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Application of Artificial Intelligence in Medical Imaging Diagnosis

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Abstract: Both the treatment of cancer and other serious diseases often depends on the diagnosis of artificial complexity and heavy experience. The introduction of artificial intelligence in medical imaging has injected vitality into the diagnosis of images. Artificial intelligence uses deep learning, image segmentation, neural networks and other algorithms flexibly in image recognition through learning data sets to extract features for accurate diagnosis of clinical diseases. At the same time, it also plays a special role in controlling the spread of infectious diseases such as new coronary pneumonia.

Keywords: Artificial Intelligence; Cancer Diagnosis and Treatment; Medical Imaging; Image Processing

In recent years, big data and artificial intelligence have made breakthroughs in key technologies. Artificial intelligence is increasingly closely related to medical imaging diagnosis, and combining the main algorithms of artificial intelligence with medical imaging can efficiently promote the accuracy of medical imaging instruments and provide favorable material guarantee for doctors to make diagnosis. Artificial intelligence helps screen for diseases and diagnose patients, and needs to be judged from imaging, biochemistry, etc. Routine testing relies on CT and X-rays. It can be seen that images play an extremely important role in the doctor's judgment. Making full use of artificial intelligence to help doctors judge diseases and predict diseases is the future direction.

1. Big data in medical imaging

Artificial intelligence contains data, algorithms, computing power three elements. Big data as the cornerstone of artificial intelligence, for the subsequent algorithm, computing power provides a material basis. The operation mechanism of artificial intelligence is based on a large number of effective and reliable training samples, which is constantly updated and accumulated by specific algorithms and then applied to production and life. It can be seen that the stability of the training sample acquisition channel, the feasibility of the sample itself both the advantages and disadvantages of the algorithm will determine the application effect of artificial intelligence.[1]

Medical imaging big data used to be collected in their respective health care facilities, resulting in poor mobility. At present, the rapid development of cloud computing, crossed the space limitations, can easily access the resources uploaded by the cloud, and promote the development of medical imaging. Common medical imaging techniques include nuclear magnetic resonance, ultrasound imaging, diffuse optometomy, computed tomography (CT) and so on, so artificial intelligence needs to set different algorithms with characteristics to be applied to different fields of medical imaging diagnosis.[2] The constant "intelligence" of medical imaging has brought the gospel to the first-line medical diagnosis.

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2. The principle of medical imaging diagnosis

The algorithm for medical imaging diagnosis comes from the neural networks of artificial intelligence and deep learning. At the same time, based on the particularity of medical imaging, image processing technology has been widely used.

Deep learning algorithm has the advantage of being able to handle the variable and unstable signal data because of its unique flexibility, and has been effectively applied in the field of medical image diagnosis, and the special application of convolutional neural network in image recognition and processing also plays an important role in image technology and robot vision. Weijia Li *et al*. on the lung imaging detection of the article on the initial confirmation of convolutional neural network in the lung imaging detection reliability.[3] Image recognition algorithms commonly used in medical imaging include Alex Net, Mobile Nets, VGG16 neural network model. Jinfan Zhou[4] studies and analyzes the lung X-ray image based on big data, and finally selects the VGG16 model with good resolution effect to improve the algorithm to get the optimal model.

The application of artificial intelligence in medical imaging diagnosis can improve the quality of pictures through technical means, break through the limitation of the human eye's own resolution, make medical instruments better serve the daily diagnosis and treatment process, greatly facilitate doctors to make accurate diagnosis of the patient's status quo, and also make the patient get the first time effective treatment.

3. Examples of the application of artifical intelligence in medical imaging diagnosis

3.1 Cancer of the liver

Image processing plays a vital role in image diagnosis and treatment. With the development of science and technology, people pay more attention to the extraction of features in images. The extraction of high characteristics has undoubtedly become the direction of people's pursuit. This algorithm can directly extract the key information in the image and weaken other irrelevant information, providing a solid guarantee for the doctor's initial diagnosis of the disease. CT images are used in the diagnosis of liver cancer due to high signal-to-noise ratio and high resolution. The current image feature extraction is mainly texture and shape, lack of image advanced semantic expression and so on, by improving the multi-scale local two-value mode algorithm[5] can fill this defect.

3.2 Female cancer

With the increasing incidence of cancer year by year, it has aroused the concern of the society to prevent cancer. Breast cancer and cervical cancer, as two types of cancer with higher incidence in women, can be effectively controlled by early detection and treatment. In the past, artificial diagnostic treatment was characterized by low accuracy and complexity. At this point, artificial intelligence is introduced into the cancer system, through image classification learning algorithm, can be divided into normal and disease two categories. The length of initial diagnosis is greatly shortened, and the continuous development of instrument accuracy has greatly reduced the misdiagnosis rate. The effects of the introduction of migration learning[6] in pre-trained convolution neural networks to classify the effects of migration learning on the detectors. Using the characteristics of the data set itself to combine, abstract, migrate into the new data set features, classify again, make accurate judgment stoic medical images.

3.3 Cerebral hemorrhage

Cerebral hemorrhage is a clinically common severe brain disease. As an acute disease, it has the characteristics of high disability rate and fast onset. At present, the diagnosis of such diseases is mostly expert diagnosis, relying on clinical experience to make a judgment on the patient's illness. Diagnosis in this area lacks reliable data support.[7] By establishing the model and the method of image segmentation, the preliminary artificial intelligence scheme of cerebral hemorrhage CT diagnosis and treatment can be formed. Collect a large number of clinical patients in different periods of brain images edit to establish the first training set, through the robot vision extraction features, output test results, for the future brain hemorrhage patients to provide a method.

3.4 The outbreak of new coronary

pneumonia

The outbreak of new coronary pneumonia is severe, and it is urgent to diagnose pneumonia patients quickly. Professor Xu's team worked with other medical institutions to build the "New Coronary Pneumonia CT Imaging Integrated Analysis AI Auxiliary System"[9]. The system is based on CT images and includes AI analysis system and imaging analysis system. Imaging system analyzes typical imaging features of pneumonia, such as lung real change, wool glass and other analysis results. AI analysis adds a new assessment of different types of pneumonia, which has higher requirements for the accuracy of the analytical system, to distinguish the nuances of pneumonia types requires a large number of real and reliable clinical patient imaging samples. The accuracy of the diagnosis of the system was 83%, and the first-level screening of the new coronary pneumonia was realized to help the outbreak judgment. This system will subsequently expand the data set to improve judgment accuracy.

3.5 Acute intestinal blood vessel ischemia

Critical abdominal emergency, with high mortality rate, poor prognosis characteristics.[10] The fatality rate is more than 60%, and the early symptoms are not serious, which makes it difficult for the initial diagnosis and treatment. In order to treat patients at the best time, medical imaging has intelligently developed the relevant technology of acute intestinal membrane vascular ischemia. New technologies such as digital-reducing angiography technology, non-invasive imaging examination technology, and near-infrared fluorescence imaging technology based on molecular imagery have been developed. Through the optimization of intelligent algorithm, improve the computing performance of the instrument, establish the data computing system, and promote the rapid development of medical imaging.

4. The intelligent prospect of medical imaging diagnostics

At present, cancer and clinical critical care have a greater demand for medical imaging intelligence. In the past, the complex expert experience diagnosis not only requires doctors year-round clinical experience but also strong dependence on human. Now artificial intelligence in the medical image recognition processing technology continues to develop, can accurately and efficiently judge the patient's situation, to the doctor quickly provide first-hand effective information, easy to follow-up diagnosis. However, due to the large demand for data, narrow media scope, less contact with medical information and other factors, artificial intelligence in medical imaging diagnosis there are obstacles, the future development of big data to build a national medical information network, as well as the continuous improvement of data collection technology can effectively solve such problems.

In addition, regulators say the medical imaging diagnosis of artificial intelligence needs to be able to replace the imaging doctor.[1] This idea plays a guiding role in the diagnosis of clinical critical disease, and combining artificial intelligence with human experience is the direction of the future development of artificial intelligence.

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