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The AI Race Is the New Gold Rush

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Abstract

The calls to frame artificial intelligence competition as a "new gold rush" have intensified as generative AI systems scale from niche laboratory research to billion-parameter open-source platforms. This review article revisits that metaphor through a data-science and data-analytics lens, to sharpen the earlier analysis with evidence from recent literature on educational disruption, regulatory pluralism, job market, and geopolitical spillovers. A mixed-methods research design combines the best of both bibliometric clustering and comparing study-cases from previous literature. Results confirm that the continued dominance of deep-learning stacks and vertical integration may reveal that an advantage is migrating toward high-trust data pipelines and adaptive governance. Techno-federal fragmentation in both the U.S and China fosters rapid experimentation but generates compliance friction. Meanwhile, the E.U.'s risk-averse-based AI Act attract "trust-seeking" healthcare pilots. In education, large language-model chatbots deliver personalized tutoring at scale and "Study and Learn Mode" yet still amplify academic-integrity concerns. It might be concluded that sustainable leadership will hinge less on raw computing power than on federated, privacy-preserving analytics that align with emergent social norms and regional regulations. Therefore, while also comparable to the 1970s space race era, today's policy makers and data-science teams should co-design auditability, synthetic-data augmentation, and cross-border sandboxes to avoid a systematic "race to the bottom."

1. Introduction

Since late 2022, foundation models such as ChatGPT and Bard have catalyzed what dubs the great rush towards general-purpose AI. Governments equate algorithmic prowess with strategic autonomy (Broeders et al., 2025). Yet, pathways from data assets to durable power remain very opaque (Bühler et al., 2023).

Building on prior work likening AI investment mania to the nineteenth-century mineral booms, one should ask:" How will data-analytics practices, governance architectures, and sectoral spillovers interact to shape competitive advantage in the contemporary AI race? By integrating new evidence on educational disruption and job market disruption (Tampubolon et al., 2024) as well as regulatory fragmentation, the gold-rush analogy should be refined to offer actionable insights for scholars and practitioners. Moreover, this is more concerning than ever, because whether the billions of dollar investment over years are actually benefiting the society and businesses (or is it better put elsewhere? or should the AI rush prioritize benefiting the broader society impact), are still questionable (Adebayo, 2025; Brown & Whelan, 2025; ING Think, 2024).

It is already well known in the education sector that knowledge can be obtained easily from the internet or books. But AI chatbot as a study and learning medium is democratizing it even further. But then, if the information from a paid book can be obtained for free via AI chatbot, it is questionable what is left for the author, real actual human. Nonetheless, the regulations around the world are by far fragmented. Moreover, some of the Premium-tier or the Plus-tier or the Pro-tier version of the AI chatbot is generating money (adding to the "gold rush" framing) for the company that creates the AI chatbot.

Comparisons between today's AI boom and the nineteenth-century gold rushes also reflect a scramble for scarce, value-creating resources (Yousefi & Collins, 2024). Those are now the data, the talent, and the computing power (Yousefi & Collins, 2024). Governments proclaim their national AI strategies, venture capitals pour their record fundings into model training, and firms chase the first-mover competitive-advantage (Bareis & Katzenbach, 2022; Gruetzemacher et al., 2025; Krakowski et al., 2023; Nafizah et al., 2024; Papyshev & Yarime, 2023; Radu, 2021). Yet, the evidence on how data-science practices translate into geopolitical power remains fragmented. Thus, this study also investigates how are the leading actors are operationalizing data-analytics capabilities to win the AI race, and what are the externalities that accompany those strategies. It is essential to integrate the insights from technology-policy literature with empirical mini-cases to illuminate patterns and pitfalls in the future.

2. Related Works

Three pieces of literature ground this study. The geo-political competition contrast U.S venture-led scaling with China's state-orchestrated roadmap, that is currently extending into Southeast Asia (H. Zhang & Khanal, 2024). Regulatory scholars highlights the "techno-federalism," wherein fragmented state-level rules and industry self-governance co-evolve (Wu, 2025). Europe, especially the E.U., counters with norm-entrepreneurship aimed at trustworthy AI (Baronchelli, 2024) as well as ethical AI. The sectoral analyses document the chatbot arms race and its educational ramifications (Grassini, 2023; Labadze et al., 2023; Rudolph et al., 2023). Of course, AI may take a lot of forms, from military drones to car dashboard to spreadsheets. But here in the educational sector, one might say that the most obvious and broadly influential form is the natural language chatbot interface. Systematic reviews report benefits in personalized tutoring alongside concerns over over-reliability and plagiarism (Grassini, 2023; Labadze et al., 2023; Rudolph et al., 2023). Moreover, students must develop and have lifelong learning, not only the 'lifelong asking AI chatbot'. Current development such as the OpenAI's "Study and Learn Mode" tried to tackle some of those problems by not directly giving the key answers to student. Yet crosstalk among these streams is limited, obscuring how governance choices feed back into data-science pipelines and vice-versa.

Prior scholars frames the contest as a geopolitical competition (Budhiraja, 2024), a regulation race (Smuha, 2021), and innovation tournament (Wooldridge, 2022) driven by scale effects, reliability, trust in foundational model (Glikson & Woolley, 2020). Somehow, it is a mix of the 1840s gold rush and the 1970s space race to the moon. Quantitative studies chart patent counts and R&D spending, while qualitative analyses explore governance gaps (Walter, 2024). However, cross-disciplinary synthesis lining data-science workflows to strategic outcomes is still relatively scarce. Moreover, most datasets privilege the U.S.-China

dynamics, while under-representing the European Union's emphasis on trustworthy AI. This study addresses those gaps by triangulating bibliometrics with in-depth study cases of policy and industry cases.

3. Methods

The first phase of this study is conducted through bibliometrics. This phase extended the dataset by harvesting 15 articles. Although in total, this paper uses 35 articles. The articles were strictly grasped by the search strings, namely, "Artificial Intelligence Race"; "Artificial Intelligence Rush"; "Artificial Intelligence Competition"; and "Artificial Intelligence Data Analytics", that are filtered related to the matters and the gaps of this study, through Google Scholar. However, after examining the weight of the links or connection between the authors, using VOSviewer, it can be determined that it is very scattered, and there are not many mutual citations or quoting between them. It can be assumed that the discussions in the case of AI race or the matter of AI rush come from various disciplines. It will be discussed further in Chapter 4. Results. The second phase is about determining the background, nuances, and topics of the cases. It will also be discussed further in Chapter 4.

4. Results

The literature review and bibliometrics reveal four clusters:

i. Scale Economics
ii. Ethical-legal governance and norms
iii. Education applications
iv. Emerging market diffusion.

The scale economics, education applications, and emerging market diffusion are also related to the vertical integration-applications or the application verticality of the current AI development (Attard-Frost & Widder, 2025; Sheikh, 2022; Zhang et al., 2022). The countries mentioned is the U.S., the E.U. countries, and the Southeast Asian. The citation bursts post-2022 coincide with chatbot-style releases such as GPT-4 and Bard (later become Gemini), and the regional regulatory drafts (Sekti et al., 2024; Sudirman et al., 2024; Tampubolon, 2024a).

The simple visualization using the VOSviewer can be seen in the Figures below.

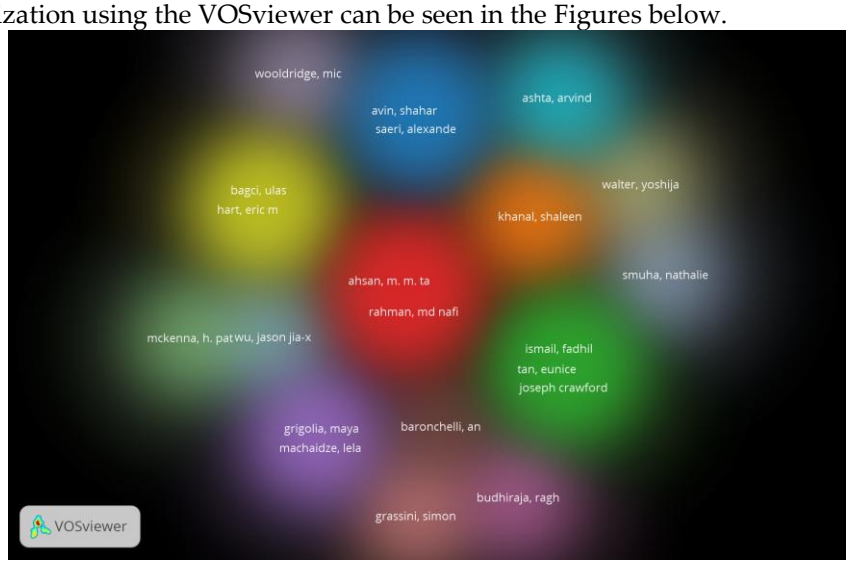

Figure 1 VOSviewer visualization based on Document Weight

Figure 2 VOSviewer visualization based on Link Weight

From the figure above, it can be implied that the matter of questioning AI Rush and its sustainable impact on business and society in general, is still a new topic of discussion, which has not yet been linked or related to one another.

In the U.S., venture funding worths tens billions USD accelerated proprietary model training. Meanwhile the state privacy statutes (e.g. California CPRA) might create patchwork compliance costs (Atata, 2024; Geraldine O. Mbah & Ismail Oluwasola Sanni, 2025; Grace Annie Chintoh et al., 2025; Rudden, 2025). In line with that, the venture-led innovation also funnels abundant private data into proprietary foundation models. Policy inertia persists despite the 2023 Executive Order on Safe, Secure, and Trustworthy AI and other early drafts of regulations.

In Southeast Asia, the ongoing tensions between Washington and Beijing resulted in central directives to align with the provincial data exchanges. Pilot data centers in Singapore and Malaysia secure fresh training corpora while skirting U.S. export controls. The spillover from the spillover also got into Indonesia, reflected by the jumping market stock prices of data-center-related entities. Cloud technology has been around for decades and hasn't caused a stock market jump of this magnitude in Indonesia; so, what else could it be but the current development of AI. In line with that, the central coordination under the "New Generation AI Plan" aligns provincial data-exchanges with state investment, producing rapid model deployment but raising surveillance concerns (as often feared and voiced by the West).

In the E.U., lawmakers, policymakers, have drafted the AI Act that catalyzed start-ups to pivot toward federated learning. Moreover, in the privacy-sensitive sectors, the healthcare diagnostics is hoped to leverage the "trust dividend" while using or assisted by safe AI. In line with that, the draft AI Act prioritizes risk-based regulation. Start-ups adapt by focusing on transparent, small-data analytics and federated-learning pilots to satisfy upcoming compliance audits.

5. Discussion

The finding from this study refines that returns to scale persist, but data quality, legality, and social licenses are now decisive (Yousefi & Collins, 2024). In the U.S., techno-federalism fosters rapid sandboxing but invites regulatory arbitrage that undermined cross-state data sharing (Wu, 2025). Beijing's outward push into Southeast Asia enlarges its data moat yet may export surveillance norms (as often feared and voiced by the West), triggering geopolitical backlash (Zhang & Khanal, 2024). While the U.S. is in their 'America First' moments, the E.U. is having their moments with their 'ethic first' data regulation. And because AI feeds on

data, AI is also affected by GDPR. The E.U.'s so-called 'ethics first' path, often criticized as innovation-suppressing, instead incubates even the high-trust medical AI compliant GDPR. It can be said that E.U.'s GDPR remains the standard, or even the gold standard. Education illustrates sectoral spill-overs: while chatbots democratize tutoring (Grassini, 2023), unchecked deployment erodes assessment validity (Labadze et al., 2023) and fuels an escalating "war of the chatbots" narratives (Rahaman et al., 2023; Rudolph et al., 2023). One might argue that strategic advantage is migrating up-stack from model weights to integrated data-governance pipelines. Keep in mind that the integrated data-governance pipelines also include differential-privacy layers, synthetics augmentation, and third-party audits. Privacy and audits will satisfy emerging norms (Baronchelli, 2024). Policymakers should therefore fund shared evaluation benchmarks and interoperable compliance tooling rather than solely subsidizing computing power/capabilities. It is more important now than ever because AI chatbots are already moving into the agentic phase or being highly connected, as somehow being promised by OpenAI's Agent Mode, Anthropic's Model Context Protocol, or even the open source such as N8N, LangChain, etc.

Scaling the data and scaling the compute still drives benchmarks' performance. Yet, several cases revealed diminishing marginal returns. Leaders might now differentiate via data-quality pipelines, not raw petabytes. But high-quality data is becoming more difficult to obtain, not like the pre-2022 when the internet is not yet flooded by the AI-generated content itself. Some leaders might even move towards synthetics data.

Governance models shape pipelines. The U.S. might reap short-term gains, but faces trust deficits over privacy and bias (Ashta & Herrmann, 2021). Beijing's integrated data infrastructure is efficient and accelerates the deployment, yet, could provoke global backlash against exports perceived as too centralized (Gruetzemacher et al., 2025). The E.U.'s relatively slower, ethics-first path might unlock a "trust dividend," positioning it as a safe-harbor for critical applications such as health (Medetalibeyoglu et al., 2025). In the end, practitioners should therefore amble auditability and synthetic-data augmentation early to hegde against regulatory tightening. But there is a systematic loop here, because it should be reminded that the synthetic data might be generated by the earlier AI or another AI. Anything artificial, as its name suggests, is not natural, and might be far from real (Nurhayati et al., 2025; Tampubolon, 2024b). Therefore, auditability of the synthetic data is a necessity; to assure how actual, how close, and how reliable it is for the real-life situation.

Re-examining the AI gold-rush metaphors through fresh literatures underscores that competitive advantage no longer stems from hoarding digital "ore" alone (or the well-known quotes of "data is the new oil" per se). Instead of that, the AI rush increase where vast and diverse datasets intersect with transparent and ethically anchored analytics. Nations and firms as well as the hyper-scalers were quick to operationalize the federated architecture and cross-border sandboxes. Federated architecture and cross-border sandboxes can harvest innovation while avoiding social-trust deficits. Future research should quantitatively model how governance regimes mediate the translation of data-science capability into socio economic returns. The AI data centers are being built rapidly in the Sout East Asia and Middle East/Western Asia; thus, making the regulatory mediations, especially across the Global South, where regulatory templates remain fluid, should be examined.

Back to the the Figure 1 and Figure 2, one may imply that the issues around criticizing the AI as 'new Gold Rush' or as 'new Space Race' along with its sustainable impact on business profitability and society's improvement at large, is still a new topic of discussion, which has not yet been related or linked to one another. Therefore, this study also suggests that future researchers should make a more comprehensive critical-systematic literature review, in the future, of course when there are more links and more documents. Along with that limitation, the database used here is still limited to Google Scholar; so, it is recommended to further expand the sources (e.g., Scopus, Web of Science).

6. Conclusion

The twenty-first century "AI race" or "AI rush" is frequently likened to historical resource booms. Yet, unlike gold or oil, the value of AI derives from intangible data assets and analytics capabilities that compound exponentially. This study positions the AI race as a contemporary gold rush. This study also assesses how nations, firms, and research ecosystems convert data into competitive advantage. Drawing a structured literature review and secondary data synthesis, the following are being mapped: headlines of investment flows in AI; evaluations of dominant data-science methods harnessed in the AI race; and discussions of socio-economic externalities. The AI race, as an economic activity, has consequences on society, even extended beyond the direct participants. This study, based on the reviewed literature, results in showing a convergent adoption of deep-learning pipelines, while being divergent in governance logics. The market-driven scaling in the U.S., the state-orchestrated acceleration in China, and the regulation-first pragmatism in the E.U, are altogether put AI development in the spotlight (just in different ways). One might argue that sustainable leadership will depend less on raw computing prowess than on trustworthy data-governance architectures that minimize bias, protect privacy, and enable reproducible analytics. Thus, this study asks for further research about practical recommendations for policymakers and data-science teams seeking durable advantage without triggering a systematic "race to the bottom."

To conclude, viewing the AI race as a new gold rush reframes data as the bedrock ore. Meaning that the analytics pipelines are the extraction technology. Sustainable advantage emerges where data volume, data quality, and good governance intersect. Nations and firms that institutionalized transparent, bias-controlled, and privacy-preserving analytics will convert initial breakthrough into lasting socio-economic value. Future research should also model the causal links between governance regimes and innovation yield and extend the empirical coverage to the Global South, to avoid a narrow tri-polar narrative. The government should balance between not over-regulating and not under-regulating, while continually assess the taxpayers' money invested (whether the business is having profit, or is it just putting more pressure on the job market) in the ongoing AI rush and race.

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