Application of Big Data and Artificial Intelligence Technology in the Prevention and Control of COVID-19 Epidemic

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Abstract: This article analyzes the content related to big data and artificial intelligence technology. The author studied the characteristics of the COVID-19 epidemic, epidemic characteristics, and transmission routes. The author has studied the use of big data and artificial intelligence technologies in genome sequencing and analysis, intelligent medical diagnostic services, vaccine research and development and drug screening, reasonable scheduling of anti-epidemic resources, epidemic monitoring and early warning analysis, epidemic prevention inspection robots, unmanned delivery models, and epidemic robots. Specific application. The purpose of this article is to give full play to the value of big data and artificial intelligence technology to improve the prevention and control of the COVID-19 epidemic.

1. INTRODUCTION
Since December 2019, the pneumonia epidemic caused by the new coronavirus infection has had a huge impact on the world. With the in-depth study of the virus by scientists around the world, they have gradually gained more knowledge about it. In this process, the application of artificial intelligence, big data analysis and other methods and technical means has achieved phased victory. The Ministry of Industry and Information Technology issued a proposal as early as February 2020, advocating artificial intelligence-related societies, alliances, enterprises and institutions to give full play to the empowerment effects of artificial intelligence, and organize scientific research and production forces to fully respond to the new coronavirus epidemic. How to use big data, artificial intelligence and other modern governance methods to win this epidemic prevention and control war in this critical period is directly related to the people's life, health and safety and the country's economic and social stability.

2. OVERVIEW OF BIG DATA AND ARTIFICIAL INTELLIGENCE TECHNOLOGY

2.1. Big Data Technology
Big data mainly refers to data information that cannot be captured and sorted by conventional software in a short period of time. When organizing them, people need to match better processing software to obtain more diversified information assets to meet the needs of healthy social development. At present, big data includes semi-structured data, structured data, unstructured data and other types in classification. Among them, unstructured data can account for more than 50%. Especially for operating companies, more than 80% of their operating data are unstructured data, and the data stock is also increasing at a trend of 105-15% each year. Judging from the current development situation, big data has been well developed in the fields of enterprise development, medical services, and machinery.
manufacturing. Moreover, the massive amount of information provided by big data can also provide a value reference for decision-making services and improve the reliability of analysis results.

Figure 1. Big Data Diagram

2.2. Artificial Intelligence Technology
Artificial intelligence is the study of making computers simulate certain human thinking processes and intelligent behaviors (such as learning, reasoning, thinking, planning). Its content mainly includes the principle of computer realization of intelligence and the manufacture of computers similar to human brain intelligence. It can enable the computer to realize higher-level applications. Commonly used classifications are shown in Figure 2. Artificial intelligence will involve disciplines such as computer science, psychology, philosophy, and linguistics. It can be said that almost all disciplines of natural sciences and social sciences have far exceeded the scope of computer science. The relationship between artificial intelligence and thinking science is the relationship between practice and theory. Artificial intelligence is at the technical application level of thinking science and is an application branch of it. From the perspective of thinking, artificial intelligence is not limited to logical thinking, thinking in images and inspirational thinking can promote the breakthrough development of artificial intelligence. Mathematics is often regarded as the basic science of many subjects, and mathematics has also entered the field of language and thinking. The subject of artificial intelligence must also borrow mathematical tools. Mathematics not only plays a role in the scope of standard logic, fuzzy mathematics, etc., it will also promote each other and develop faster in the subject of artificial intelligence.

Figure 2. Artificial Intelligence Technology Classification

3. ANALYSIS OF THE BASIC CONTENT OF THE COVID-19 EPIDEMIC

3.1. Onset Characteristics
Based on the medical records collected from December 2019 to December 2020, after being infected with the COVID-19 virus, more than 70% of patients will have problems such as fever, dry cough, and
weakness of the limbs. There are also a small number of patients who have respiratory problems such as digestive tract or nasal congestion such as diarrhea. Severely ill patients will have lung breathing difficulties one week after the COVID-19 virus invades the body, accompanied by problems such as multifunctional organ failure and septic shock. These patients need to rely on ventilators to maintain their body breathing. It should be noted that many patients infected with the COVID-19 virus will not have obvious fever problems in the initial stage, that is, “asymptomatic infected persons”. Such situations also increase the difficulty of personnel selection. In addition, mild patients infected with the COVID-19 virus have clinical manifestations such as low-grade fever, mild fatigue, and rarely have pneumonia problems. According to the feedback results of cured cases in 2020, more than 85% of patients recovered well after being cured. Many elderly people also have poor recovery after surgery because of other underlying conditions.

3.2. Popular Features
The COVID-19 virus has the characteristics of a pandemic in terms of epidemics. The so-called pandemic feature refers to the rapid spread of a certain type of disease after the onset of disease, and the area involved is very wide, and the population involved is large. It can spread across regions or even across borders in a short period of time, bringing serious negative effects. According to China's medical records from December 2019 to December 2020, the number of infected people has increased geometrically at the beginning of the COVID-19 outbreak. The researchers take Wuhan, where the epidemic is the most severe, as the place to research. In the early stage, the infection occurred and it took less than three months to spread across the country. However, foreign countries have expanded to hundreds of thousands or even tens of millions in a short period of time due to unfavorable control and control, which shows that the COVID-19 epidemic has a strong pandemic. Moreover, the dormant period of the COVID-19 virus is relatively short, and the time from infection to onset of most patients is within 14 days. This is also an important reference for setting the safety isolation period.

3.3. Way for Spreading
As shown in Figure 3, the sources of transmission of the COVID-19 virus include sick patients, hidden infections (that is, asymptomatic infections), pathogen carriers, and animals infected with COVID-19. Symptoms infected). Pathogen carriers belong to the difficulty of prevention and control when the current prevention and control work is carried out, and specific measures need to be drawn up for analysis and treatment. According to statistical feedback, the transmission of COVID-19 virus includes respiratory transmission, digestive tract transmission, contact transmission, vector transmission, blood transmission, and body fluid transmission. This is also what the COVID-19 virus needs to focus on in the process of spreading.

![Figure 3. Analysis of the Transmission Route of COVID-19 Virus](image)

4.Specific Applications of Big Data and Artificial Intelligence Technology

4.1. Genome Sequencing and Analysis
According to the global epidemic statistics in 2020, the COVID-19 virus has evolved and mutated. If we want to carry out comprehensive prevention and control, we need to do a good job of gene
sequencing and analysis (the sequencing process is shown in Figure 4). According to the relationship between host and pathogen, medical staff accelerate the production of therapeutic drugs and preventive vaccines. From the actual research situation, the gene sequence of the COVID-19 virus is longer. It is very difficult to complete the detection of the whole genome sequence by conventional means in a short time, which greatly restricts the research progress. The service platform based on big data and artificial intelligence technology can use systematic data processing algorithms to determine the genome of the COVID-19 virus. Its working time has also been compressed from more than ten hours to 120in, and with the continuous optimization of the algorithm, the COVID-19 virus genome verification time has been further reduced. At present, the inspection can be completed within 30 minutes. This greatly improves the detection efficiency and improves the timeliness of the detection results. For example, the intelligent algorithm provided by Alibaba Company can perform detailed analysis of the genetic sequence and protein composition of the COVID-19 virus. At the same time, with the cloud service function, the timeliness of the COVID-19 virus sequencing content is improved. This also laid the foundation for the smooth development of follow-up new drug research and development [1].

![Figure 4. Genome Sequencing Process](image)

4.2. Intelligent Medical Diagnostic Service

There are more sources of spread of COVID-19 viruses, with hidden infected people (i.e., asymptomatic infections), pathogen carriers belong to the prevention and control difficulties in the current prevention and control work. How to make timely discovery patients, the accuracy of the improvement test results is also an important means of conducting COVID-19 virus science prevention and control. According to the clinical statistics in June 2019, June 2020, when the nucleic acid detection method was used to measure the virus, 60% of the probability of false negative. This also increases the fault tolerance rate of medical diagnosis. The integration of big data and artificial intelligence technology can effectively improve this situation. For example, the artificial intelligent pneumonia diagnostic system established by the large data and artificial intelligence technology can achieve automatic operation, providing the doctor with an accurate diagnostic effect. Its fault tolerance is 0.01%, which also increases 30% of the condition diagnosis speed, reduced by 20% of patient waiting time, thereby reducing the chance of occurrence of cross-infection risk. Some hospitals rely on the smart imaging evaluation system established by the big data and artificial intelligence technology to extract CT image information, combined with accurate quantitative analysis to obtain quantitative efficacy evaluation results. This is also conducive to the more intuitive evaluation of COVID-19 virus diagnostic accuracy, thus laying the foundation for measures [2].

4.3. Vaccine R & D and Drug Screening

The COVID-19 virus has a strong popular feature. In order to avoid further deterioration of the situation, medical staff needs to do a good job in vaccine development on the basis of strengthening the study. This is also the basic conditions for further exploding from the root cause. The service platform built
based on large data and artificial intelligence technology can greatly optimize the consequent research process with a large extent to which the systematic data processing algorithm is largely optimized, thereby improving the reliability and practicality of the research results. For example, during the research of COVID-19 viral vaccine, Tencent Yun Group provides cloud headed for the research team. Baidu provides billion-level computing resources for research teams, and Ali has established a drug research and development big data platform. These integrated analysis platforms established by these advanced technologies can conduct in-depth research on the biological composition, pathogenic mechanism of COVID-19 viruses. In the meantime, it can also quickly complete the drug screening in a short period of time to ensure the reliability and guidance of the analysis results [3].

4.4. Reasonable Scheduling of Anti-resources
Covid-19 viruses in China broke out in Wuhan, in the early stage of anti-optics, also facing the shortage of cultural affected resources. In order to organize organizational, efficient completion of the anti-vlotenia, how to make reasonable scheduling of COVID-19 viral residue also have an important role. The service platform based on big data and artificial intelligence technology can be organized for national medical resources by means of systemic data processing algorithms. It can also improve the resource scheduling of the resource management structure of the resource management structure in the case of ensuring local resources. For example, many e-commerce platforms use large data and artificial intelligence technology to quickly judge the trueness, pricing, etc. of COVID-19 viral drug-related medical materials. Meanwhile, the use of intelligent development platforms can be scientifically configured on the use of resources, and thereby increasing 20% -60% resource utilization efficiency. This also alleviates the uneven dispensing of regional immunity resources [4].

4.5. Epidemic Monitoring and Early Warning Analysis
COVID-19 viruses have burst, latent, and other characteristics during the propagation process. In order to organize organizational, efficient completion of cultures, how to perform dynamic monitoring of COVID-19 virus dissemination is also one of important tasks. The service platform based on big data and artificial intelligence technology can complete massive data processing every day. At the same time, this has also established an intelligent early warning system. After an abnormal situation, the system will timely warn, adopt the corresponding emergency treatment plan, thereby improving the reliability of the epidemic monitoring results. For example, many cells utilize large data and artificial intelligence technology for statistics for entering and exiting community information, including temperature measurement data. If there is a COVID-19 patient or a fever person in the community, the system will automatically warmers at this time, prompting the relevant personnel to launch a key investigation. Simultaneously, the use of intelligent monitoring platforms can be summarized for person activity data. This also provides effective reference for the formulation of the isolation plan [5].

4.6. Epidemic Prevention Ruler
The above has been mentioned above, and the propagation route of COVID-19 viruses in the propagation process includes contact propagation, blood propagation, body fluid propagation, etc. The hospital is the main gathering place for such patients, how to improve the patrol efficiency is also a matter of concern in COVID-19 epidemic prevention, based on the safety of medical personnel. The anti-prevention inspection robot based on large data and artificial intelligence technology can complete the established inspection task in accordance with the instructions. Moreover, using the robot's voice function, the video function can promptly understand the patient's body characteristics, and the recovery situation is performed, thereby improving the reliability of the epidemic prevention and control process on the basis of ensuring the safety of medical personnel. For example, many hospitals used during the epidemic can complete the inspections as required and summarize the activity data. This also provides effective reference for subsequent work [6].
4.7. Unmanned Distribution Mode
During the COVID-19 viral propagation, contact propagation belongs to the main propagation mode. As a result, reducing direct contact between people can reduce the risk of infection to a large extent. Unmanned distribution robots based on big data and artificial intelligence technology can be sent to the designated position in accordance with the instructions, and the whole process does not need to be in contact. Moreover, using the robot's voice function, the video function can record the distribution position, the delivery situation, thereby improving the epidemic prevention and control effect on the safety of the delivery process. For example, many hospitals use unmanned distribution robots during the epidemic to accomplish the delivery of drugs, food, and medical devices, and reduce the contact rate during the delivery process. This also reduces the chance of cross infection. In the meantime, the distribution data can be summarized by the establishment of the data platform. This also provides the necessary data support for subsequent robot distribution paths and distribution tasks [7].

4.8. Epidemic Robot
According to Z China Statistics, COVID-19 viruses were found earlier in December 2019. People have less than the propagation method of COVID-19 viruses, daily protection, medical treatment issues, etc. How to accelerate the speed of this problem, reduce personnel panic is also the content of the development stage that needs attention. The epidemic robots based on large data and artificial intelligence technology have been detailed for the relevant content of COVID-19 viruses. With robotic voice features, video features can be visualized to personnel consultation issues. This also effectively enhances the problem of problem solving, deepening the impression of the personnel. For example, many companies have launched smart voice robots such as Tmall elves, Baidu robots. These smart voice robots can answer detailed answers based on user issues, and reduce people's concerns. This also reduces the panic feeling, which can use the correct attitude to address the epidemic [8].

5. CONCLUSION
In summary, since the emergence of new crown pneumonia, artificial intelligence technology has made great contributions to fighting the epidemic. Artificial intelligence plays an important role in the management of mobile person, epidemic monitoring, epidemic prediction, logistics support, adjuvant diagnosis, accelerated drugs and vaccine research and development. Based on this, related companies also need to do technical research work to make the intelligent medical level can be sustained.

ACKNOWLEDGMENT
Achievements of 2019 Annual Scientific Research and Innovation Team (Software Technology Research Development and Application Team) of Dalian Vocational Technical College

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