The Application of AI in Social Development And A Survey of The Stock Market of Leading Companies

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Abstract. The AI craze that started in the mid-20th century has reached its peak now, and people's lives are increasingly dependent on AI technology, ranging from surgical treatment to helping people with multiple-choice questions. It is foreseeable that the future trend of artificial intelligence technology will move in the direction of intelligence, efficiency and convenience. Therefore, it is necessary to have an in-depth understanding of the operation of the industry and the development of the leading companies in the industry. This paper mainly adopts the comparative research method. First of all, the development status and existing problems of the artificial intelligence chip industry are analyzed. Then, compare and analyze the development of NVIDIA and AMD and the advantages and disadvantages of their products. Finally, suggestions are put forward for the problems existing in the artificial intelligence chip industry. After a period of research, this article found that exclusivity is particularly sought after in this industry. For example, NVIDIA's H100 tablet helped NVIDIA in the AIGC industry.

Keywords: AI chip, AIGC industry, AI technology.

1. Introduction

With the beginning of the mid-20th century, the development of AI entered a historical chapter. From 1943 to 1956, AI entered the preparatory stage, mainly the theoretical research and exploration stage. Early researchers proposed some basic theories and algorithms of AI. , with neuron models, decision trees, search algorithms, etc. From 1956 to 1974, they studied how to represent knowledge into a form that computers can understand and be able to perform reasoning and judgment. At the same time, some classic AI algorithms and models have also emerged, such as logical reasoning, expert systems, etc. AI has entered the stage of knowledge representation and reasoning. From 1974 to 2010, AI began to have knowledge acquisition and learning capabilities. People began to use machine learning and data mining and other technologies to let computers automatically learn knowledge from data, and gradually formed some data-driven AI algorithms and models. , such as neural networks, support vector machines, decision trees, etc. Give AI autonomous consciousness. Since 2010, AI technology has had a stable industrial chain and in-depth learning, which means that the development direction of new AI technology is successful. In addition, the emergence of ChatGPT has generated a lot of interest in artificial intelligence technology, and the AI chip industry has gradually been understood. It is understood that in recent years, the AI algorithms developed by China have become more and more powerful, but the computing power of domestic hardware has traditionally lagged behind that of the top enterprises in developed countries. Some large AI models of Chinese enterprises are mainly completed on the basis of Nvidia hardware, which is also a big problem in China's chip industry. Many domestic manufacturers are also constantly seeking breakthroughs. At present, Huawei's technology in the field of GPU has been able to achieve comparable performance with Nvidia. In general, understanding the current AI intelligent algorithms and improving the industrial chain are crucial to the development of China's AI chip industry. Through deep learning algorithms, computers can achieve higher-level pattern recognition and self-learning with the support of large amounts of data, which is also an important milestone in the development of AI technology.

2. Literature Review

Zhao Yue, Xiao Mengyan, Luo Jun, Wang Xiaoqiang , Luo Daojun (2023) provided an insightful exploration of the profound integration between AI and the integrated circuit industry. It delves into the technical advancements and industrial trends of AI chips, while also highlighting the immense potential of China's AI chip industry. The article reflects the Chinese government's dedication and support for the AI chip sector [1]. An Baolei (2021) analyzed the AI chip technology, its current status, trends, and its application scenarios during the industrial deployment phase. The author emphasizes the high demands and challenges posed by AI technology, making AI chip technology a hot topic in recent years. The research and analysis in this paper offer readers deeper insights into the design, development, and future trends of AI chips [2].Wang Yanpeng, Lv Lucheng , Zhang Bo, Zhao Yajuan, Qian Li (2019) focused on patent technology related to AI chips, examining patent trends, the origin of patents, patent applicants, and high-value patents in subfields like GPU, FPGA, and CPLD. It unveils the global layout and competitive landscape of AI chip patent technology, serving as an intelligence reference for AI chip technology development [3]. Lv Peng (2022)wrote an artical which is addresses the increasing demands for underlying computing platforms and perceptual algorithm capabilities in the future of intelligent vehicles. Horizon aims to provide technology and solutions for all-scenario intelligent vehicles, aligning with a future where humans and machines co-drive [4]. Fei Baoding, Li Pengfei, Zhang Xu, Zeng Shi, First Research Institute of the Ministry of Public Security (2023) introduced a video analysis application development framework based on AI chips, aiming to enhance system concurrency, scalability, hardware portability, stability, and reduce development workloads. The framework employs modular plug-ins, pipeline design, efficient memory management, and hardware abstraction layers. It facilitates the rapid application of the latest AI chips and video analysis algorithms in security scenarios. The article also acknowledges the rapid development of deep learning frameworks and the need for continuous maintenance and adaptation [5]. Cao Pengjun, Fu Zhe (2023) wrote an article which is commences by outlining the developmental trends and challenges in object detection algorithms, subsequently delving into the principles and advantages of lightweight networks. It proceeds to detail the implementation and experimental results of a lightweight object detection algorithm based on YOLOv5, encompassing hardware and environmental configurations in training and inference environments. Finally, it explores the prospective applications of such lightweight object detection algorithms in domains such as autonomous driving, intelligent security, smart monitoring, and intelligent coal mining [6]. Wang shengjin (2021) wrote an article which is details the technical challenges and potential applications of multi-algorithm fusion, as well as the advantages of autonomous AI chip solutions in practical applications. The article also introduces methods for optimizing the efficiency of encrypted video stream analysis and discusses their advantages in real-world applications. Overall, this article provides valuable information and insights for those interested in the field of AI and its applications in public safety and smart security [7]. Zhao Rongjie,Fang Chao,Xu Manshu(2022) wrote an article which explores the development and trends of China's AI chip industry. Despite facing challenges such as a shortage of top AI chip talent and high energy consumption, the industry has vast potential due to abundant data resources, excellent AI algorithm foundations, and favorable policy support. The proliferation of open-source chips and the increasing demand for new AI chip architectures have created new market opportunities for startups and small and medium-sized enterprises. The paper also highlights recent advancements in AI chip technology, such as Google's self-driving car and the development of "Tianjicore," a heterogeneous fusion neuromorphic computing chip that supports multiple neural networks. Overall, the paper provides a comprehensive overview of the current state and future prospects of China's AI chip industry [8]. Summary, this literature review incorporates multiple relevant research papers, reports, and national policy documents, providing substantial support and references for the research and analysis conducted in this paper.

3. Application Fields of AI Chips

3.1. Applications Fields

AI chips have extremely wide application fields, which are conducive to realizing intelligence in many industries and improving operational efficiency. For example: in the field of smart phones, AI chips can be used for face recognition and other functions in smartphones to improve the intelligence and user experience of smartphones; in the field of autonomous driving, AI chips process a large amount of sensor data to realize vehicle Autonomous perception, decision-making and control; in the field of robots, AI chips can be used for speech recognition and other functions in robots to make robots more intelligent; in the field of security monitoring, AI chips can be used in security monitoring to realize functions such as face recognition , improve the accuracy and real-time nature of monitoring data; in the medical and health field, AI chips can realize functions such as medical image recognition, improving the efficiency and accuracy of the medical and health field; in the financial field: AI chips can be used in the financial field to achieve risk control and other functions to improve efficiency and security in the financial field.

3.2. AMD and NVIDIA Comparative Analysis

AMD and NVIDIA are two well-known semiconductor companies in the world, and they have obvious differences in business areas, technical strength, market position and so on.

3.2.1. Business Areas

AMD's main business areas are cpus, Gpus, servers and so on.And some processors for specific application areas, such as game consoles, mobile devices and so on. NVIDIA is mainly involved in GPU, data center, artificial intelligence, autonomous driving and other fields, but also produces Tegra processors, Jetson platform and other products. It can be seen that AMD's business areas are more diversified, while NVIDIA is more focused on GPU technology and related areas.

3.2.2. Technical Strength

AMD has excelled in CPU and GPU integration, and its APU products are widely used in areas such as mobile devices and game consoles. NVIDIA, on the other hand, has always been a leader in GPU technology, and its GPU products have excellent performance and power control. In the field of artificial intelligence and deep learning, NVIDIA's GPU products have also been widely used. Nvidia's breakthrough in artificial intelligence can be traced back to the CUDA platform launched in 2006. With its relatively simple use and versatility, CUDA firmly binds a large number of users who specialize in artificial intelligence. It is also relying on years of accumulation that Nvidia successfully monopolized the indispensable graphics card in the field of artificial intelligence. Today, Nvidia's core competitiveness is not only chip performance, but the whole ecology based on chips and created by tools and software [9].

3.2.3. Market Position

In the GPU market, NVIDIA is the absolute leader, with more than 70% market share.AMD's market share is less than 30%. As the king of AI chips, Nvidia has a market share of 91.4%, while its second-place rival AMD has a market share of only 8.5% [10]. In the CPU market, AMD's share has gradually increased, but it is still far behind NVIDIA. Chip expert Step Rixin told the Beijing Business Daily reporter that in the three elements of artificial intelligence data, algorithms, computing power, Nvidia is almost the only company that occupies the top pyramid of the global computing power market, which makes it catch up with the best rich air [11].

3.2.4. Product Positioning

AMD's product positioning is more for the consumer market, such as game consoles, desktops, laptops and so on.NVIDIA is more for the enterprise market, such as data centers, artificial intelligence, autonomous driving and other fields.

3.2.5. Future Development Trend

In the next few years, AMD and NVIDIA will continue to strengthen their layout in artificial intelligence, cloud computing and other fields.AMD,in particular, will continue to strengthen its competitiveness in the mobile device market and launch more excellent APU products.NVIDIA will continue to strengthen its layout in areas such as autonomous vehicles and smart homes, while continuing to expand the GPU and data center markets. Qin Xiao (2023) pointed out since ChatGPT led the generative AI wave, NVIDIAGPU has become the top choice for high-power AI chips supporting generative AI and large model training. With the GH200 super AI chip upgrade and the launch of several Gpus and server products, Nvidia has demonstrated its absolute dominance in AI infrastructure [12].

To sum up, although AMD and NVIDIA have their own advantages in different fields, they have a broad market space and development prospects. In the future, they will continue to innovate and compete, driving the development of the entire semiconductor industry.

3.3. Investment Risks and Recommendations

3.3.1. Emergence of Valuation Bubble

For NVIDIA, the substantial growth in revenue this year conceals the risk of a valuation bubble. Its total market capitalization has exceeded one trillion dollars, doubling in value within the year, with a price-to-earnings ratio exceeding 200. Even with projected earnings per share at $7, its price-to-earnings ratio remains at a high 64, far surpassing IT giants like Apple, Microsoft, and Google, which typically have price-to-earnings ratios of around 30. The emergence of a valuation bubble significantly increases operational risks for the company. Therefore, investors should maintain a rational outlook.

3.3.2. Evolution Path of Artificial Intelligence Technology

Gartner, a globally renowned management company, has charted the 2023 Artificial Intelligence Technology Maturity Curve. This curve indicates that the much-hyped generative artificial intelligence technology of this year is gradually approaching the peak of overblown expectations, teetering on the edge of a potential disillusionment phase. While we cannot pinpoint the exact year when this disillusionment phase will occur, this trend warrants vigilance and cautious investment.

3.3.3. Entry of New Players Intensifies Market Competition

New competitors are emerging one after another, with companies like Amazon, Google, and Microsoft announcing their research into AI chips, aiming to challenge the positions of NVIDIA and AMD, recognizing the boom in AI chip demand. Therefore, all AI chip companies should enhance their innovation capabilities to secure a foothold in the market as much as possible.

3.3.4. Strengthen talent cultivation

The AI chip industry requires a large number of high-quality talents, including chip design, algorithm development, system integration, and other talents. Governments and enterprises should increase investment in talent cultivation and encourage more talents to join the AI chip industry.

3.3.5. Strengthen international cooperation

The AI chip industry is a global industry that requires strengthened international cooperation to promote its development. Governments and enterprises should strengthen cooperation with international organizations and enterprises to jointly promote the development of the AI chip industry.

3.3.6. Strengthen standardization construction

The AI chip industry needs to establish a sound standard system to ensure the quality and stability of chip products. Governments and enterprises should strengthen standardization construction, formulate relevant standards and specifications, and improve the quality and competitiveness of chip products.

3.3.7. Strengthen intellectual property protection

The AI chip industry needs to protect intellectual property rights to prevent technology from being stolen or infringed. Governments and enterprises should strengthen intellectual property protection, formulate relevant laws and regulations, and establish a sound legal system to protect intellectual property rights.

By focusing on these key areas, governments and businesses can help to promote the growth and development of the AI chip industry. This will not only benefit the industry itself, but also the wider economy and society as a whole.

4. Conclusion

4.1. Key Findings

As of the third quarter of 2023, NVIDIA has achieved historic revenue growth in the data center sector. This upward trend can be attributed to the rapid development of generative artificial intelligence technology, especially technologies exemplified by CHAT-GPT. This has led to a strong demand for artificial intelligence chips, and NVIDIA's self-developed chips such as H800 and V100 have performed exceptionally well in the data center sector. The company has adopted an active strategic approach to seize more advanced resources, expanding its prospects for the future, and aligning with the rapid rise of the AIGC (Artificial Intelligence and Graphics Computing) industry.Currently, the AI chip industry is still in its infancy, but unlike the traditional chip market, it is filled with tremendous market opportunities. By comparing NVIDIA and AMD's situations and their interactions with the AIGC industry, we conclude that while both companies' traditional products—CPUs/GPUs—continue to meet market demand, there is a stronger market appetite for AI chips. This is largely due to the popularity of ChatGPT, which has sparked exploration into generative artificial intelligence technology and applications. The rapid advancement of artificial intelligence has created a massive demand for AI chips, and NVIDIA's rapid growth in the data center sector is attributed to its self-developed chips like H800 and V100, leading to a frenzy of purchases in the market and substantial profits. By integrating their chips with the AIGC industry, both companies have gained varying degrees of market recognition, with their stock prices repeatedly reaching new highs.

4.2. Market Assessment

It is expected that in the future, AI chips will be widely used in smart homes, smart healthcare, intelligent transportation, intelligent manufacturing and other fields, bringing more convenience and efficiency to people's lives and work. For enterprises in the field of AI chips,NVIDIA is expected to continue leading the market in the near future, leveraging its product and ecosystem advantages, but there is also a risk of overvaluation. Both companies aim to secure more advanced resources to explore future prospects, adapting to the increasing prominence of the AIGC industry in the technology and business sectors. The AI technology maturity curve and the emergence of new competitors will introduce uncertainty for these two companies.

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