commission, 2015).

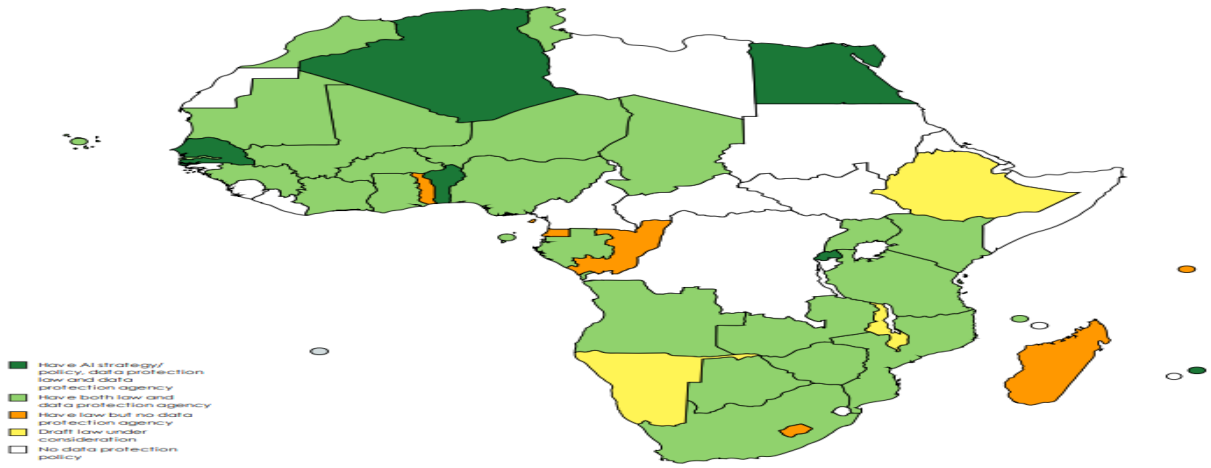
[3] Ezio Di Nucci and Filippo Santoni de Sio, *Drones and Responsibility: Legal, Philosophical and Socio-Technical Perspectives on Remotely Controlled Weapons* (Routledge, 2016).

The ranking published by Oxford Insights outlines a distinct order among African nations regarding their readiness to adopt AI. The report, named "Government AI Readiness Index 2023," analyzed 193 countries globally. It was based on 39 criteria within three principal areas: "Government," "Technology Sector," "Data and Infrastructure," and "Private Sector." The Global AI Index evaluates the AI capabilities of countries through two approaches: absolute and relative. The overall score merges these two methods and is categorized into two fundamental ideas: scale, which gauges the overall strength of a nation's AI ecosystem on an international level, and intensity, which assesses how effectively AI resources are utilized relative to the country's population or economy size. This integration provides a comprehensive view of a nation's AI potential, taking into account the volume of AI activities and their effectiveness. Mauritius, Egypt, and South Africa rank highest in this list, underscoring their dedication to nurturing environments that support technological advancement. These nations have made significant investments in forward-thinking government policies, encouraging the growth of AI-driven startups and enterprises. This adoption hinges on the establishment of vibrant ecosystems that include five essential participants: policymakers, universities, large corporations, startups, and multi-stakeholder collaborations. These entities are vital in fostering innovation, skill enhancement, and creating a favorable atmosphere for the effective implementation of AI across various industries. Nonetheless, despite the strides taken, numerous African nations still encounter enduring obstacles such as inadequate infrastructure and a shortage of technical expertise, positioning them among 'emerging' and 'nascent' countries in terms of AI investment, creativity, and execution.

3.2.2 Key Mechanisms for AI development: Decolonial responses

Decoloniality is a theoretical framework that emerged as response to the ongoing legacies of colonialism and seeks to challenge and dismantle the structure of power[1]*. With the Continental AI Strategy, Africa is laying the necessary foundations to become an integral participant in the AI revolution and to become a key player in the AI landscape*[2]*.*

Figure3.3:*Status of AI Strategies & Policies*



Source: *Africa AI startegy document*

Although the adoption of AI is steadily rising, there is a significant gap in preparedness throughout the continent. In spite of the African Union's emphasis on the need for national AI policies, only three countries have established comprehensive policies, while fewer than ten have developed national AI strategies. This situation arises from the differences in capabilities among the various African political entities. Nations such as Nigeria, South Africa, Kenya, and Egypt are prominent as key regional centers, each benefiting from robust tech ecosystems and entrepreneurial networks. These

[1] Gorden Moyo and Sabelo J. Ndlovu-Gatsheni, *Global Storms and Africa in World Politics: Contemporary Challenges and Decolonial Responses* (Springer Nature, 2025).
[2] "44004-Doc-EN-_Continental_AI_Strategy_July_2024.Pdf," accessed May 13, 2025, https://au.int/sites/default/files/documents/44004-doc-EN-_Continental_AI_Strategy_July_2024.pdf.

centersfollowed by Nigeria and Egypt at 12% each, and Kenya at 10%.Egypt, on the other hand, is advancing its second National AI Strategy (2025)[1]

3.2.2.1 AI capabilities

- ***Datasets and Computing PowerT:***

Data must also be high-quality, varied, inclusive, and locally sourced to effectively tackle local issues. However, there exists a considerable disparity in the quality, inclusiveness, and accessibility of data for AI models in Africa. Much of the data generated by both public and private sectors remains out of reach. Organizations in these sectors frequently lack the necessary infrastructure, resources, and data-management systems to gather data and make it available for advancing AI adoption. Conversely, the majority of data regarding the African population is currently controlled by only a few companies. [2]*as previously shown in the last section.*

Utilizing data for AI necessitates computers that possess substantial computational and processing capabilities due to the requirement to handle large datasets and evaluate all potential outcomes for each decision. Many African nations do not have access to high-performance computing resources equipped with advanced graphics processing units within their research organizations and educational institutions. Consequently, it is crucial to invest in computing infrastructure and cloud computing solutions for AI-related purposes. Access to data is an essential component for fostering a competitive AI environment. African countries can tackle these challenges by achieving the following objectives.[3]

The advancement of AI is also constrained by inadequate network accessibility in Africa. The pace of infrastructure development and mobile technology connectivity is sluggish, leaving a considerable portion of the African population unconnected and lacking Internet access (Marino Garcia and Kelly, 2015). Moreover, the steep costs associated with Internet access and broadband inhibit the broad adoption of AI, with expenses in certain African nations reaching as high as 44% of GDP (Marino Garcia

[1] Divine-Favour Ukoh, "AI Development in Africa – An Overview," *The AI Innovator* (blog), April 12, 2025, https://theaiinnovator.com/ai-development-in-africa-an-overview/.
[2] Thomas, "Africa's AI Moment."
[3] "70029-Eng_ai-for-Africa-Blueprint.Pdf."

and Kelly, 2020). Almost 300 million Africans reside more than 50 kilometers away from a fibre or cable broadband connection[1]

- ***AI Skills and Talent:***

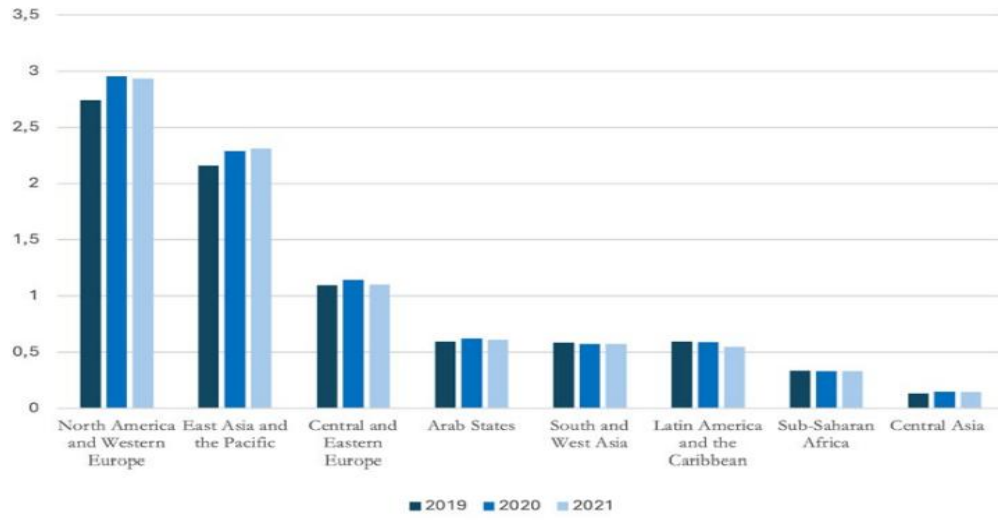
Numerous outstanding research and educational institutions exist across Africa. For instance, the African Institute for Mathematical Sciences (AIMS) and the Centre for Artificial Intelligence Research (CAIR) offer valuable contributions, alongside universities like the University of Johannesburg, which have established AI-focused programs. It is essential to expand on these initiatives to cultivate a cohort of highly skilled AI professionals in Africa. Despite the potential for brain drain, where talented individuals leave the continent for opportunities in the U.S. or China due to competition, leadership in AI advancement fosters a self-reinforcing loop that draws top global talent.[2]

- ***AI Research and Innovation :***

In Africa, local specialists are progressively establishing technology hubs similar to Silicon Valley in the US and Silicon Wadi in Israel. Many of these tech centers are fittingly named 'Silicon Savannah' in Kenya, 'Sheba Valley' in Ethiopia, and 'Yabacon Valley' in Nigeria. These tech ecosystems, along with various African networks (such as DeepLearning Indaba and the Responsible AI network—Africa) and local AI start-ups, as well as stakeholders like educational institutions, governments, and a broader AI community, are fostering an evolving landscape aimed at developing AI systems that align with African interests, issues, and cultures[3].

[1] Arakpogun et al., "Artificial Intelligence in Africa," 2021.
[2] Craddock, "The AI Superpower Showdown."
[3] Eke, Wakunuma, and Akintoye, *Responsible AI in Africa*.

Figure3.4*: R&D Investment Expenditures (as a Percentage of GDP by Region)*



Source*: UNESCO Institute for Statistics*

When comparing AI adoption among leading nations, African countries have lagged behind. This slower pace has led to statistics showing that the US secures more venture capital investments in a single morning ($155 million) than the entire Southern Africa region does in a whole year ($77 million in 2019). Additionally, Google has noted a 270% increase in AI-related searches across Africa in the past year[1]*.*

3.2.2.2 AI governance

While it is essential to have domestic AI regulations to ensure that the advantages and disadvantages of AI do not unfairly impact certain groups, global governance of AI—through an international regulatory body, treaties, or other methods—might be necessary to facilitate a wide and fair distribution of both benefits and challenges. A multi-layered approach to governance will be required to foster responsible AI ecosystems, guarantee equitable distribution of AI benefits, manage risks, address harms, and ensure that AI development and usage across Africa remains transparent and accountable to its citizens. The governance of AI in Africa will take into account emerging best practices in AI policy and regulation both regionally and globally (such as the EU AI Act) and will recognize the varying degrees of AI utilization and adoption among different stakeholders within African AI ecosystems.A robust governance

[1] "Navigating the U.S.-China AI Competition."

regime for Africa will align with existing relevant national legislation and continental frameworks, augmenting them and addressing regulatory gaps and policy areas[1]

The governance gap for AI will largely be addressed through what is known as soft law. These mechanisms encompass a variety of instruments that outline substantive expectations but lack direct enforceability by governmental bodies, including methods such as professional guidelines, codes of conduct, standards, and best practices. Effective governance is crucial for ensuring that AI's use and development are inclusive of diverse populations, align with African priorities, and do not negatively impact African individuals, communities, or environments. Establishing solid governance frameworks for AI grounded in ethical principles, democratic ideals, human rights, and the rule of law, in accordance with Agenda 2063, should be an essential focus for actors at the continental, regional, and national levels. This strategy will involve the following actions: Revising and implementing existing laws and frameworks: There are several legal structures that provide important foundations for the responsible and equitable use and advancement of AI in Africa.These include[2]*:*

- *Intellectual Property laws*
- *Electronic Communications and Transactions laws*
- *Whistleblowing and protected disclosure laws*
- *Access to information laws*
- *Personal data protection laws*
- *Cybersecurity laws*
- *Consumer protection laws*
- *Antitrust and competition laws*
- *Laws and policies pertaining to inclusion and empowerment of different groups (women, girls, people with disabilities, youth, children, rural population, etc.)*

[1] "44004-Doc-EN-_Continental_AI_Strategy_July_2024.Pdf."
[2] "44004-Doc-EN-_Continental_AI_Strategy_July_2024.Pdf."

3.2.2.3 Public and Private Investment

Although worldwide investment is crucial, the advancement of AI in Africa should minly depend on funding from African governments and the continent's private sector to ensure independent AI capabilities. Some governments are already taking initiatives to finance AI by establishing national AI institutes, creating centres of excellence at universities, and supporting innovative AI startups. However, investment from the African private sector remains minimal and requires enhancement. Additionally, governments can play a vital role in fostering a supportive environment for research and innovation, which can attract more AI stakeholders and investment opportunities. A successful strategy for AI investment could trigger a surge in African AI startups and innovation hubs. The accessibility of open government data can also drive innovative solutions. As highlighted by private sector representatives from Africa who were interviewed, African governments tend to be protective of national resources and wary of the intentions of certain private sector entities, fearing exploitation for profit and the outflow of earnings. Consequently, private sector companies must strive to alleviate government concerns and clearly understand the objectives that governments aim to achieve through a partnership[1]

The Smart Africa alliance is of note as a nexus of African multilateral action on digital issues. Smart Africa brings together 36 African member state governments and a myriad of private sector players, academia, civil society and international development organizations. It coordinates continental efforts to make the digital economy a significant contributor to socio-economic development. Smart Africa works closely with the African Union even though the former appears to be relatively more reactive. It provides technical support, feedback and pilot project expertise and helps African countries pool resources[2]*.*

3.2.2.4 Regional and International cooperation

AI has become a powerful force reshaping the landscape of international cooperation and international relations with emerging global crises such as food security, climate change, and Pandemics demand innovative solutions. AI is playing a pivotal role in

[1] Soulé, "Navigating Africa's Digital Partnerships in a Context of Global Rivalry."
[2] Soulé.

addressing complex issues that transcend borders and require cooperation across various domains and actors[1].

Intra-Africa Coordination on AI : *AI faces numerous transnational challenges, such as the movement of data and applications that rely on AI across national borders. The risks associated with AI are also a global concern. Nations can take advantage of economies of scale by developing skills, sharing computing infrastructures, and benefiting from research and innovation. Thus, regional collaboration and coordination are crucial for optimizing the advantages of AI for the African population, minimizing risks, pooling resources, and fostering innovative solutions for development. There are many opportunities for cooperation and coordination among AU Member States:*

- *Exchange of experience in the development and implementation of AI Strategies*
- *Data exchange*
- *Research and Development Collaboration*
- *Knowledge and expertise sharing*
- *Address the ethical, safety and security risks of AI*[2].

[1] "44004-Doc-EN-_Continental_AI_Strategy_July_2024.Pdf."
[2] "44004-Doc-EN-_Continental_AI_Strategy_July_2024.Pdf."

Conclusion

Conclusion

To sum up, this reaserch reafirms by the end an ancient African quote "When elephants fight, it is the grass that suffers," underscores the depth and meaning of the situation the African continent is currently experiencing. The Sino-American rivalry in AI is forging new spheres of influence, altering alliance dynamics, and compelling countries globally to carefully manage their connections with both superpowers The immediate implications are particularly noticeable in terms of AI soverignty and forced alignment where countries are facing pressure to align with either the US or Chinese technological landscapes. This decision goes beyond simple technology selection to include data governance policies, ethical concerns, and infrastructural reliance. The establishment of parallel technological norms and infrastructures risks creating a 'digital iron curtain' that could splinter the global AI landscape . Thus, Sino-American technological competition could lead to the Galapagos syndrome, an emerging state-centric model that not only sees two big countries competing to bring smaller economies into their systems but a "you're with me or you're against me" strategic mentality that could lead to direct political or economic pressure on other small countries. Force countries to take sides in business, science, and defense .There as increased disputations over the control of global AI market, taking the form of contetations between a re-westernization led by the United States and its allies and de-westernization led by China. At an other level, the global south made up of global Africa is also intensifiying struggles for for AI decoloniality as unfinished liberation project to stop the marginalization and dependence of the african continent on external AI.

The African continent has not kept pace with the global digital trends. A combination of factors such as widespread digital connectivity, inadequate digital infrastructure, excessive dependence on foreign entities, a lack of education among technology users and workers, inconsistent regulatory frameworks, and financial limitations has left many African nations facing infrastructure challenges. Within African policymaking circles, there is a recognized need for governments to assert their autonomy in dealing with other countries and to effectively navigate this intricate digital landscape in a manner that serves their interests rather than subordinating to the agendas of either side in the digital geopolitical spectrum. A significant concern is whether a stance of non-alignment—considered by scholars as a more practical approach for Africa in managing foreign relations—can help the continent seek self-sufficiency instead of

continued dependency; they prefer assistance that empowers them rather than mere charity, as they strive to transition from the periphery of the AI revolution to its core.

To harness the positive and transformative potential of AI for African progress and to mitigate associated risks, it is essential to develop the necessary capabilities. This entails consistent investment in infrastructure—including reliable electricity, comprehensive broadband connectivity, data facilities like data centers and cloud services, and computing resources—as well as access to extensive quality data, education, and skills in AI, research, and innovation. Furthermore, Africa must cultivate a dynamic and inclusive AI startup ecosystem that focuses on creating and applying social and economic applications and systems. Adopting a cohesive, strategy-driven approach would enable the continent to proactively ensure that AI serves its interests rather than becoming a victim of a one-size-fits-all strategy.

Although the research aims to identify the emerging challenges at the continental level, it ultimately reaffirms that ethics is an inherent principle of existence and is vital for ensuring our safety, even within military contexts. Beyond the replication of AI, it is crucial to remember the human element, as AI will play a pivotal role in shaping the new world ordeR.

List of References

1. “2024-Wttc-Introduction-to-Ai,” n.d.
2. “2024-Wttc-Introduction-to-Ai.Pdf.” Accessed February 9, 2025. https://cdn-dynmedia-1.microsoft.com/is/content/microsoftcorp/microsoft/final/en-us/microsoft-brand/documents/2024-wttc-introduction-to-ai.pdf.
3. “2024-Wttc-Introduction-to-Ai.Pdf.” Accessed February 9, 2025. https://cdn-dynmedia-1.microsoft.com/is/content/microsoftcorp/microsoft/final/en-us/microsoft-brand/documents/2024-wttc-introduction-to-ai.pdf.
4. “44004-Doc-EN-_Continental_AI_Strategy_July_2024.Pdf.” Accessed May 6, 2025. https://au.int/sites/default/files/documents/44004-doc-EN-_Continental_AI_Strategy_July_2024.pdf.
5. “44004-Doc-EN-_Continental_AI_Strategy_July_2024.Pdf.” Accessed April 9, 2025. https://au.int/sites/default/files/documents/44004-doc-EN-_Continental_AI_Strategy_July_2024.pdf.
6. “44004-Doc-EN-_Continental_AI_Strategy_July_2024.Pdf.” Accessed May 13, 2025. https://au.int/sites/default/files/documents/44004-doc-EN-_Continental_AI_Strategy_July_2024.pdf.
7. “70029-Eng_ai-for-Africa-Blueprint.Pdf.” Accessed May 6, 2025. https://www.bmz-digital.global/wp-content/uploads/2022/08/70029-eng_ai-for-africa-blueprint.pdf.
8. Adegbindin, Omotade. “CRITICAL NOTES ON HEGEL’S TREATMENT OF AFRICA” 11 (2015).
9. Adegoke, Praise. “Utilization of AI to Solve Security Challenges in Africa: What Africa Can Learn from China and the UK.” SSRN, 2024. https://doi.org/10.2139/ssrn.4989163.
10. Aditya, Muhammad Ferdy, Khoirul Amin, and Devy Indah Paramitha. “China’s Military Engagement in The Pacific Region: Implications For Australia’s Defence and National Security Policy,” n.d.
11. “AEP-US-China-AI-Paper-2024-1.Pdf.” Accessed May 15, 2025. https://americanedgeproject.org/wp-content/uploads/2024/12/AEP-US-China-AI-Paper-2024-1.pdf.
12. “Africa-and-the-US-China-Tech-Comp,” n.d.
13. *Agenda 2063: the Africa we want*. Addis Ababa: African Union Commission, 2015.
14. Ahammad, Dr Aftabuddin. “America-China Conflict: An Overview,” n.d.

15. Ahmad Khan, Irteza Imam And Adeela Azam. “Role of Artificial Intelligence in Defence Strategy: Implications for Global and National Security.” *Strategic Studies* 41, no. 1 (May 9, 2021): 19–40. https://doi.org/10.53532/ss.041.01.0058.

16. “AI Becomes Latest Frontier in China-US Race for Africa - Issuu.” Accessed May 9, 2025. https://issuu.com/aimediasynapse/docs/synapse_magazine_issue_23_240624_v2/s/52516759.

17. “AI in China: Sketchy Prehistories.” Accessed May 13, 2025. https://dsprojects.lib.cuhk.edu.hk/en/ai-in-china-sketchy-prehistories/.

18. “Ai-Governance-Snapshot---Essential-Components-of-Ai-Governance.Pdf.” Accessed April 15, 2025. https://www.uts.edu.au/globalassets/sites/default/files/2024-01/ai-governance-snapshot---essential-components-of-ai-governance.pdf.

19. Alayande, Ayantola, Samuel Segun, and Leah Junck. “Emerging Technology Policies and Democracy in Africa,” n.d.

20. AlShebli, Bedoor, Shahan Ali Memon, James A. Evans, and Talal Rahwan. “China and the U.S. Produce More Impactful AI Research When Collaborating Together.” *Scientific Reports* 14, no. 1 (November 19, 2024): 28576. https://doi.org/10.1038/s41598-024-79863-5.

21. American Enterprise Institute - AEI. “China Makes a Move on the Horn of Africa.” Accessed May 15, 2025. https://www.aei.org/op-eds/china-makes-a-move-on-the-horn-of-africa/.

22. Amin, Hadya. “The Impact of Chinese AI on Developing Countries in Sub-Saharan Africa.” San Francisco State University, 2024. https://doi.org/10.46569/fq978300s.

23. Amini, Massih-Reza. *Apprentissage machine: de la théorie à la pratique*. Eyrolles, 2015.

24. “An Inquiry Into the Nature and Causes of the Wealth of Nations - Adam Smith - Google Livres.” Accessed February 15, 2025. https://books.google.dz/books?id=C5dNAAAAcAAJ&pg=PP7&source=kp_read_button&hl=fr&newbks=1&newbks_redir=0&redir_esc=y#v=onepage&q&f=false.

25. Arakpogun, Emmanuel Ogiemwonyi, Ziad Elsahn, Femi Olan, and Farid Elsahn. “Artificial Intelligence in Africa: Challenges and Opportunities.” In *The Fourth Industrial Revolution: Implementation of Artificial Intelligence for Growing Business Success*, edited by Allam Hamdan, Aboul Ella Hassanien, Anjum Razzaque, and Bahaaeddin Alareeni, 935:375–88. Studies in Computational Intelligence. Cham: Springer International Publishing, 2021. https://doi.org/10.1007/978-3-030-62796-6_22.

26. ———. “Artificial Intelligence in Africa: Challenges and Opportunities.” In *The Fourth Industrial Revolution: Implementation of Artificial Intelligence for Growing Business Success*, edited by Allam Hamdan, Aboul Ella Hassanien, Anjum Razzaque, and Bahaaeddin

Alareeni, 935:375–88. Studies in Computational Intelligence. Cham: Springer International Publishing, 2021. https://doi.org/10.1007/978-3-030-62796-6_22.

27. Araya, Daniel, and Alex He. “United States-China Multilateralism in the Age of Military AI,” no. 309 (2024).

28. “Arora.Pdf.” Accessed April 20, 2025. https://www.imf.org/external/pubs/ft/fandd/fre/2010/12/pdf/arora.pdf.

29. “Artificial-Intelligence-Types.Pdf.” Accessed February 10, 2025. https://blogs.bmc.com/artificial-intelligence-types/?print-posts=pdf.

30. “Assessing U.S.-China Technology Competition in Africa | NSI.” Accessed May 10, 2025. https://nsiteam.com/social/smaspeakerseries_04april2023/.

31. Audibert, Rafael B., Henrique Lemos, Pedro Avelar, Anderson R. Tavares, and Luís C. Lamb. “On the Evolution of A.I. and Machine Learning: Towards a Meta-Level Measuring and Understanding Impact, Influence, and Leadership at Premier A.I. Conferences.” arXiv, January 8, 2024. https://doi.org/10.48550/arXiv.2205.13131.

32. Bao, Anniek. “China Strikes Back with 125% Tariffs on U.S. Goods as Trade War Intensifies.” CNBC, April 11, 2025. https://www.cnbc.com/2025/04/11/china-strikes-back-with-125percent-tariffs-on-us-goods-starting-april-12.html.

33. Beauchamp-Mustafaga, Nathan. “Exploring the Implications of Generative AI for Chinese Military Cyber-Enabled Influence Operations: Chinese Military Strategies, Capabilities, and Intent,” n.d.

34. “Before_and_Beyond_Artificial_Intelligence_Opportun,” n.d.

35. Bengio, Yoshua, Aaron Courville, and Ian Goodfellow. *L’apprentissage profond*. MASSOT EDITIONS, 2018.

36. Bhattacharya, Samir. “China Is Exporting Its Model of Political Authoritarianism to Africa.” The Strategist, February 16, 2025. https://www.aspistrategist.org.au/china-is-exporting-its-model-of-political-authoritarianism-to-africa/.

37. “Big Data: Concepts, Methodologies, Tools, and Applications: Concepts ... - Google Livres.” Accessed May 13, 2025. https://books.google.dz/books?id=BKEoDAAAQBAJ&pg=PA1050&dq=big+data+PDF&hl=fr&newbks=1&newbks_redir=0&sa=X&ved=2ahUKEwiUiIa9g6GNAxVwTqQEHcigMUcQ6AF6BAgGEAM#v=onepage&q=big%20data%20PDF&f=false.

38. “Big-Data-Compilation-Sdg-Indicators-Arab-Region-Challenges-Opportunities-Arabic.Pdf.” Accessed April 23, 2025.

https://www.unescwa.org/sites/default/files/pubs/pdf/big-data-compilation-sdg-indicators-arab-region-challenges-opportunities-arabic.pdf.

39. "Black Communication in the Age of Disinformation: DeepFakes and Synthetic Media - Google Livres." Accessed April 15, 2025. https://books.google.dz/books?id=nLLFEAAAQBAJ&pg=PA54&dq=deep+fake&hl=fr&newbks=1&newbks_redir=0&sa=X&ved=2ahUKEwjb-f_k7tmMAxWbVqQEHUvnMmIQ6AF6BAgLEAM#v=onepage&q=deep%20fake&f=false.

40. Bode, Ingvild. "AI Technologies and International Relations: Do We Need New Analytical Frameworks?" *The RUSI Journal* 169, no. 5 (July 28, 2024): 66–74. https://doi.org/10.1080/03071847.2024.2392394.

41. Boniface, Pascal. *Géopolitique de l'intelligence artificielle: comment la révolution numérique va bouleverser nos sociétés*. Paris: Eyrolles, 2021.

42. "Book Review: China–US Competition: Impact on Small and Middle Powers' Strategic Choices," n.d.

43. *Bridging the Artificial Intelligence Governance Gap: The United States' and China's Divergent Approaches to Governing General-Purpose Artificial Intelligence*. RAND Corporation, 2024. https://doi.org/10.7249/PEA3703-1.

44. Buchanan, Bruce G. "A (Very) Brief History of Artificial Intelligence," n.d.

45. Camp, Noelle, and Michael Bachman. "Challenges and Opportunities for US-China Collaboration on Artificial Intelligence Governance," n.d.

46. Castro, Daniel, Michael McLaughlin, and Eline Chivot. "Who Is Winning the AI Race: China, the EU or the United States?," n.d.

47. Chrisley, Ronald, and Sander Begeer. *Artificial Intelligence: Critical Concepts*. Taylor & Francis, 2000.

48. Chui, Michael, Eric Hazan, Roger Roberts, Alex Singla, Kate Smaje, Alex Sukharevsky, Lareina Yee, and Rodney Zemmel. "The next Productivity Frontier," n.d.

49. Coleman, Danielle. "Digital Colonialism: The 21st Century Scramble for Africa through the Extraction and Control of User Data and the Limitations of Data Protection Laws." *Michigan Journal of Race & Law*, no. 24.2 (2019): 417. https://doi.org/10.36643/mjrl.24.2.digital.

50. ———. "Digital Colonialism: The 21st Century Scramble for Africa through the Extraction and Control of User Data and the Limitations of Data Protection Laws." *Michigan Journal of Race & Law*, no. 24.2 (2019): 417. https://doi.org/10.36643/mjrl.24.2.digital.

51. Collectif. *L'Internet et la démocratie numérique*. Presses universitaires de Perpignan, 2017.

52. “Computational Power and AI - AI Now Institute.” Accessed May 13, 2025. https://ainowinstitute.org/publications/compute-and-ai.

53. “Computer Vision: Algorithms and Applications - Richard Szeliski - Google Livres.” Accessed April 14, 2025. https://books.google.dz/books?id=bXzAlkODwa8C&pg=PA689&dq=computer+vision&hl=fr&newbks=1&newbks_redir=0&sa=X&ved=2ahUKEwir5qOZ5deMAxVvaqQEHdJaN1AQ6AF6BAgKEAM#v=onepage&q=computer%20vision&f=false.

54. Coyne, Thomas. “How the Enlightenment Ends - The Atlantic.” *The Atlantic*, n.d.

Craddock, Mark. “The AI Superpower Showdown.” *Medium* (blog), March 26, 2025. https://medium.com/@mcraddock/inside-the-us-china-race-for-technological-supremacy-52cb5c3df063.

55.“CSC 401.Pdf.” Accessed February 9, 2025. https://nacosadsu.org.ng/main/docs/400L/CSC%20401.pdf.

56.Cui, Jun. “A Comparative Study on the Development of ChatGPT and DeepSeek AI Models in General Artificial Intelligence Technologies,” 2025. https://doi.org/10.13140/RG.2.2.19380.77443.

57.“Data Capitalism.” Accessed April 15, 2025. https://datacapitalism.d4bl.org/?utm_source=chatgpt.com.

58.Delipetrev, Blagoj, Chrisa Tsinaraki, and Uroš. Kostić. *AI Watch, Historical Evolution of Artificial Intelligence: Analysis of the Three Main Paradigm Shifts in AI*. Luxembourg: Publications Office of the European Union, 2020.

59.Di, Afiff. “2024 Q2: Artificial Intelligence for Development,” n.d.

60.Ding, Jeffrey. *Technology and the Rise of Great Powers: How Diffusion Shapes Economic Competition*. Princeton University Press, 2024.

61.Dong, Tianyu, and Lingxing Meng. “Assessment of International Competitiveness of AI Industry Based on Positive and Negative Ideal Points Weighting Method.” Edited by Sang-Bing Tsai. *Mobile Information Systems* 2021 (September 25, 2021): 1–9. https://doi.org/10.1155/2021/9119262.

62.Doyle, Michael W. *Cold Peace: Avoiding the New Cold War*. Liveright Publishing, 2023.

63.Eke, Damian Okaibedi, Kutoma Wakunuma, and Simisola Akintoye, eds. *Responsible AI in Africa: Challenges and Opportunities*. Social and Cultural Studies of Robots and AI. Cham: Springer International Publishing, 2023. https://doi.org/10.1007/978-3-031-08215-3.

64.El-Had, Mohamed. “Artificial Intelligence Background, Definitions, Challenges and Benefits.” *مجلة الجمعية المصرية لنظم المعلومات وتكنولوجيا الحاسبات* 31, no. 31 (May 1, 2023): 124–32. https://doi.org/10.21608/jstc.2023.297957.

65.*Elon Musk at the White House: FULL NEWS CONFERENCE*, 2025. https://www.youtube.com/watch?v=ThjwjSNzye0.

66.Ertel, Wolfgang. *Introduction to Artificial Intelligence*. Springer, 2018.

67."Executive Order on Maintaining American Leadership in Artificial Intelligence – The White House." Accessed April 27, 2025. https://trumpwhitehouse.archives.gov/presidential-actions/executive-order-maintaining-american-leadership-artificial-intelligence/.

68.Fowdur, Tulsi Pawan, Satyadev Rosunee, Robert T. F. Ah King, Pratima Jeetah, and Mahendra Gooroochurn. *Artificial Intelligence, Engineering Systems and Sustainable Development: Driving the UN SDGs*. Emerald Group Publishing, 2024.

69.Fukuyama, Francis. *The End of History and the Last Man*. New York : Toronto : New York: Free Press ; Maxwell Macmillan Canada ; Maxwell Macmillan International, 1992.

70."GDC-Submission_the-Millennium-Project.Pdf." Accessed February 12, 2025. https://www.un.org/digital-emerging-technologies/sites/www.un.org.techenvoy/files/GDC-submission_the-millennium-project.pdf.

71.Geetha, T. V., and S. Sendhilkumar. *Machine Learning: Concepts, Techniques and Applications*. CRC Press, 2023.

72.Ghosh, Moumita, and A. Thirugnanam. "Introduction to Artificial Intelligence." In *Artificial Intelligence for Information Management: A Healthcare Perspective*, edited by K. G. Srinivasa, Siddesh G. M., and S. R. Mani Sekhar, 88:23–44. Studies in Big Data. Singapore: Springer Singapore, 2021. https://doi.org/10.1007/978-981-16-0415-7_2.

73.Gilpin, Robert, and Jean M. Gilpin. *Global Political Economy: Understanding the International Economic Order*. Princeton: Princeton University Press, 2011.

74."Global Center on AI Governance." Accessed May 9, 2025. https://www.globalcenter.ai/analysis/articles/africa-s-ai-future-in-the-context-of-the-us-china-ai-race.

75.Gonçalves, Bernardo. "Passed the Turing Test: Living in Turing Futures." *Intelligent Computing* 3 (January 2024): 0102. https://doi.org/10.34133/icomputing.0102.

76.Gonzales, Daniel, Julia Brackup, Spencer Pfeifer, and Timothy M Bonds. "Securing 5G: A Way Forward in the U.S. and China Security Competition," n.d.

77."GPUs Are Currently Much More Difficult to Obtain than Drugs." - Recherche Google." Accessed May 13, 2025. https://www.google.com/search?q=GPUs+are+currently+much+more+difficult+to+obtain+than+drugs.%E2%80%9D&rlz=1C1GCEU_enDZ1161&oq=GPUs+are+currently+much+more+difficult+to+obtain+than+drugs.%E2%80%9D&gs_lcrp=EgZjaHJvbWUyBggAEEUYOTIHCAEQIRiPAjIH

CAIQIRiPAtIBBzQwNGowajSoAgCwAgE&sourceid=chrome&ie=UTF-8#fpstate=ive&vld=cid:81580bee,vid:nxbZVH9kLao,st:0.

78.Graham, Allison. *Vers La Guerre: L'Amérique et La Chine Dans Le Piége de Thucydide*. Odile Jacob, n.d.

79."HAI_2024_AI-Index-Report," n.d.

80.Hine, Emmie. "Governing Silicon Valley and Shenzhen: Assessing a New Era of Artificial Intelligence Governance in the United States and China." *Digital Society* 3, no. 3 (December 2024): 50. https://doi.org/10.1007/s44206-024-00138-7.

81.Horowitz, Michael C., Gregory C. Allen, Edoardo Saravalle, Anthony Cho, Kara Frederick, and Paul Scharre. "National Security-Related Applications of Artificial Intelligence." Artificial Intelligence and International Security. Center for a New American Security, 2018. https://www.jstor.org/stable/resrep20430.3.

82.Huntington, Samuel P. "The Clash of Civilizations and the Remaking of World Order," n.d.

83.Ide, Enrique, and Eduard Talamas. "Artificial Intelligence in the Knowledge Economy." arXiv, February 24, 2025. https://doi.org/10.48550/arXiv.2312.05481.

84."IMPLICATION OF ARTIFICIAL INTELLIGENCE ON NATIONAL SECURITY FOR THE NIGERIA SECURITY AGENCIES." *Journal of Terrorism Studies* 6, no. 1 (July 3, 2024). https://doi.org/10.7454/jts.v6i1.1075.

85.Jr, Joseph S Nye. "The Future of Power," n.d.

86.Kai, Jin. *Rising China in a Changing World: Power Transitions and Global Leadership*. Springer, 2016.

87.Kissinger, Henry, Eric Schmidt, and Daniel P. Huttenlocher. *The Age of AI: And Our Human Future*. Paperback edition. London: John Murray, 2022.

88.Krause, David. "Artificial Intelligence and the Changing Political Landscape: The Impact of Trump's Return on AI Governance and Policy." SSRN, 2024. https://doi.org/10.2139/ssrn.5018240.

89.Li, Jieruo. "Artificial Intelligence Technology and China's Defense System," n.d.

88.Lippert, Barbara, Volker Perthes, and Stiftung Wissenschaft Und Politik. "Strategic Rivalry between United States and China: Causes, Tragectories, and Implications for Europe." *SWP Research Paper*, 2020, 4/2020. https://doi.org/10.18449/2020RP04.

89.Lobell, Steven E. "Can the United States and China Escape the Thucydides Trap?," n.d.

90.Magara, Ibrahim Sakawa, and Hubert Kinkoh. "China's Military Positioning in the Horn of Africa and Its Implications for Regional and Global Security Outcomes," 2020.

91.Maisha, Kanij Fatima. “AI & Arms Race: The Rivalry Between the U.S. & China in the Field of Tech Supremacy,” n.d.

92.Malik, Mohan. “Technopolitics: How Technology Shapes Relations Among Nations,” n.d.

93.Matthijs, Matthias. “Hegemonic Leadership Is What States Make of It: Reading Kindleberger in Washington and Berlin.” *Review of International Political Economy* 29, no. 2 (March 4, 2022): 371–98. https://doi.org/10.1080/09692290.2020.1813789.

94.Mazarr, Michael, Jonathan Blake, Abigail Casey, Tim McDonald, Stephanie Pezard, and Michael Spirtas. *Understanding the Emerging Era of International Competition: Theoretical and Historical Perspectives*. RAND Corporation, 2018. https://doi.org/10.7249/RR2726.

95.Mearsheimer, John J. *The Tragedy of Great Power Politics*. W. W. Norton, 2001.

96.Mitre, Jim, and Joel B Predd. “Artificial General Intelligence’s Five Hard National Security Problems,” n.d.

97.Morgenthau, Hans J. “Politics Among Nations The Struggle For Power And Peace,” n.d.

98.Moyo, Gorden, and Sabelo J. Ndlovu-Gatsheni. *Global Storms and Africa in World Politics: Contemporary Challenges and Decolonial Responses*. Springer Nature, 2025.

99.“Navigating the U.S.-China AI Competition: An African Perspective – ASCIR.” Accessed May 8, 2025. https://ascir.org/2025/02/18/navigating-the-u-s-china-ai-competition-an-african-perspective/.

100.“Navigating the U.S.-China AI Competition: An African Perspective – ASCIR.” Accessed May 9, 2025. https://ascir.org/2025/02/18/navigating-the-u-s-china-ai-competition-an-african-perspective/.

101.Nilsson, Nils J. *The Quest for Artificial Intelligence*. Cambridge University Press, 2009.

102.“Noor-Book.Com الذكاء الاصطناعي مقدمة قصيرة جدا,” n.d.

103.Noujio, Basile Sede. “HHeeggeell’’ss PPhhiilloossoopphhyy Ooff HHiissttoorryy--AA CChhaalllleennggee Ttoo Tthhee AAffrriiccaann TThhiinnkkeerr:: TThhee TThhoouugghhtt Ooff LLeeooppoolldd SSeeddaarr SSeenngghhoorr,” n.d.

104.“NSS-Final-12-18-2017-0905.Pdf.” Accessed March 1, 2025. https://trumpwhitehouse.archives.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf.

105.Nucci, Ezio Di, and Filippo Santoni de Sio. *Drones and Responsibility: Legal, Philosophical and Socio-Technical Perspectives on Remotely Controlled Weapons*. Routledge, 2016.

106.OECD. *Artificial Intelligence in Society*. OECD, 2019. https://doi.org/10.1787/eedfee77-en.

OECD. “Global Trends in Government Innovation 2023,” May 15, 2023. https://www.oecd.org/en/publications/global-trends-in-government-innovation-2023_0655b570-en.html.

Onome. “The Untold History of AI.” *AutoGPT* (blog), July 18, 2024. https://autogpt.net/the-untold-history-of-ai/.

Rahman, Mijanur. “Foundations of Artificial Intelligence,” n.d.

“Rééquilibrer l’intelligence artificielle,” 2023.

Rokvić, Vanja. “Back to the Future: The US-China AI Arms Race?,” 97–123, 2024. https://doi.org/10.18485/iipe_dijalozi_kina.2024.4.1.ch5.

Sabry, Fouad. *Robótica Autónoma: ¿Cómo Aparecerá Un Robot Autónomo En La Portada de La Revista Time?* One Billion Knowledgeable, 2021.

Schmidt, Helmut, and Zbigniew Brzezinski. “The Grand Chessboard: American Primacy and Its Geostrategic Imperatives.” *Foreign Policy*, no. 110 (1998): 179. https://doi.org/10.2307/1149289.

Schuchmann, Sebastian. “History of the Second AI Winter.” *Towards Data Science* (blog), November 28, 2019. https://medium.com/towards-data-science/history-of-the-second-ai-winter-406f18789d45.

Shambaugh, David. “China Is the Challenge of Our Time—and the United States Must Get to Grips with the Totality of the Competitive Challenge in All Its Dimensions.,” n.d.

Sisson, Dr Melanie W. “Artificial Intelligence, Geopolitics, and the US-China Relationship,” n.d.

Soulé, Folashadé. “Navigating Africa’s Digital Partnerships in a Context of Global Rivalry,” n.d.

Strohbach, Martin, Jörg Daubert, Herman Ravkin, and Mario Lischka. “Big Data Storage.” In *New Horizons for a Data-Driven Economy*, edited by José María Cavanillas, Edward Curry, and Wolfgang Wahlster, 119–41. Cham: Springer International Publishing, 2016. https://doi.org/10.1007/978-3-319-21569-3_7.

“Stuart Russell, Peter Norvig-Artificial Intelligence_ A Modern Approach-Prentice Hall (PDFDrive).Pdf.” Accessed February 11, 2025. http://repo.darmajaya.ac.id/4836/1/Stuart%20Russell%2C%20Peter%20Norvig-Artificial%20Intelligence_%20A%20Modern%20Approach-Prentice%20Hall%20%28%20PDFDrive%20%29.pdf.

“Superintelligence: Science or Fiction? | Elon Musk & Other Great Minds - YouTube.” Accessed February 12, 2025. https://www.youtube.com/watch?v=h0962biiZa4.

"Symbiotic Logic: Co-Evolution of Human-AI Thought through Mutual Error Correction" by Smith Lee :: SSRN." Accessed May 13, 2025. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5207130.

"TAGP-4_1_Research_Venske_US-China-Techwar.Pdf." Accessed May 9, 2025. https://digitalmallblobstorage.blob.core.windows.net/wp-content/2024/03/TAGP-4_1_Research_Venske_US-China-techwar.pdf.

Tait, John I. *Charting a New Course: Natural Language Processing and Information Retrieval.: Essays in Honour of Karen Spärck Jones*. Springer Science & Business Media, 2005.

"The Digital Iron Curtain | The Generation." Accessed May 15, 2025. https://www.the-generation.net/the-digital-iron-curtain/.

"The Digital Silk Road: China's Technological Rise and the Geopolitics of ... - Google Livres." Accessed May 15, 2025. https://books.google.dz/books?id=gXqfEAAAQBAJ&pg=PT47&dq=the+Digital+Silk++road+pdf&hl=fr&newbks=1&newbks_redir=0&sa=X&ved=2ahUKEwiz067Z-6WNAxUJgP0HHcCdMLQQ6AF6BAgEEAM#v=onepage&q=the%20Digital%20Silk%20%20road%20pdf&f=false.

"The Impact of Artificial Intelligence on Productivity, Distribution and Growth: Key Mechanisms, Initial Evidence and Policy Challenges." OECD Artificial Intelligence Papers. Vol. 15. OECD Artificial Intelligence Papers, April 16, 2024. https://doi.org/10.1787/8d900037-en.

The Interaction Design Foundation. "What Is Human-Centered AI (HCAI)? — Updated 2025." Accessed May 13, 2025. https://www.interaction-design.org/literature/topics/human-centered-ai.

"The Rise of China: The International Hegemonic Stability and the Consequences of Chinese and American Power Strategies," n.d.

"The US-China Economic Relationship," n.d.

"The-Evolution-of-AI-Technology.Pdf." Accessed February 6, 2025. https://tnfarmbureau.org/wp-content/uploads/2023/07/The-Evolution-of-AI-Technology.pdf.

Thomas, David. "Africa's AI Moment: Innovate, Collaborate or Fall Behind." African Business, April 3, 2025. https://african.business/2025/04/long-reads/africas-ai-moment-innovate-collaborate-or-fall-behind.

Tourpe, Hervé. "Promesses et périls de l'intelligence artificielle," n.d.

"Transc-Dartmouth.Pdf." Accessed February 5, 2025. https://denisevellachemla.eu/transc-dartmouth.pdf.

Ukoh, Divine-Favour. "AI Development in Africa – An Overview." *The AI Innovator* (blog), April 12, 2025. https://theaiinnovator.com/ai-development-in-africa-an-overview/.

"Understanding AMERICAN HEGEMONY.Pdf." Accessed April 19, 2025. https://eprints.uad.ac.id/37467/1/Understanding%20AMERICAN%20HEGEMONY.pdf.

"U.S. - China Relations for the 2030s," n.d.

"U.S. Development Agencies Should Embrace AI to Transform the U.S.-Africa Relationship | Carnegie Endowment for International Peace." Accessed May 9, 2025. https://carnegieendowment.org/research/2024/09/africa-ai-us-development?lang=en.

"U.S.-China Competition in Emerging Technologies," n.d.

"Wang-Chen-2018-Rising-Sino-u-s-Competition-in-Artificial-Intelligence-1," n.d.

Wheeler, Nicholas J. "'To Put Oneself into the Other Fellow's Place': John Herz, the Security Dilemma and the Nuclear Age." *International Relations* 22, no. 4 (December 2008): 493–509. https://doi.org/10.1177/0047117808097313.

"Will China's Influence in Africa's AI Revolution Undermine Its Sovereignty? | ODI: Think Change." Accessed May 9, 2025. https://odi.org/en/insights/opinion-will-chinas-influence-in-africas-ai-revolution-undermine-its-sovereignty/.

Wong, Yuna, John Yurchak, Robert Button, Aaron Frank, Burgess Laird, Osonde Osoba, Randall Steeb, Benjamin Harris, and Sebastian Bae. *Deterrence in the Age of Thinking Machines*. RAND Corporation, 2020. https://doi.org/10.7249/RR2797.

"Xi's Full Speech on Science & Tech on May 28." Accessed May 13, 2025. https://www.pekingnology.com/p/xi-jinpings-speech-on-science-and.

"أنطونيو غرامشي حول الهيمنة الثقافية.. ما هي وكيف تعمل؟." Accessed April 19, 2025. https://tadween.alhadath.ps/article/167041/أنطونيو-غرامشي-حول-الهيمنة-الثقافية-ما-هي-وكيف-تعمل؟.

"السيادة-الرقمية-والإستقلال-التكنولوجي-بين-تحديات-الظروف-الوطنية-والدولية-Digital-Sovereignty-and-Technological-Independence-between-the-Challenges-of-National-and-International-Circumstances," n.d.

"الفوضى-العالمية-ودور-إفريقيا-في-إعادة-صياغة-النظام-الدولي.Pdf." Accessed May 16, 2025. https://qiraatafrican.com/wp-content/uploads/2024/01/%D8%A7%D9%84%D9%81%D9%88%D8%B6%D9%89-%D8%A7%D9%84%D8%B9%D8%A7%D9%84%D9%85%D9%8A%D8%A9-%D9%88%D8%AF%D9%88%D8%B1-%D8%A5%D9%81%D8%B1%D9%8A%D9%82%D9%8A%D8%A7-%D9%81%D9%8A-%D8%A5%D8%B9%D8%A7%D8%AF%D8%A9-%D8%B5%D9%8A%D8%A7%D8%BA%D8%A9-%D8%A7%D9%84%D9%86%D8%B8%D8%A7%D9%85-%D8%A7%D9%84%D8%AF%D9%88%D9%84%D9%8A.pdf.

152.“تأثير-الصعود-الصيني-على-النظام-الدولي-في-ظل-الهيمنة-الأمريكية (1),” n.d.

153.“مذكرة نهائية.Pdf.” Accessed May 10, 2025. https://dspace.univ-alger3.dz/jspui/bitstream/123456789/10190/1/%d9%85%d8%b0%d9%83%d8%b1%d8%a9%20%d9%86%d9%87%d8%a7%d8%a6%d9%8a%d8%a9.pdf.

“مفهوم الهيمنة في نظريات العلاقات الدولية,” n.d.

154.“国务院关于印发新一代人工智能发展规划的通知_科技_中国政府网.” Accessed April 23, 2025. https://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm.

155.“国务院关税税则委员会关于调整对原产于美国的进口商品加征关税措施的公告.” Accessed April 20, 2025. https://gss.mof.gov.cn/gzdt/zhengcefabu/202504/t20250411_3961823.htm.