Positive Effect of AI on the Medical Industry During the Epidemic

Zheng Gao [*, †], Jialin Liang [†] and Jiasen Liang [†]

School of International Business School Suzhou, Xi'an Jiaotong-liverpool University, Suzhou, China

* Corresponding author: Zheng.Gao20@student.xjtlu.edu.cn

† These authors contributed equally

Abstract. In last three years, the COVID-19 has swept around the world. Under the impact of the epidemic, the medical industry must face plenty of new challenges. To be specific, at this time, AI medical came into being and helped many fields. This paper will use PEST, literature review, quantitative analysis, and other methods to investigate the current situation of AI medicine and the two essential areas of AI medicine, i.e., the market of AI medicine and AI imaging and the financing of AI medicine. Based on the analysis, AI medical treatment is an emerging and popular field in the market. It has carried out technological innovation in many fields, improved efficiency, and reduced costs. According to the analysis, the financing situation of Ai Medical is optimistic, the total amount is rising, and the market is also maturing. AI Healthcare has a very positive impact on all enterprises involved. These results will help investors better understand this emerging industry and shed light on guiding further exploration of AI implementation in medical industry.

Keywords: AI, medical, influence, valuation.

1. Introduction

At the end of 2019, COVID-19 began to spread and spread rapidly. The whole medical industry has been impacted and challenged by COVID-19. In the first quarter of 2020, the medical industry in China was affected by the outbreak of COVID-19. The enterprises delayed the start of work to varying degrees, and the shutdown, transportation, logistics control, and personnel traffic restrictions significantly impacted the operation of enterprises, which caused the whole industry to be hindered in a short period. In the face of difficulties, to improve medical efficiency and increase enterprise valuation, the medical industry began to apply emerging technologies in the medical process, in which artificial intelligence (AI) played an indispensable role.

As a matter of fact, AI has two important applications in the medical field, namely AI imaging and AI pharmaceutical. COVID-19 can cause acute respiratory distress syndrome in patients and CT imaging is necessary for early diagnosis. In previsou research, Wang believes that using ai to assist screening can reduce the workload of clinicians and radiologists, which is very important for patients to get early diagnosis and timely treatment [1]. Drug reuse is a strategy to determine new indications for unapproved or investigational drugs [2]. Since the safety of these drugs has been tested in other clinical trials, reusing known drugs can provide drugs to patients faster than developing new drugs, and the cost is lower. Wang, Tang, and Nussinov pointed out in the report that applying ai in this process can achieve more efficient and accurate drug reuse [3].

In order to analyze the impact of AI on the medical industry during COVID-19, this paper studied the application of AI in the medical industry and the valuation changes of corresponding application technology enterprises since 2019. This paper will first use PEST to analyze the macro factors that AI medicine has encountered since 2019, then analyze how the two critical applications of AI medicine and AI imaging have helped the development of the medical industry, and finally analyze the development of the entire AI medical industry and the impact of AI medical on the entire medical industry. The first part is the background of the emergence of AI Healthcare. The second part will introduce the development of AI Healthcare. The third part will introduce AI Pharmaceutical and AI Imaging, respectively, and the fourth part will analyze the valuation changes of leading enterprises

involved in AI Healthcare and the impact of the development of AI Healthcare on the entire medical industry.

2. Overall of Current Status of AI Medical Service

The whole AI medical service is now in a rising stage. In 2020, the number of medical financing events will continue to decline, but the total amount of financing will rise. New drug R&D and AI imaging are two hot financing areas, of which new drug R&D accounts for 54% of the disclosed amount, and AI imaging has remained at about 20% for three consecutive years. From the policy level, the Chinese government attaches great importance to developing medical care and continuously releases the policy dividend. In 2017, the State Council issued the Development Plan for the New Generation of Artificial Intelligence, which proposes to develop convenient and efficient intelligent services, promote the application of new models and new means of AI treatment, and establish a fast and accurate intelligent medical system. Among them, the government has strongly advocated medical treatment. Residents' willingness to pay for medical care has increased socially. The emergence of AI can help medical institutions improve their medical level to meet the growing medical needs of residents. From the economic point of view, the total health expenditure has increased year by year, and the proportion of medical security expenditure of urban and rural residents in the total consumption expenditure has also increased year by year. AI medical can help auxiliary medical finance reduce health expenditure. In terms of technology, from 2015 to 2017, AI+images developed rapidly, and the accuracy of AI in image recognition continued to improve as shown in Fig. 1. Thanks to long-term research in the clinical knowledge base, CDSS products have become mature. All these have made a technical preparation for developing AI medical treatment.

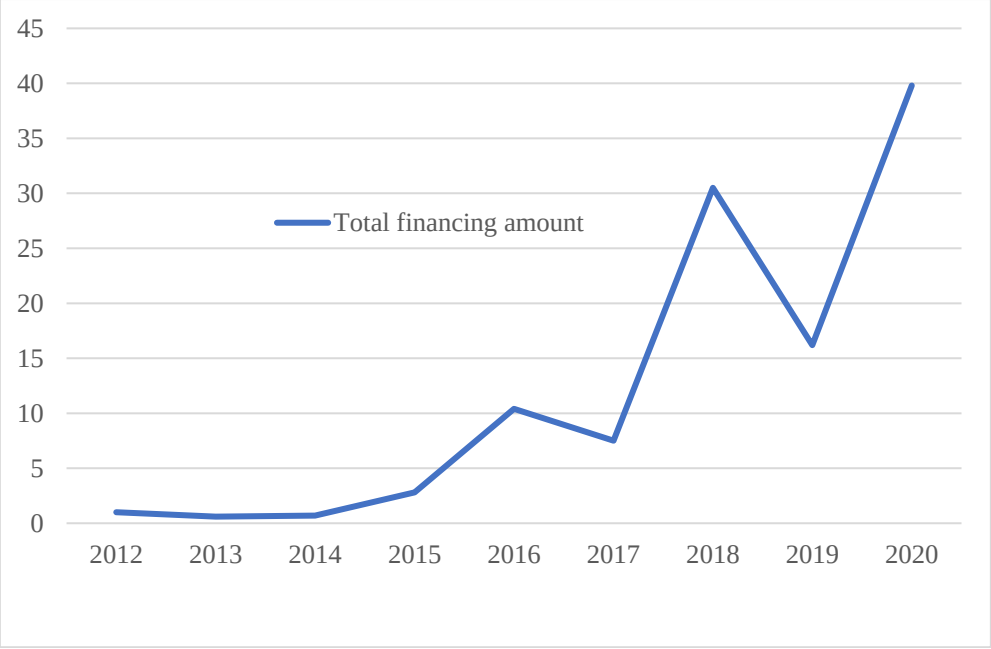

Figure 1. Total financing amount.

3. AI Pharmaceutical

The specific meaning of AI pharmaceutical is to apply artificial intelligence technologies such as natural language processing and big data to the pharmaceutical field to improve drug research and development quality and efficiency. During the COVID-19 pandemic, "AI medicine" has gained more significant development, and the technology has been used to research novel coronavirus antibody drugs and vaccines. In the dilemma of no medicine, AI's reuse of existing drugs has

alleviated the crisis and met people's urgent need for drugs. With the boost of capital, AI drug research and development has set off a boom and gradually become the development trend of the industry [4].

In July 2022, Yunnan Baiyao said that it signed the "Comprehensive Contract Agreement on Artificial Intelligence Drug Research and Development" with Huawei Technologies Co., LTD., a leading enterprise in the rapid development of science and technology, and a famous pharmaceutical enterprise with a century-old reputation. Since then, the two companies have decided to work together to innovate and develop pharmaceuticals. Yunnan Baiyao admitted in its annual report that scientific research on traditional Chinese medicine is stagnant, there is a lack of innovative drugs, and the speed and approval rate of traditional Chinese medicine is low. The involvement of Huawei alleviates this crisis. It can use AI pharmaceuticals to accelerate the speed of new drug research and development and shorten the cycle and cost of drug research and development [5].

By 2022, 600 AI drug R&D companies will be worldwide, with a year-on-year growth of 21.6%. In the short term, the market size of Chinese AI pharmaceuticals will continue to grow. The spread of COVID-19 has promoted the innovation and development of pharmaceutical enterprises and attracted the investment of many cross-border enterprises (e.g., Huawei, Tencent, and Alibaba), which have good technology and information technology, and gradually started the layout of AI pharmaceuticals [6].

As people gradually attach importance to health, the state and enterprises are also gradually making efforts in AI medical treatment. AI is a general term that refers to using computers to mimic intelligent behavior. It was officially born in 1956. Artificial intelligence has two branches in the medical industry. Speed and reliability in school medical schools can also help train students to diagnose patients. The branch of physics is represented by its application in CT machines. The application of AI in medical diagnosis is becoming increasingly mature, which has brought considerable benefits to enterprises, people, and the country. In the period of rampant novel coronavirus pneumonia, AI medical treatment has played a considerable role [7].

ISM001-055, a new drug developed by Insilon for treating idiopathic pulmonary fibrosis, entered clinical trials and completed clinical administration in the first healthy volunteers in Australia, becoming the world's first new target, novel molecular structure candidate drug discovered by artificial intelligence. The new drug candidate ISM001-0s5 for treating idiopathic pulmonary fibrosis was born from AI Pharmaceutical Systems. Its target is new and has been discovered by the PandaOmics platform. The platform finds the genetic differences between patients and healthy people by analyzing omics data and text data pool. Then, it combines the comprehensive analysis of signal pathways, scientific literature, and other information to find the association between the target and the disease to discover new targets for specific indications. Silicon-smart completed the process from target discovery to preclinical candidate identification in 18 months at $2.6 million. Traditional drug discovery can take more than four years, cost hundreds of millions of dollars, and risk a high failure rate.

4. AI Imaging

In addition to AI medicine, AI imaging is an essential field in AI medicine. Medical imaging data accounts for over 80% of all clinical data and is the cornerstone of clinical diagnosis, disease treatment, and health management. However, the analysis of medical images is complicated, requires high experience and ability of doctors, and the overall efficiency of image diagnosis could be much higher. Therefore, with the help of AI technology, AI medical imaging technology can achieve intelligent recognition and mapping of medical image lesions, assist doctors in clinical diagnosis and early screening of related diseases, and has broad prospects for future application. It is also one of the most promising segments of the AI track for commercial lending. Currently, the two mature directions in AI medical imaging are CT image recognition and retinal image recognition.

Through intelligent CT image recognition of coronary artery, chest, limb joints, bones, and other parts, CT image recognition can complete case screening, intelligent analysis, and diagnosis and assist

clinical diagnosis and treatment decisions. Compared with traditional retinal imaging methods, AI retinal image recognition technology has the advantages of high diagnostic efficiency and accuracy. It can also provide diversified risk assessment and management needs for ordinary customers.

In 2017, iFLYTEK used AI to build the first municipal smart hospital in Anhui Province with Hefei Binhu Hospital. IFLYTEK's artificial intelligence medical image auxiliary diagnosis system provides local auxiliary diagnosis suggestions for doctors in Binhu Hospital. Primary medical institutions can also upload CT images to the cloud. The system can judge the benign and malignant pulmonary nodules and return the auxiliary diagnosis results to the primary hospitals in the cloud. The small artificial image-aided diagnosis greatly reduces the time of film reading and the probability of misdiagnosis and missed diagnosis in grass-roots hospitals. During the study, the sensitivity of the AI image-aided diagnosis system was 97.78%, and the sensitivity was 92.31%, i.e., the specificity of COVID-19 diagnostic efficiency. The accuracy rate is up to 97.09%, proving the method's effectiveness [8, 9].

General Medical, Siemens, Philips, and Toshiba mainly occupy China's medium and high-end CT market. The low-end CT market mainly comprises six enterprises: General Medical, Siemens, Philips, Hitachi, Toshiba, and Neusoft. In 2019, the annual sales volume reached 3825 units, up 8.94% yearly. According to the data, the sales volume of China's CT machine market will reach 4112 sets in 2020, with a year-on-year increase of 7.5%. The three giants of China (Baidu, Alibaba, and Tencent) also participate in medical+artificial intelligence. Tencent released the medical AI imaging product "Tencent Shadow" and announced its cooperation with more than 100 hospitals [10]. In 2020, the total financing of AI medical care in China will reach 3.98 billion yuan. AI auxiliary examination is the second largest track after AI new drug research and development. The investment and financing amount will reach 860-million-yuan, accounting for 21.61% of the total investment and financing amount. The market scale of AI medical imaging in China is expanding, and the prospect is extensive.

5. Financial Analysis

To obtain the market data of the whole AI healthcare, we collected and analyzed the data of AI healthcare financing in China from 2012 to 2021 (seen from Fig. 2). From the results, one notices that from 2012 to 2018, the total amount of financing and the number of financing hours have continued to rise, indicating that AI medical care has gradually received market attention. Although the number of financing hours has declined from 2018 to 2021, the total amount of financing has continued to rise, reaching the highest level of 8 billion yuan in 2021. Meanwhile, we also analyzed the financing rounds of these companies (as presented in Fig. 3).

Compare the rounds of financing projects in 2019 and 2020. The proportion of angel round, Series A, and Series B in financing projects decreased from 85.7% to 70.6%, indicating that the market maturity has improved. At the same time, the average amount of financing increased from 39 million yuan per transaction to 114 million yuan per transaction, indicating that the industry is in a period of rapid growth. To sum up, AI Healthcare has grown rapidly and gradually matured through research, and the industry scale is expanding.

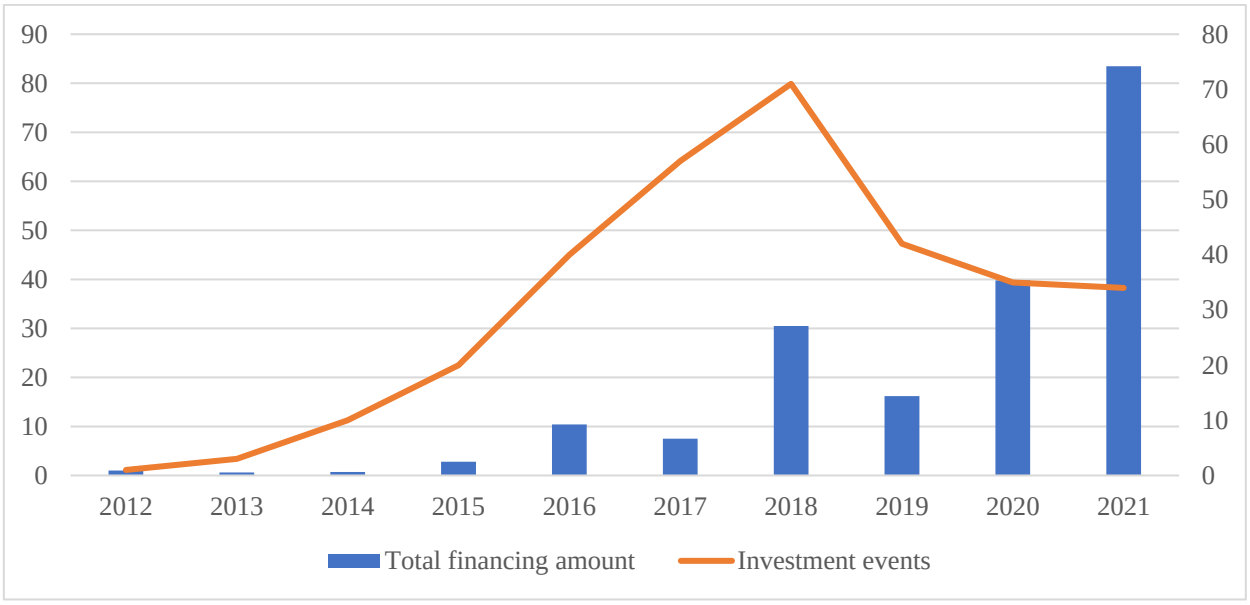

Figure 2. 2012-2021 Total financing amount and number of financing events of AI medical care in China

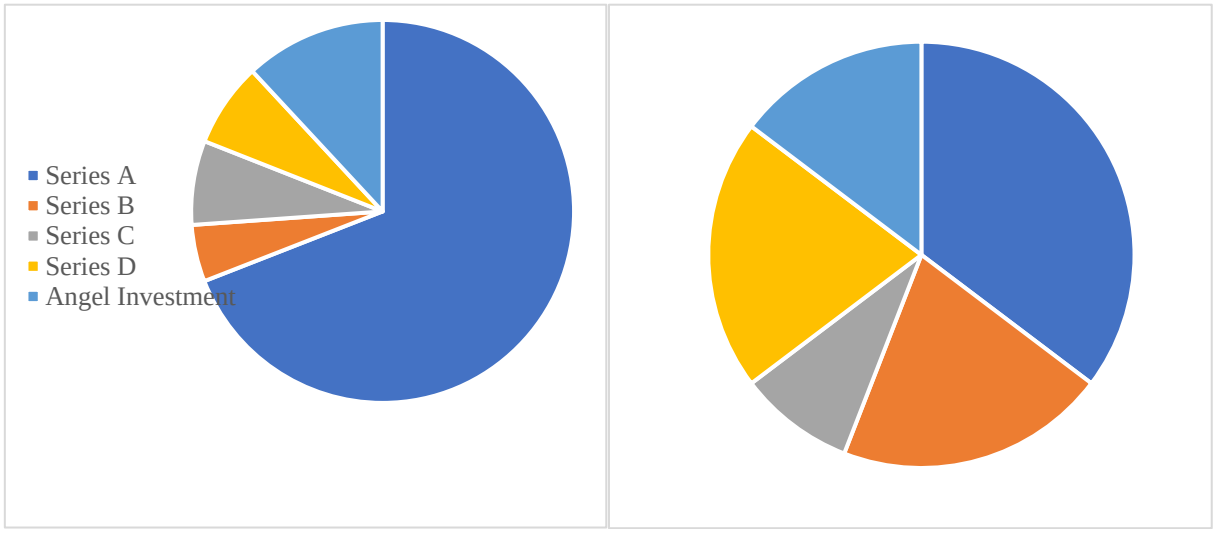

Figure 3. 2019 (left panel) and 2020 (right panel) China's AI medical project series.

6. Conclusion

In summary, under the background of the increasing contradiction between the aging population and the limited medical resources due to the epidemic situation. AI Medical has fully empowered all aspects of medical treatment with its powerful analytical and decision-making ability, improved the level and efficiency of diagnosis and treatment, and promoted the rational allocation of medical resources. Among them, AI Pharmaceutical and AI Imaging have achieved the goal of innovative technology in their respective fields, effectively alleviating the shortage of medical resources. Considering the positive impact and development speed of AI healthcare on the medical industry, this study believes that AI healthcare will positively impact the valuation of all participating companies. In the future, AI healthcare will become more mature. AI will continue to enhance its driving role in the transformation of digitalization and automation in the medical industry, which will be an excellent investment outlet.

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