Application of Artificial Intelligence in Medical Industry

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Since artificial intelligence was proposed at Dartmouth in 1956, it has experienced highs and lows. From May 1997, IBM's Deep Blue defeated the chess master Kasparov to the release of Alpha Go and Alpha Zero, which defeated the best human Go players, represented by Ke Jie(Zhou Jie.2020), Artificial intelligence is getting more and more attention from the public and experiences a new high of development.

Artificial intelligence can be divided into "artificial" and "intelligent". While "artificial" can be better understood, it is still difficult to explain what "intelligence" is. This relates to other theories such as consciousness, self, and so on. Some people hold an idea that Artificial intelligence is, the study of the laws of human intelligent activities, the construction of artificial systems with certain intelligence, and the study of how to make computers do the work that needs human intelligence in the last couple of years, and this requires artificial intelligence to learn the basic theory, method and technology of applying computer hardware and software to simulate certain intelligent human behavior(Kenneth et al., 2020).This statement partly reflect the basic idea and content of the artificial intelligence.

In recent years, the AI technology represented by deep learning has made some great breakthroughs which are inseparable from the improvement of computing power, the development of big data, and advanced algorithms proposed by outstanding scholars. The application of AI to the medical field to aid diagnosis is also significant(Leite Michel L et al., 2021).

It is an important diagnostic pattern that doctors judge whether the patient is healthy by observing the body image of the patient, for example X-ray imaging and ultrasonic imaging. (Kauppi et al., 2019) In the past, medical images were often interpreted by doctors, the kind of approach has some disadvantages, for instance low efficiency, and easy to be affected by fatigue and subjectivity. In order to improve these deficiencies, we have to develop the technology of computer-aided medical diagnosis. Recently, the best performance way is to use a model called convolution neural network (CNN) to inspect the images of possible diseased tissue and mark the areas where problems may occur. (Li et al., 2014). In 2012, Alexnet proposed by Hinton et al. (2012) won the championship in ImageNet Large Scale Visual Recognition Challenge. In 2016, deep residual learning for image recognition proposed by He et al. (2016) from Microsoft Research Asia achieved further success on the basis of predecessors. Saxena et al. (2020) designed a model, which uses pre trained CNN for feature extraction, and use support vector machine as classification for breast lesion detection, and achieved good results

Previous studies on medical artificial intelligence mostly use supervised learning methods. Although they have achieved good results, such methods have the problem of high data acquisition cost (Zhou et al., 2019). In order to make the model learn more medical knowledge to help diagnosis and treatment, professional medical professors have to complete labeling data. The more labeled data, the more medical knowledge the model can learn and better diagnostic results can be obtained. However, the time of excellent doctors is very precious. In practice, it is almost impossible to obtain enough data to support this research. Moreover, this also violates the original intention of medical artificial intelligence to reduce the burden of medical workers and assist doctors（Mulayim, N. et al , 2016）. In addition, even very professional doctors may make mistakes. If the model learns the wrong labeled samples, the consequences will be unimaginable.

Even though supervised learning has brought great help to mankind in the medical field, it still faces some problems and difficulties in clinical application. Aimed at challenging problem of medical images, we propose the unsupervised in-depth learning -- This is a method to obtain knowledge from images without labels, which better assists doctors diagnosis. We based on the unsupervised in-depth learning techniques, registration network, learning strategies and so on key technologies in-depth study (Duan luwen,2021); it doesn’t need a doctor to tell professional medical knowledge. We can learn medical knowledge only by learning samples of human physiological organization, and put forward specific effective unsupervised registration model. Doctors need to collect lots of no marked physical images, including both patients and normal people. These images were led into the model, which was able to distinguish between abnormal images and which were patients.

Up to now, tens of thousands of discases have been discovered. If the method of supervised learning is applied to finish the diagnosis of all diseases, it requires the continuous work of hundreds of thousands of doctor, which is obviously impossible to complete. However, the application of unsupervised in-depth learning and the collection of images input of pre-designed models, the computer can automatically diagnose disease greatly, which can reduce the workload of doctors. It plays an extremely important role in the medical field.

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