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# From Artificial Intelligence to Artificial Intelligences

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**Abstract:** Artificial intelligence was over; artificial intelligences are booming around us. Artificial intelligence is significant for many people as a discipline, where Artificial intelligences have benefited all people, organizations, companies, and nations. This paper examines artificial intelligence, the evolution from AI to artificial intelligences. It looks at artificial intelligence systems and platforms, business intelligences as examples of artificial intelligences. The proposed approach in this paper might facilitate the research and development of AIs, artificial wisdoms, business intelligences, and business analytics.

**Keywords:** Artificial intelligence (AI), Artificial intelligences (AIs), artificial wisdom, business intelligences, and business analytics.

## 1. INTRODUCTION

We are in the age of artificial intelligence (AI) (Kissinger, Schmidt, & Huttenlocher, 2022) (Sun Z. , 2024). However, artificial intelligence was over! We are in the age of artificial intelligence (AIs) because artificial intelligences are booming around us (Sun Z. , 2024) (Kissinger, Schmidt, & Huttenlocher, 2022). Artificial intelligence is significant for many people as a discipline, whereas Artificial intelligences have benefited all people, organizations, companies, and nations. This leads to two interesting questions.

1. Why are Artificial intelligences?
2. What is the relationship between artificial intelligence and artificial intelligences?

This paper examines artificial intelligence, the evolution from AI to artificial intelligences. It looks at artificial intelligence systems and platforms, business intelligences as examples of artificial intelligences. The proposed approach in this paper might facilitate the research and development of AIs, artificial wisdom, business intelligences and business analytics.

The rest of this paper is organized as follows: Section 2 looks at the evolution of artificial intelligence. Section 3 examines artificial intelligences. Section 4 presents a calculus of artificial intelligences. Section 5 looks at BI and BIs and considers BIs as Applications of AIs. The final section ends this paper with a few concluding remarks and suggestions for future work.

## 2. EVOLUTION OF ARTIFICIAL INTELLIGENCE

(This section analyses evolution of artificial intelligence.)

Alain Turing published his seminal paper in 1950 (Turing, 1950). John McCarthy, a mathematics professor at Dartmouth defined AI as the “science and engineering of making intelligent machines” “in 1956 (McAfee & Brynjolfsson, 2017, p. 67; Tkaczyk, 2024). His definition can be updated as “science, engineering, technology, and systems of making and managing intelligent machines and systems”. From that time on, AI has become one of the most significant forces affecting our human beings, machines, systems, and platforms. AI has been one of the most rapidly developing fields in the last decade. We are immersed in the age of AI (Kissinger, Schmidt, &

Mundie, 2024). AI directly focuses on intelligence and wisdom (Sun Z. , 2024). However, since the late 1950s, AI researchers have found that knowledge-driven intelligence is important because of the development of expert systems and knowledge base systems (Sun Z. , 2024). In the past decade, data intelligence has become more important because of machine learning’s resurgence and deep learning development (Kissinger, Schmidt, & Mundie, 2024) (Tkaczyk, 2024), thanks to the inception of ChatGPT (Mollick, 2024). There are many intelligences, for example, our bodily intelligences are composed of hearing intelligence, writing intelligence, and moving intelligence, which focus on the development of human-centered AI (Sun Z. , 2024).

Briefly, AI is a subfield of computer science and data science, concerned with symbolic reasoning and problem-solving (Sharda, Delen, & Turba, 2018). Technically, AI is concerned with imitating, extending, augmenting, amplifying, and automating the intelligent behaviors of human beings (Russell & Norvig, 2020) (Sun Z. , 2024). AI attempts not only to understand how humans think, understand, write, learn, listen, and act rationally and smartly, but also to build intelligent entities that can think, write, perceive, understand, predict, and manipulate a world.

Jenkins, et al. state that “the history of AI has included several waves of ideas” (Jenkins, Lopresti, & Mitchell, 2020). The first wave, from the 1950s to the 1980s, focused on logic and symbolic hand-encoded representations of knowledge, the foundations of so-called “expert systems”. The second wave, starting in the 1990s, focused on statistics and machine learning, in which, instead of hand-programming rules for behavior, programmers constructed “statistical learning algorithms” that could be trained on large datasets. In the wave of the last decade, AI research has largely focused on deep learning in machine learning. AI has experienced a resurgence recently, because the increasing computing power and algorithms have become increasingly refined (Mueller, 2016). Other reasons are that data-driven and market-oriented AI are becoming popular products around us; AI on social media has blossomed in these communities (Chowdhary, 2020). The current wave is that AI has been ubiquitous in the market. Market-driven AI is aimed at machines, systems, apps, and tools (Russell & Norvig, 2020) (Sun Z. , 2024) (Tkaczyk, 2024) (Mollick, 2024).

### 3. ARTIFICIAL INTELLIGENCE

(This section reviews AI and explores AIs as next-generation intelligences.)

Intelligence is not only a lasting topic for computer science, AI, intelligence computing, BI, and intelligent analytics, but also an exciting topic for industries, organizations, and businesses (Sun, Sun, & Strang, 2018) (Sun Z. , 2024).

AI has facilitated the development of intelligent services, intelligent manufacturing, intelligent systems (Russell & Norvig, 2020), intelligent chips, and intelligent analytics (Sun Z. , 2019). BI has improved competitive business and marketing performance, supported management decision-making of organizations, and produced trillion-level enterprises such as Google, Amazon, and Meta (Sabherwal & Becerra-Fernandez, 2011) (Howarth, 12, 2022). Industries continue to dominate frontier AI research and development; Generative AI investment skyrockets. China dominates industrial robotics: In 2013, China’s installations accounted for 20.8% of the global total (Stanford , 2024). A lot of companies brand their products as AI products. Many social media brands do things as AI products and services. For example, ChatGPT-4, Gemini, and Claude 3 are impressively multimodal: They can generate fluent text in dozens of languages, process audio, and even explain memes (Stanford , 2024).

Artificial intelligence has been playing a significant role in making AI ubiquitous and upgrading economies and industries to intelligent ones. An artificial intelligence entity (AIE) is an intelligent entity in terms of a system, app, platform, or tool. For instance, the Nvidia GPU chips, DeepSeek, and ChatGPT. Data, intelligences, and analytics are the most important attributes of the AIE. Currently, data, analytics, and intelligences and their integration are also at the frontier for revolutionizing our work, life, business, management, and organization, as well as healthcare, finance, e-commerce, and web services (Tkaczyk, 2024) (Kissinger, Schmidt, & Mundie, 2024). Big data has become one of the most unprecedented and ever-increasing frontiers for innovation, research, and development in the computer industry and business (Sun Z. , 2024). Big data analytics, advanced analytics, and modern analytics have drawn increasing attention in academia, industry, and government (Sun Z. , 2024). Artificial intelligence entities are becoming a core business and analytic competency to transform business processes, reconfigure workforces, optimize infrastructure, and blend industries (Laney & Jain, 2017).

However, the current AI is a mixed intelligence and market-driven, although they are useful for AI research and development.

1. What is the next trend of artificial intelligence?
4. What is the relationship between artificial intelligence and artificial intelligences
5. How can we examine artificial intelligence entity?
6. What is the relationship among Artificial intelligence entities, data, analytics and intelligences?

All these three questions need to be addressed by academia, industries, and people. Following on the book (Sun Z. , 2024) published by CRC press | Routledge | Taylor & Francis Group in 2024, this research delves into artificial intelligence and artificial intelligences.

## **4. ARTIFICIAL INTELLIGENCES**

This section explores artificial intelligences.

### **4.1 Multiple Intelligences**

Professor Howard Gardner provides the theory of Multiple Intelligences (MI) (Gardner, 2012). This consolidates the relationship between natural intelligences and artificial intelligences.

Gardner states that the single word intelligence is fundamentally limited and misleading. This is right for the theory of multiple intelligences (Gardner, 2012). It is also right for (natural) intelligences in AI. For example, how many intelligences are in our own body? there are at least 12 natural intelligences (Sun Z. , 2024). Furthermore, from a technological viewpoint, each of the 12 natural intelligences of our own body needs many different artificial intelligences (AIs) to imitate, augment, and simulate as we realized (Sun Z. , 2024, p. 138). In other words, many AIs are used to realize the human intelligence of our own body.

### **4.2 The Age of AI and AIs from the Books**

Many books have used AIs although they have not explained why AIs and AI are different. For example, Kissinger et al (Kissinger, Schmidt, & Mundie, 2024). Bostrom (Bostrom, 2014), and Mollick (Mollick, 2024) have used AIs in their books. Sun differs AIs from AI based on the idea of Gardner’s theory for Multiple Intelligences (MI) (Gardner, 2012) (Sun Z. , 2024).

Sun discusses intelligence, mind and wisdom in his book (Sun Z. , 2024). In fact, it is more important is that national and international intelligence, mind and wisdom are also important for a country, community, organisation and international ones. In such a way, we have big intelligence, big mind, and big wisdom. However, intelligence, mind and wisdom were mentioned in chapter 2 of Kissinger’s book (Kissinger, Schmidt, & Huttenlocher, 2022).

Kissinger’s book did not explicitly mention AIs. However, the authors really wrote AIs in the book (Kissinger, Schmidt, & Huttenlocher, 2022). We argued that AIs are based on the multiintelligence (Gardner, 2012) and a set of intelligences (Sun Z. , 2024).

### **4.3 Artificial Intelligences from the Scholars**

Google Scholar search for “artificial intelligence” and “artificial intelligences” found 4,990,000 and 17,600 publications on June 11, 2025. This implies that artificial intelligence plays an important role in research and development, although artificial intelligences have also drawn important attention in the recent time.

Of 17,600 publications on “artificial intelligences are legal personhood artificial intelligences, skynet destructive, artificial intelligences moral agents, artificial intelligences robots, artificial intelligences suggestive drawing, artificial intelligences digital minds”

Then we analyzed the first 100 ranked by Google Scholar search and found that:

1. No authors explain AIs.
2. From the perspective of psychology and philosophy, Brožeka and Janik address the question of whether artificial intelligences can be moral agents based on internal, external, and moral agency (Brožeka & Janik, 2019). The paper concludes that machines cannot be considered moral agents. However, the research only mentioned “existing artificial agents, as well as the future ones which are constructed within the same ‘architectural’ paradigm, and their relationships with the external and internal conditions of moral agency. However, there are no relationships with artificial intelligences.
3. Sotala surveys four categories of factors that might give a digital mind, such as an upload or an artificial general intelligence, an advantage over humans (Sotala, 2012). It seems that no real exploration into artificial intelligences has been conducted, although artificial intelligences has not played a significant role in this research.
4. Fox uses multi-Intelligence (MI) to combine natural and artificial intelligences in hybrid beings and systems (Fox, 2017). From the references of Fox’ research (Fox, 2017), we have not found the AIs. Even so, Fox frames AI as a contributor to multi-intelligence (MI) in the setting of hybrid beings and/or systems. Fox’s idea leads us to extend natural intelligences and artificial intelligences and how to develop natural intelligences with artificial intelligences. Intelligences consists of natural and artificial one. What Professor Garder researched is natrual intelligences of our body (Gardner, 2012). What we explores are artificial intelligences.
5. Levin considers artificial intelligences as a bridge toward /diverse intelligence and humanity’s future (Levin, 2025).

Overall, many scholars have used AIs to describe AI-related machines, systems, platforms, and apps. There is no yet a series of theories on what AIs are. One possibility for defining artificial intelligences as diverse human minds (Levin, 2025), However, human minds are at a meta (intelligence) level (Sun Z. , 2024).

Therefore, we define artificial intelligences as intelligences that human beings, machines, systems, platforms, and apps possess based on a set of intelligent systems, technologies, tools within applications. For example, artificial intelligences as intelligences that human beings possess based on a set of intelligent systems, technologies, and tools within applications. Human beings can have artificial intelligences such as data intelligences, knowledge intelligences, hearing intelligences, speaking intelligences, tasting intelligences, writing intelligences, moving intelligences, and more. Each of them hav been implemented using a set of intelligent systems, technologies, and tools (Sun Z. , 2024).

## 5. A CALCULUS OF ARTIFICIAL INTELLIGENCES

This section presents a calculus of artificial intelligences.

### 5.1 AI and AIs

Artificial Intelligences (AIs) include data intelligence, knowledge intelligence, wisdom intelligence, experience intelligence, analytics intelligence, big data intelligence, understanding intelligence, learning intelligence, to name a few (Sun Z. , 2024). For example, machine learning aims to develop learning intelligence. Expert systems aim to improve knowledge intelligence; big data analytics aim to provide analytics intelligence and insight to organizations and individuals. In such a way, we can easily understand metaintelligence as intelligence about intelligence.

We can differentiate intelligence from intelligences. We emphasize learning, understanding, thinking, connecting, and sharing as keys to intelligence (Sun Z. , 2024). We also highlight collective intelligence,

cooperation, collaboration, negotiation and bargaining as intelligences, as illustrated in Table 1 (Sun & Finnie, 2004).

Table 1. Artificial intelligence to Artificial Intelligences

Intelligence	Intelligences	Remarks
learning	collective intelligence	For collective work
understanding	cooperation	Cooperation intelligence
thinking	collaboration	collaboration intelligence
connecting	negotiation	negotiation intelligence
sharing	bargaining	Bargaining intelligence

At the moment, machine learning is still a data intelligence-driven technique. So that ChatGPT is a data intelligence technique that can bring about the same knowledge intelligence. Deep Seek is also an intelligent tool for providing data intelligence and knowledge intelligence to customers.

Based on the Gartner’s research on the Hype Cycle for Artificial Intelligence (Jaffri, 2024), Generative AI (GenAI) receives much of the hype when it comes to AI. However, GenAI has yet to deliver on its anticipated business value for most organizations. GenAI has passed the peak of inflated expectations. Maybe it also reflects that another winter of AI will be upon us within a year. Similarly, the general problem solver was not very successful in 1957. GenAI also faces “general” challenges, including ethical and societal concerns, and nefarious uses like deep fakes and disinformation (Jaffri, 2024; Tkaczyk, 2024).

The composite AI is as follows:

1. Composite AI lays the foundation for future AI architectures. Composite AI represents the next phase in AI evolution. The original concept is a hybrid AI. Composite AI combines AI methodologies-such as machine learning, natural language processing and knowledge graphs - to create a more adaptable and scalable solution (Tkaczyk, 2024). For instance, integrating knowledge-based (rule-based) systems with machine learning allows enterprises to process unstructured data, thereby enhancing their ability to derive insights from diverse datasets.
2. AI Computing has become famous because Computing = AI science + AI engineering + AI technology + AI systems + AI + AI services (Sun Z. , 2024). This leads to AIE Computing = AIE science + AIE engineering + AIE technology + AIE systems + AIs + AIE services.
3. AI engineering and knowledge graphs. AI engineering. AI engineering approaches, such as DataOps, ModelOps, and DevOps, make it possible to deploy models into production in a structured, repeatable factory-model framework. Knowledge graphs are machine-readable representations of the physical and digital worlds.
4. Besides the above-mentioned, the hype cycle for Artificial Intelligence also includes autonomic systems, quantum AI, Embodied AI, multiagent systems, Decision Intelligence, and prompt engineering (Jaffri, 2024). This consists of IoTE (the Internet of intelligent everything). Furthermore, this also means that multiagent systems have been moving towards the market rather than at the theoretical level. We will look at a lot of multiagent systems in future work.

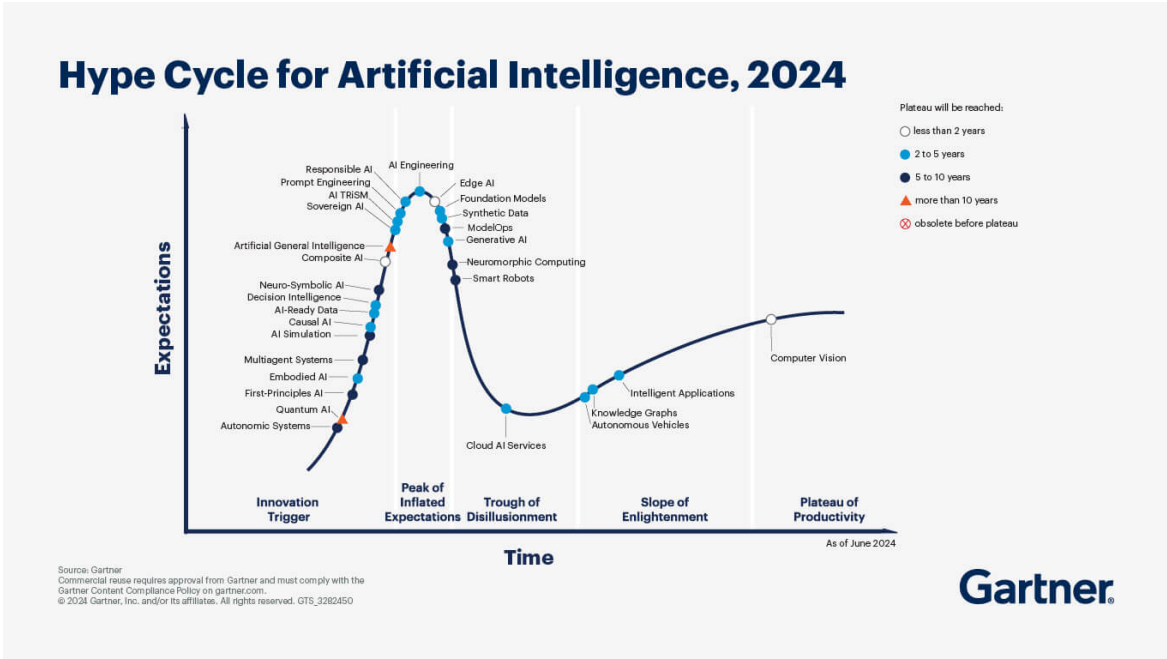


Figure 1.1 Gartner hype cycle for AI 2024.

Furthermore, one agent cannot dominate all in AI, but there are millions of AI agents; They will work together to complete almost all delegated tasks (Liu, 2025) (Scott & Stebbings, 2025).

**5.2 Intelligences and Multi-intelligences**

A model of artificial intelligences was introduced based on Multi-intelligence (MI) hybrid beings and systems (Fox, 2017), as illustrated in the following Figure 1.2, which has been edited and extended to intelligences and multintelligences.

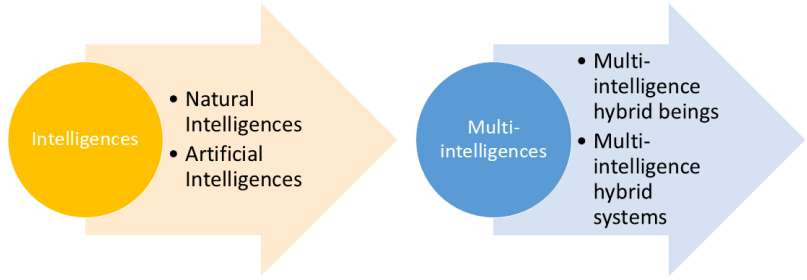


Figure 1.2. Intelligences and multintelligences

In this model, intelligences have been classified into natural intelligences and artificial intelligences. Multi-intelligences have been classified into multi-intelligence hybrid beings and multi-intelligence hybrid systems (Fox, 2017).

Natural intelligences are composed of human intelligences (Gardner, 2012), animal intelligences, social intelligences, and business intelligences (Sun Z. , 2024). Artificial intelligences have not been mentioned in the research of Fox. However, the intelligences contributed to multi-intelligences; which consists of multi-intelligence hybrid beings and multi-intelligence hybrid systems (Fox, 2017).

Multi-intelligences were used for exploring human intelligences since 1980 (Gardner, 2012). Human intelligences have even intelligences (Gardner, 2012). A human body has at least 12 natural bodily intelligences (Sun & Wei, 2024).

Based on Merriam-webster dictionary (Merriam-webster, 2025) Being has the following meaning:  
**a:** the quality or state of having existence. Example: social events and natural events.  
**b:** Something that actually exists: Example: life and animal.  
**c:** A living thing, example: person.

We believe that Fox has covered all beings except the systems (Fox, 2017). Therefore, hybrid beings are related to human beings and animals (Fox, 2017).

Table 2. Multintelligences have the following characteristics.

Multintelligences	Characteristics	Examples
Multintelligences	includes the full range of natural and artificial intelligences, which are defined in fundamental terms, such as self-awareness, robust adaptation, and problem solving.	Human bodily intelligences, Multi-agent systems.
Multintelligences	considered in terms of whole systems of causal mechanisms and causal contexts encompassing the full range of variables that can contribute to intended and unintended consequences	A group of robots working in the production line- Robotic process automation.
Multintelligences	encompasses hybrid beings and hybrid systems having emergent properties that can be more than, and different from, the various types of intelligence, which they are comprised of.	Intelligent enterprise systems.

Robotic process automation (RPA), also known as software robotics, uses intelligent automation technologies to perform repetitive office tasks of human workers, such as extracting data, filling in forms, moving files, and more (IBM, 2025). RPA uses rule-based expert systems to perform business process activities at a high volume, freeing up human resources to prioritize more complex tasks. RPA enables CIOs and other decision makers to accelerate their digital transformation efforts and generate a higher return on investment (ROI) from their staff.

The difference between RPA and AI: RPA is a process-driven and rule-based system; it can only follow the rule-based processes. AI combines cognitive automation, rule-based expert systems, machine learning (ML), natural language processing (NLP), reasoning, hypothesis generation, and analysis, therefore, AIs are knowledge-based and data-based intelligences. AI bots use expert systems and machine learning to recognize patterns in data and make decisions (IBM, 2025).

### 5.3 From AI via AIs to AIIEs

The above model can be extended into the following model: from AI via Artificial intelligences to AIEs, as illustrated in Figure 1.3.

Human intelligence has been studied in artificial intelligence (Russell & Norvig, 2020). Both have been extended to intelligences, which consist of natural intelligences and artificial intelligences (Fox, 2017). Natural intelligences and artificial intelligences have been extended into multi-intelligences. (Fox, 2017). Multi-intelligences have been classed into multi-intelligence hybrid beings and multi-intelligence hybrid systems. They then are extended into artificial Intelligence entities. Artificial intelligence entities have been classified into AIE apps, AIE machines, AIE systems, AIE platforms (Kissinger, Schmidt, & Huttenlocher, 2022).

It is interesting to study this history based on Figure 1.3.

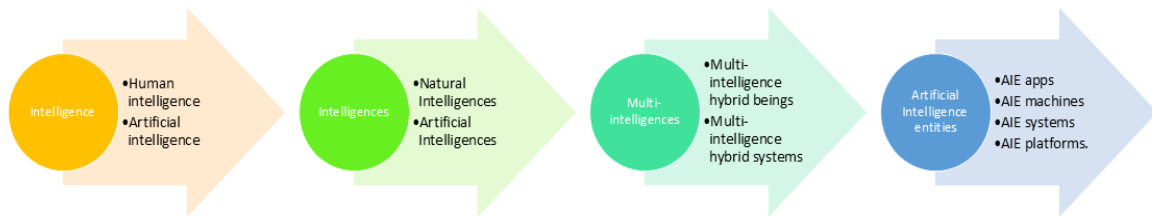


Figure 1.3 from AI via AIs to AIIEs

Therefore, from AI to AIs, intelligences are the real phenomena in the intelligence world, not only in human intelligences, but also in AIs. If humanity has its world. What is the intelligence world? Can we see that the intelligence world consists of a lot of intelligences.

Intelligences are also important from BI and BIs, see the latter section.

### 5.4 The Internet of Intelligences

When we discussed intelligences with application. We must explore The Internet of AIs. That is, The Internet of AIs consist of many different AIs which interacted with many different intelligent systems or agents. In other words, The Internet of AIs have been reflected by the integration of many The Internet of intelligent entities such as different intelligent systems or agents as shown in Figure 1.4. In other words, the Internet of AIs will be implemented by the Internet of intelligent entities, such as different intelligent systems or intelligent agents. At the same time, the internet of intelligent entities, such as different intelligent systems or intelligent agents, will produce The Internet of AIs. Figure 1.2

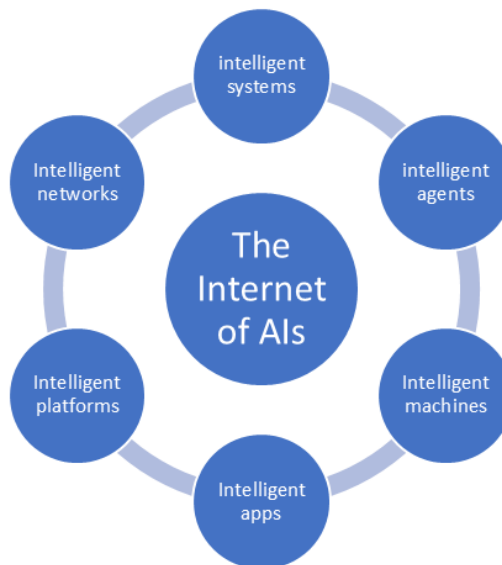


Figure 1.4 The internet of AIs and the internet of intelligent entities.

The Internet of Everything (IoE) expands the Internet of Things (IoT) by connecting people, processes, data, and things to create a more integrated and intelligent network. Then we have (Sun Z. , 2024).

$$IoE = IoT + IoP + IoS \tag{1}$$

Apply intelligent as an operation on both sides of (1), we have

$$\text{IoIE} = \text{IoIT} + \text{IoIP} + \text{IoIS}.$$

Where IoIE = The Internet of intelligent everything, IoIT as The Internet of intelligent things, IoIP = The Internet of intelligent people, IoIS = The Internet of intelligent services.

Furthermore, we have the Internet of intelligent entities as a part of IoIE, which produces the internet of AIs. That is,

$$\text{IoAIEs} \subset \text{IoIEs} \quad \text{produce IoAIs} \quad (2)$$

Where IoAIEs = the Internet of AI entities. IoIEs = the Internet of intelligent entities. IoAIs = the Internet of AIs.

## 6. FROM BUSINESS INTELLIGENCE TO BUSINESS INTELLIGENCES

This section looks at business intelligence to business intelligences and discusses the relation between business intelligences and artificial intelligences.

Commerce is buying and selling. Business consists of all activities related to buying and selling (Schneider, 2017). Business Intelligence (BI) was first coined by Luhn in 1958 when he developed a business intelligence system at IBM (Luhn, 1958). Business intelligence was then promoted by Dresdner since 1989 (Sun Z. , 2024). Business intelligence is the intelligence for making money from humans, machines, and systems in business activities using a set of machines, systems, technologies, and techniques (Laudon & Laudon, 2020). BI has important technology for developing business technologies and systems. The most fundamental technologies of BI consist of data mining, data warehousing, and data analytics (Sun Z. , 2024).

Only some indulge BI. Many already use BIs. That is, business consists of multiple intelligences, for example, BI consists of financial intelligence, agile business intelligence, 3commercial intelligence, competitive intelligence, market intelligence, social intelligence, mobile business intelligence, retail intelligence, real-time intelligence, visual business intelligence, location intelligence, sales intelligence, product intelligence, and more (Brooks, 2022). In reality, every business action requires BIs to promote the business activities.

Business Intelligences (BIs) are all the intelligences for making money from business humans, machines, and systems using a set of intelligent machines, intelligent systems, intelligent technologies, and intelligent techniques.

Therefore, there are a number of business intelligences that need to be imitated, augmented, and simulated using intelligent systems, such as market analytics and intelligence, e-commerce analytics and intelligence, Supply Chain analytics and intelligence, and more (Sun Z. , 2024; Brooks, 2022).

The relationship between AIs and BIs is that the BIs are the applications of AIs in the business domain whereas AIs are the generalization of BIs, as shown in Figure 1.5. Similarly, BI is the applications of AI, whereas AI is the generalization of BI.

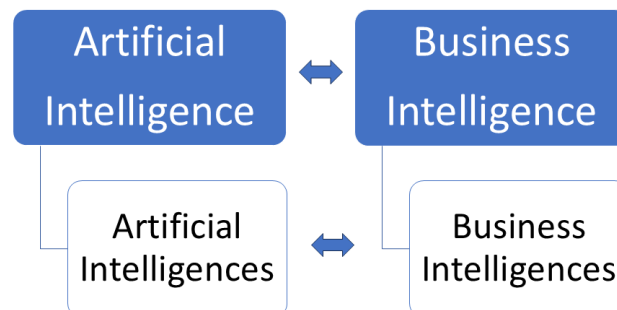


Figure 1.5 AIs and BIs

Intelligences are also important from BI and BIs. We will discuss BIs from BI in another project.

## 7. CONCLUSION

Artificial intelligence was over; artificial intelligences are booming around us. Artificial intelligence is significant for many people as a discipline; whereas Artificial intelligences have benefited all people, organizations, companies, and nations. This research examines artificial intelligence, the evolution from AI to artificial intelligences. It looks at artificial intelligence systems, platforms, and BIs as examples of artificial intelligences. The main contributions of this research consist of 1). Artificial intelligences are intelligences that human beings, machines, systems, platforms, and apps possess based on a set of intelligent systems, technologies, tools, with applications. 2). AIE Computing = AIE science + AIE engineering + AIE technology + AIE systems + AIs + AIE services. And 3) BIs are the applications of AIs in the business domain, whereas AIs are the generalization of BIs.

In future work, we will deliver into the relationships between the Internet of AIs and intelligent entities with applications in industries.

Scott said that models are no products. Only products can link the demands of users, the value of models can be occurred (Liu, 2025) (Scott & Stebbings, 2025). There is a general question: What are the relationships among algorithms, models and products. We will look at it in another paper.

## REFERENCES

- Bostrom, N. (2014). *Superintelligence: paths, Dangers, Strategies*. London, UK: Oxford.
- Brooks, S. (2022). *Business Intelligence and Analytics: Concepts, Techniques and Applications*. New York, NY: Murphy & Moore Publishing.
- Brożeka , B., & Janik, B. (2019). Can artificial intelligences be moral agents? *54*, 101-106.
- Chowdhary, K. (2020). *Fundamentals of artificial intelligence*. New York, NY: Springer International Publishing .
- Fox, S. (2017). Beyond AI: Multi-Intelligence (MI) Combining Natural and Artificial Intelligences in Hybrid Beings and Systems. *Technologies, MDPI*, 5(3), 38(1-14). doi: <https://doi.org/10.3390/technologies5030038>
- Gardner, H. (2012, June). *The Theory of Multiple Intelligences: As Psychology, As Education, As Social Science*. Retrieved October 21, 2023, from <https://howardgardner01.files.wordpress.com/2012/06/473-madrid-oct-22-2011.pdf>
- Howarth, J. (12, 2022, December 12). *30+ Incredible Big Data Statistics (2023)*. Retrieved May 3, 2023, from <https://explodingtopics.com/blog/big-data-stats#top-big-data-stats>
- IBM. (2025). *What is robotic process automation (RPA)?* Retrieved April 27, 2024, from IBM: <https://www.ibm.com/think/topics/rpa>
- Jaffri, A. (2024, November 11). *hype-cycle-for-artificial-intelligence*. Retrieved April 13, 2024, from Gartner: <https://www.gartner.com/en/articles/hype-cycle-for-artificial-intelligence>
- Jenkins, C., Lopresti, D., & Mitchell, M. (2020). *Next Wave Artificial Intelligence: Robust, Explainable, Adaptable, Ethical, and Accountable*. Retrieved January 12, 2021, from <https://cra.org/ccc/resources/ccc-led-whitepapers/#2020-quadrennial-papers>
- Kissinger, H. A., Schmidt, E., & Huttenlocher, D. (2022). *The Age of AI: And Our Human Future*. Back Bay Books.
- Kissinger, H. A., Schmidt, E., & Mundie, C. (2024). *Genesis: Artificial Intelligence, Hope, and the Human Spirit*. Little, Brown and Company.

- Laney, D., & Jain, A. (2017, June 20). *100 Data and Analytics Predictions Through*. Retrieved August 04, 2018, from Gartner: <https://www.gartner.com/events-na/data-analytics/wp-content/uploads/sites/5/2017/10/Data-and-Analytics-Predictions.pdf>
- Laudon, K. G., & Laudon, K. C. (2020). *Management Information Systems: Managing the Digital Firm (16th Edition)*. Harlow, England: Pearson.
- Levin, M. (2025). Artificial Intelligences: A Bridge Toward Diverse intelligence and humanity's future. *Adanced Intelligent Systems, 202401034*, 1-11.
- Liu, D. (2025, April 20). *Z Finance*. (Translaltor, Ed.) Retrieved April 20, 2025, from wx: <https://wx.zsxq.com/group/454854145828> in Chiinese
- Luhn, H. P. (1958). A Business Intelligence System. *IBM Journal of Research and Development 2(4)*, 314-319.
- McAfee, A., & Brynjolfsson, E. (2017). *Machine, Platform, Crowd: Harnessing Our Digital Future*. W. W. Norton & Company.
- Merriam-webster. (2025). *being*. merriam-webster. Retrieved from <https://www.merriam-webster.com/dictionary/>
- Mollick, E. (2024). *Co-Intelligence: Living and Working with AI*. Portfolio.
- Mueller, V. (. (2016). *Fundamental issues of artificial intelligence*. New York, NY: Springer International Publishing.
- Russell, S., & Norvig, P. (2020). *Artificial Intelligence: A Modern Approach (4th Edition)*. Upper Saddle River: Prentice Hall.
- Sabherwal, R., & Becerra-Fernandez, I. (2011). *Business Intelligence: Practices, Technologies, and Management*. Hoboken, NJ: John Wiley & Sons, Inc.
- Schneider, G. P. (2017). *Electornic Commerce (12th Edition)*. Cengage Learning.
- Scott, K., & Stebbings, H. (2025, Mar 31). *Kevin Scott, CTO @ Microsoft: An Evaluation of Deepseek and How We Underestimate the Chinese*. Retrieved April 20, 2025, from Youtube: <https://www.youtube.com/watch?v=KN7KYzpPfiU>
- Sharda, R., Delen, D., & Turba, E. (2018). *Business Intelligence and Analytics: Systems for Decision Support (10th Edition)*. Boston, MA: Pearson.
- Sotala, K. (2012). ADVANTAGES OF ARTIFICIAL INTELLIGENCES, UPLOADS, AND DIGITAL MINDS. *International Journal of Machine Consciousness, 04(01)*, 275-291. doi:<https://doi.org/10.1142/S1793843012400161>
- Stanford . (2024). *THE AI INDEX REPORT: Measuring trends in AI*. Retrieved June 12, 2024, from <https://aiindex.stanford.edu/report/>
- Sun, Z. (2019). *Managerial Perspectives on Intelligent Big Data Analytics*. IGI-Global.
- Sun, Z. (2024). *Data Analytics for Business Intelligence: A Multi-industry Approach*. CRC press | Routledge | Taylor & Francis Group.
- Sun, Z., & Finnie, G. (2004). *Intelligent Techniques in E-Commerce: A Case-based Reasoning Perspective*. Heidelberg Berlin: Springer-Verlag.
- Sun, Z., & Wei, X. (2024). Human-centered Artificial Intelligence Development. *Journal of Computer Science Research, 6 (4)*, 19-33.

- Sun, Z., Sun, L., & Strang, K. (2018). Big Data Analytics Services for Enhancing Business Intelligence. *Journal of Computer Information Systems (JCIS)*, 58(2), 162-169. doi:10.1080/08874417.2016.1220239
- Tkaczyk, M. (2024). *The AI Revolution 2050: How Artificial Intelligence Will Transform Health, Economy and Daily Life by Mid-Century Paperback*. SAPMATICS Ltd.
- Turing, A. (1950). Computing Machinery and Intelligence. *Mind*, 49, 433-460.