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Clinical Study of Deep Learning-Based Giant Needling Combined with Conventional Acupuncture for Treatment of Limb Dysfunction Due to Stroke

Jing Lu[1,a,*], Jing Yang[2,b]

[1]Beidahuang Neuropsychiatric Hospital, Jiamusi, Heilongjiang, China
[2]Jiamusi Hospital of Traditional Chinese Medicine, Jiamusi, Heilongjiang, China
[a]luxiaopang2022@163.com, [b]chenyangjing@126.com
**Corresponding author*

Abstract: *With the development of computer technology and the deepening of machine learning research, the application prospects of artificial intelligence technology in the medical field are becoming more and more broad. Deep learning algorithm is a method tool that realizes machine learning so as to be as close as possible to artificial intelligence. Its application in clinical medicine is the current hot direction of artificial intelligence in the medical field. Therefore, clinical medical research combining deep learning algorithms with traditional therapies is of great significance to the application and development of deep learning in the medical field. This article uses deep learning algorithms to study a clinical treatment plan that combines the giant needling method in traditional medicine with conventional acupuncture therapy for stroke patients with limb dysfunction. This article mainly uses the convolutional neural network in the deep learning algorithm to establish a tracking prediction model. Through the time-series signal of the neural response of stroke patients, acupoint detection and medical image processing, the study of the giant needling method combined with conventional acupuncture therapy on the limb dysfunction of stroke the clinical treatment effect. This article analyzes the limb function and therapeutic effect of the giant needling method combined with conventional acupuncture therapy before and after the clinical treatment of stroke-related limb dysfunction. This paper studies the advantages and disadvantages of deep learning algorithms and other machine learning algorithms in the clinical data processing of stroke-related limb dysfunction through comparative analysis. Studies have shown that during the six months of stroke recovery, which is mainly based on the treatment of limb dysfunction, deep learning has a prediction accuracy of 91.44% for stroke patients limb dysfunction. Data collection, medical imaging and processing for clinical studies on stroke limb dysfunction the prediction accuracy is far superior to other machine learning algorithms.*

Keywords: *Deep Learning, Giant Needling Method, Treatment of Stroke and Limb Dysfunction, Clinical Medicine*

1. Introduction

1.1 Background and Significance

With the development of modern medicine, especially the improvement of the medical technology level of integrated traditional Chinese and Western medicine, the problems of various medical diseases are gradually being overcome by people, and the treatment of stroke and limb dysfunction is one of them. This not only benefits from the development of Chinese and Western medical technology, but also depends on the rapid development of modern science and technology. For example, artificial intelligence has played an important role in the development of medical technology and the improvement of medical standards in modern medical image processing, data collection, timing signal detection of clinical medical data, and prediction models for various diseases. Although artificial intelligence has become an important breakthrough direction and research hotspot in medical development, the application of artificial intelligence in clinical medical research is still limited to individual cases due to the differences in theoretical knowledge and research directions between Chinese and Western medical technologies. Stroke is a common and serious cerebrovascular disease. It has many causes, such as obesity, heart disease, hypertension, diabetes, and metabolic disorders of

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blood functional components. However, the greatest harm caused by stroke is the organic brain injury and its series of complications, especially brain dysfunction [1]. In the process of stroke treatment, the most dangerous thing is the treatment of brain injury when stroke patients occur. However, to completely cure or help stroke patients as much as possible, clinical treatment of limb dysfunction is particularly important [2]. Studies have found that during the first three weeks of the onset of stroke, the probability of limb spasm or even paralysis caused by excessive brain injury is as high as 90%, which is a serious threat to the health of middle-aged and elderly people [3]. This article mainly discusses the deep learning algorithm in artificial intelligence. The 3D convolutional neural network model established through deep learning can detect the time-series signal of the patient's limb function and neural response data during the treatment process, monitor and predict the treatment of stroke patients' limb dysfunction The situation is of great significance for the clinical research on the treatment of limb dysfunction in stroke.

1.2 Related Research at Home and Abroad

At present, for the application of deep learning in clinical treatment, Chinese and foreign medical workers have reached in-depth exchanges and cooperation, and have also made major breakthroughs. For example, in the following domestic application research, Wang studied the important role of intelligent control in solving some problems in clinical work and promoting the development of clinical medicine through some examples of intelligent control in clinical departments [4]. Yuan analyzed the processing and analysis applications of several deep learning models for rapidly accumulated biomedical and clinical medical data through clinical trials, and found that the efficiency and accuracy of data processing by deep learning are much higher than other machine learning and data processing technologies [5]. Lai has developed a deep learning neural network (DNN) that combines heterogeneous data sources of gene expression with clinical data to accurately predict the overall survival rate of patients with non-small cell lung cancer. By using systems biology methods to calculate prognostic correlation values to select eight prognostic gene biomarkers, and combining clinical data to develop a comprehensive DNN through bimodal learning, it can predict patients with non-small cell lung cancer with an accuracy of 75.44% for 5 years The survival state of [6]. Wu summarized the indications, common treatment methods, combination of acupoints, treatment frequency, duration and efficacy of Bali points in traditional Chinese medicine, and found that these indications accounted for the highest proportion of urination disorders after stroke [7]. Feng used neuroimaging to assess the ischemia prediction of undead cells, and proposed that the application of deep learning in medical image segmentation, radioactive automatic characterization and multi-modal prognosis is of great help for clinical prediction of stroke management and timely intervention and treatment [8].

In foreign countries, the application of artificial intelligence in clinical medicine also has important research results. Belyalov developed the CardioExpert software, which includes a series of most needed cardiovascular prediction scores and calculators, for cardiovascular disease prediction based on deep learning algorithms [9]. Naylor proposed that deep learning and other forms of machine learning should be widely used to build a modern healthcare and health ecosystem [10]. Perng developed a deep learning structure to predict the mortality of patients with sepsis, and used several machine learning methods and two sepsis screening tools to quickly assess systemic inflammatory response syndrome and sepsis-related organ failure For comparison. The mortality prediction of septicemia patients who died within 72 hours and 28 days was explored. The results show that the accuracy of deep learning methods, especially convolutional neural network predictions, exceeds other machine learning methods [11]. Ariel proposed a new method for automatic left ventricle (LV) quantification using convolutional neural networks (CNN), combining a new general framework and a CNN for detecting the left ventricle and another for tissue classification the deep learning architecture composed of CNN is used for LV quantization [12]. In addition, there has been considerable progress in the application of deep learning in the treatment of limb dysfunction in stroke. Biswas tested whether changes in excitatory circuits are helpful to maintain neuronal plasticity after stroke through deep learning neural networks, and explored the treatment of limb dysfunction caused by damage to neuronal plasticity caused by brain injury after stroke [13]. Rio studied the application of the deep learning algorithm of the computer-aided imaging software system of Viz, an AI health company in San Francisco, USA, and found that the algorithm can detect potential strokes by analyzing images [14]. Lee studied the application of artificial intelligence in stroke imaging and the technical principles, clinical applications and future prospects of AI, and proposed that AI technology may play a key role in determining treatment methods and predicting individualized ways of stroke patients, which can improve stroke diagnosis. Accuracy and quality of patient care [15].

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1.3 Innovations in This Article

Compared with the traditional treatment of limb dysfunction in stroke disease, this study proposes a treatment plan combining the giant needling method in traditional Chinese acupuncture and conventional acupuncture therapy. The deep learning algorithm in artificial intelligence makes clinical data processing more efficient and the prediction of limb function conditions more accurate.

2. Application of Deep Learning Algorithms in Clinical Medicine

2.1 Giant Thorn Method

For limb pain and dysfunction, acupuncture is often used in medicine. Acupuncture treatment originated from acupuncture in ancient Chinese traditional medicine, the most famous of which are giant needling and miu needling. With the development of traditional Chinese medicine, various conventional acupuncture therapies have been derived. At present, the medical field generally adopts a combination of Chinese and Western treatments for limb dysfunction caused by strokes and other diseases, combining Western medical surgery with Chinese conventional acupuncture therapy. According to the records of Neijing and Suwen ·Miao Needle, the treatment principles of giant needling method and Miu needling method are that the left and right diseases are taken from the right, the right disease is taken from the left, and the meridian points are taken from each other for acupuncture treatment. Generally speaking, acupuncture is not directly used to treat the diseased parts of limb dysfunction, but acupuncture stimulates the neural response of some specific acupoints and meridians of the human body to affect the physiological characteristics of other parts to achieve a certain therapeutic effect.

In fact, the meridian that people often say is not a concept. The meridian is the backbone of the pathway that connects the various organs and limbs of the human body. It is distributed deep in the skin and flesh, while the collaterals are the branches of the meridians and are distributed in the superficial subcutaneous tissues. , Together with meridians, build a network of connections between various organs of the human body. Therefore, the Miao needling method treats the acupuncture site shallow and light, while the giant needling method treats the deep and fine needle site. There are various types of strokes, and the degree of symptoms is also different. The Giant Needle Method and the Miao Needle Method have certain therapeutic effects on stroke disease. However, the symptoms of limb dysfunction in stroke usually involve lesions deep into the organs and even bones. Therefore, this article mainly studies the clinical treatment of limb dysfunction in stroke with the giant needling method combined with conventional acupuncture.

2.2 The Application of Deep Learning Algorithms in the Clinical Treatment of Stroke

2.2.1 Acupuncture point tracking and positioning edge detection for stroke

The first step in the treatment of limb dysfunction due to stroke with giant needling and conventional acupuncture is the detection of acupoints. In traditional Chinese medicine research, this step is achieved based on previous records and the experience of doctors. Through the analysis of related research results of literature research, this paper adopts the method of edge detection on the fracture image to detect the location of the acupuncture point and the image of peripheral neurons. The main principle of edge detection is to adjust the size of the collected data image through Gaussian blur and blur smoothing processing [16].

$$\begin{cases} X = x + \dfrac{d_1 + d_2}{2}, Y = y + \dfrac{d_1 - d_2}{2} \\ M = \sqrt{X^2 + Y^2}, \theta(x, y) = \arctan \dfrac{Y}{X} \end{cases} \quad (1)$$

Where x, y respectively represent the pixel change difference in the horizontal and vertical directions of the image, and d_1 and d_2 respectively represent the pixel change difference on the two diagonals of the image. According to the formula, the gradient M of the image in the horizontal and vertical directions can be calculated, and then the change amplitude $\theta(x, y)$ of the gradient can be

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obtained. Since the calculated local gradient may be covered by some non-edge pixels, after obtaining the gradient amplitude, it is necessary to retain the maximum point of the local gradient in each region in the image to suppress the gradient amplitude, thereby reducing the number of non-edge values .

2.2.2 Deep learning convolutional neural network simulates neuron side inhibition

In clinical research on the treatment of limb dysfunction in stroke, the study of brain function, especially the response of brain neurons, is very important. This article uses convolutional neural network (CNN) to simulate brain neuron structure and signal transmission, the specific method is as follows. According to the signal data of each neuron, normalize the local response data of surrounding neurons to achieve the effect of inhibiting the current neuron [17-19]. The result of input (x, y) data after convolution and fitting is represented by $v_{x,y}^{i}$, and the result after normalization is represented by $u_{x,y}^{i}$. According to the formula, the original input data $v_{x,y}^{i}$ is convolved with the same weight as the number of convolutions Get new activated neuron data $u_{x,y}^{i}$.

$$u_{x,y}^{i}=\frac{v_{x,y}^{i}}{\left[\lambda+\mu\sum_{\mathrm{j}=\max(0,i-\frac{n}{2})}^{\min(N-1,i+\frac{n}{2})}(v_{x,y}^{j})^{2}\right]^{\gamma}} \tag{2}$$

In the training data processing of the deep learning algorithm convolutional neural network model, this article uses the softmax regression model, and its application principle is similar to the cost function of logistic regression and the cost function of least squares. In this model, the same hypothesis function can be obtained through the calculation of multiple sets of parameter values, and at this time, its cost function can have multiple sets of solutions [20]. This creates parameter redundancy. In order to make the algorithm easier to implement without the need to reduce the parameters to affect the accuracy of the analysis, this paper uses the weight attenuation method to solve this problem, which is to keep all the cost function parameters and add a penalty term. The penalty term determines the weight of the parameter.

$$I(w)=\frac{\lambda}{2}\sum_{i=1}^{n}\sum_{j=0}^{n}W_{ij}{}^{2}-\frac{1}{m}\left[\sum_{i=1}^{m}\sum_{j=1}^{n}1\left\{y^{(i)}=j\right\}\log\frac{e^{w_j^{T}x^{(i)}}}{\sum_{k=1}^{n}e^{w_k^{T}x^{(i)}}}\right] \tag{3}$$

Where $\left\{(x^{(i)},y^{(i)})\mid i=1,\ldots m\right\}$represents the training data set with the data volume of m, and w is the weight of the training data. It should be noted that the exponential function $1\left\{y^{(i)}=j\right\}$is used as the true value judgment. When the cost function expression is true, the return function value is 1, and vice versa. Convolutional neural networks use the back propagation of neuron signals to judge and update the weights in the network. The sensitivity of the so-called convolutional neural network is the error in the back propagation of the convolutional neural network signal, because the convolutional neural network simulates The structure of brain neurons can also be regarded as the sensitivity of neurons [21-22]. However, the same parameters will lead to the same cost function of each hidden layer in the convolutional neural network. Therefore, this paper adopts the stochastic gradient descent method to optimize the parameters to reduce the superposition of invalid functions. The parameter gradient calculation formula of this method is as follows:

$$\Delta_{w_j}I(w)=\lambda w_j-\frac{1}{m}\sum_{i=1}^{m}\left[x^{(i)}(1\left\{y^{(i)}=j\right\})-t(y^{(i)}=j\mid x^{(i)};w)\right] \tag{4}$$

In the stochastic gradient descent method, the cost function I(w) updates the value of the parameter w through calculations along the direction in which the parameter gradient w decreases, so that the loss function obtained by the cost function I(w) can be continuously reduced. When the cost function I(w) When the loss is the smallest, the parameter obtained is the optimized parameter value w* after optimization. The principle formula is as follows:

$$w^{*}=\arg\min(I(w)) \tag{5}$$

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2.2.3 Recurrent neural network time series image prediction based on deep learning

The core of the model for predicting the limb dysfunction of stroke patients in this article is the Recurrent Neural Network (RNN), which is used to learn image time series features, so as to achieve more accurate prediction results through algorithms. Recurrent neural networks are used to solve time series problems in machine learning. The storage and memory functions of the network are realized by connecting the hidden nodes in the network to the network itself. It is used in the processing and conversion between machine language and natural language. Has a very good effect. In the processing of image time series problems, the size of the time interval for image data collection at each moment is not necessarily the same, so the depth of the cyclic neural network obtained is also different, and the neural network with too deep depth is complicated, which affects the network processing efficiency and prediction accuracy Sex. And as the time interval of image information data collection increases, when learning the training set, the learning ability of the cyclic neural network will gradually decrease until it is completely lost. According to the characteristics and limitations of cyclic neural networks. This paper adopts the long and short-term memory network model (LSTM) improved by the recurrent neural network model. The long short-term memory network replaces the structure of the recurrent neuron with the structure of the gate to control the way information passes, so as to avoid the gradient of the recurrent neural network from falling until it disappears. The resulting loss of learning ability.

The forward propagation algorithm of RNN continues to move forward with the time series in the time series data. The input data is arranged in chronological order, and the sequence cannot be randomly interrupted or disrupted. Must be entered in chronological order. The RNN network model is mainly composed of an input layer, multiple hidden layers and an output layer. The hidden layer of the RNN contains a connection with itself, and there are corresponding weight matrices and deviation vectors between adjacent layers [23]. The calculation formulas for the output value v_t of the hidden layer node at time t and the predicted value z_t of the output layer in the RNN forward propagation algorithm are as follows:

$$\begin{cases} u_t = Vx_t + Uv_{t-1} + a_u \\ v_t = f(u_t) \\ w_t = Wv_t + a_w \\ z_t = h(w_t) \end{cases} \tag{6}$$

Where x_t represents the input value of the RNN network node at time t, U represents the weight matrix from the input layer to the hidden layer of the network, V represents the self-circulating weight matrix of the information flow node in the hidden layer pointing to itself, and W represents the weight matrix from the hidden layer to the output layer The weight matrix, a_u and a_w respectively represent the offset vector corresponding to the weight matrix U and W. When the actual output value of the RNN network inputting a set of data is y_t , the error formula of the node's index s of the training sample set in the network can be obtained according to the definition of the cyclic neural network to reflect the error of the entire network prediction. Calculated as follows:

$$E_t = \sum_s \frac{1}{2} \left\| y_t - z_t \right\|^2 \tag{7}$$

As the error of the network at time t, the overall error of the RNN network at the time interval T is shown as follows:

$$E = \sum_t E_t = \frac{1}{2} \sum_s \sum_{t=1}^{T} \left\| y_t - z_t \right\|^2 \tag{8}$$

The improvement of LSTM to RNN is mainly to introduce input gate, output gate and forget gate in the forward propagation algorithm. The non-linear activation function is used to control the degree to which the corresponding gate allows each data signal of the information vector to pass. Binary machine language is used here for discrimination, where all information is allowed to pass through with 1 and no information is allowed to pass through with 0. [24]. Assuming that the LSTN network does not

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allow any information to pass through i_t to represent the input gate, j_t represents the original RNN input data, and α and tanh are nonlinear activation functions, then the calculation formulas for the input gate, output gate, and forget gate can be obtained:

$$\begin{cases} i_t = \alpha(W_{xi}x_t + W_{vi}v_{t-1} + a_i) \\ j_t = \tanh(W_{xr}x_t + W_{vr}v_{t-1} + a_r) \end{cases} \quad (9)$$

Among them, r represents the memory unit, which is used to calculate the parameters of the forget gate. The above formula is the operation of the input part, and the output gate and forget gate are calculated as follows:

$$\begin{cases} p_t = \alpha(W_{xp}x_t + W_{vp}v_{t-1} + b_p) \\ q_t = \alpha(W_{xq}x_t + W_{vq}v_{t-1} + b_q) \end{cases} \quad (10)$$

In the information data transmission of the LSTM network, the information transmission includes two parts: the memory unit and the input information. The transmission information h_t of the output gate and the transmission information r_t of the forgetting gate can be obtained by combining the information through the dot multiplication operation in the logic operation.

2.3 Statistical Methods for Clinical Research

In clinical research sample data, statistical methods are generally required to calculate the number of samples collected for data, which can be achieved through some software. The measurement form of the experimental data in this paper is expressed as X±S. The comparative analysis of measurement data adopts the independent sample T test method, and the count information adopts the chi-square test method. The grade data of limb dysfunction in stroke disease were tested with non-hypothetical parameters. The calculated parameter P<0.05 was regarded as a large error, and the data processing was realized by software SSPS 23.0. The data volume calculation formula is as follows:

$$N = \frac{\left[Z_{\alpha/2}\sqrt{2m^{-1}(1-m^{-1})(n_1^{-1}+n_2^{-1})} + Z_{\beta}\sqrt{m_1(1-m_1)/n_1 + m_2(1-m_2)/n_2} \right]^2}{m_1 - m_2} \quad (11)$$

3. Clinical Experimental Research on the Treatment of Limb Dysfunction in Patients with Stroke by Giant Needling Method

3.1 Research Object

The research object of this article is a clinical trial of giant needling method combined with conventional acupuncture therapy to treat limb dysfunction due to stroke. In the era of artificial intelligence, clinical trials for the treatment of various diseases in the medical field have gradually introduced artificial intelligence technology to assist in processing and analyzing medical experimental image data. Clinical research on the treatment of stroke and limb dysfunction has also begun to contact the application of deep learning algorithms in artificial intelligence. According to the current difficulty in collecting clinical data of limb dysfunction in stroke disease, the lack of sampling data is too high, and traditional processing and analysis technologies cannot meet the needs of real-time monitoring, updating, and predicting limb function information data of stroke patients, artificial intelligence technology and especially Deep learning algorithm is used to study the clinical treatment of giant needling method combined with traditional acupuncture therapy on limb dysfunction due to stroke. This article provides new therapies and ideas for the clinical research on the treatment of limb dysfunction in stroke disease, and analyzes and predicts the efficacy of the giant puncture method on limb dysfunction in stroke disease through deep learning algorithms[25].

3.2 Experimental Design

This study collects cases of limb dysfunction treatment in stroke disease by searching related literature, online surveys, questionnaire surveys, etc., combined with some related research results,

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proposes a deep learning-based giant needling method combined with conventional acupuncture therapy for stroke disease limb function Obstacle clinical treatment plan. The experiment is divided into four steps: one is to collect information and sort out data, to understand the giant needling method and conventional acupuncture therapy. The second is to design a treatment plan based on the principles of the giant needling method and acupuncture therapy, where it is necessary to consult experienced Chinese medicine practitioners and combine Western medical technology and wireless intelligent sensor technology to collect patient limb function data. The third is to use several neural network models in deep learning algorithms to process clinical treatment image data, and to compare and analyze the treatment effects of the two therapies. The fourth is to predict the limb function of stroke patients based on the convolutional neural network model of the deep learning algorithm, analyze the advantages and disadvantages of the giant needling method combined with conventional acupuncture in the treatment of stroke limb dysfunction, and put forward some clinical treatment plan improvement suggestions . In clinical research, the neural network model of deep learning also has its limitations. According to the learning of neural network and related research results, this article improves the recurrent neural network of deep learning to obtain the long-term short-term memory network model for stroke patients with limb dysfunction. Prediction of treatment time series image processing.

3.3 Experimental Method

3.3.1 Literature research method

In the preparatory work of this research, firstly, the literature research was carried out through academic materials such as HowNet, Wanfang, Baidu Academic, Google Academic, and various TCM acupuncture therapy materials. Have a full understanding and research on the concept and principle of the giant thorn method. In the process of specific experiments, consult experienced TCM doctors and medical workers with relevant treatment case studies.

3.3.2 Controlled experiment method

This study uses a controlled experiment method. The experiment is divided into an experimental group and a control group. After consulting relevant research, literature and treatment cases, the treatment group and the control group are set up at a ratio of 1:1, and real and effective experimental data are obtained as much as possible through treatment monitoring and survey interviews. The experimental sample content is 60 cases, and the effective access rate is 100%.

4. Discussion

4.1 Analysis of Machine Learning Algorithm for Clinical Data Processing of Stroke Disease Limb Dysfunction

For stroke-related limb dysfunction, the clinical treatment data processing of the giant needling method combined with conventional acupuncture therapy was assisted in analysis by various data processing software before the concept of artificial intelligence was proposed, which required relevant personnel to input and perform related operations. After the concept of artificial intelligence was proposed, people discovered the important value of various machine learning algorithms for the collection and processing of these large amounts of medical data. As shown in Table 1, various machine learning algorithms have different efficiencies in processing these data. This article mainly focuses on the lack of data collection of these algorithms, the sensitivity and specificity of data processing, and the prediction accuracy and accuracy of stroke patients' limb function. Machine learning algorithm scores for comparative analysis.

Table 1: Machine learning algorithm processing of clinical data of stroke and limb dysfunction

Machine learning algorithm		Data missing	Precision	Sensitivity	Specificity	AUC
Supervised algorithm	Decision Tree	33.74%	67.42%	0.6074	0.7364	0.8026
	SVM	38.42%	71.83%	0.6473	0.7726	0.8317
	KNN	29.97%	77.16%	0.6926	0.7765	0.8765
Unsupervised algorithm	K-Means	27.86%	80.75%	0.7215	0.7963	0.8998
	AdaBoost	23.65%	85.37%	0.7538	0.8227	0.9174
	Deep learning	17.83%	91.44%	0.8367	0.8562	0.9873

The survey found that the machine learning algorithms used in image processing prediction models

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mainly include supervised machine learning algorithms and unsupervised machine learning algorithms. Supervised machine learning algorithms include decision trees, support vector machines, and k-proximity algorithms. Unsupervised machine learning algorithms include k-means clustering algorithms, Adaboost reinforcement learning algorithms and deep learning algorithms based on integrated technology. This article investigates and compares the machine learning scores of these algorithms, as shown in Figure 1 below. It can be seen that the data missing degree of the deep learning algorithm processing data is only 17.83%, and the learning score is the highest.

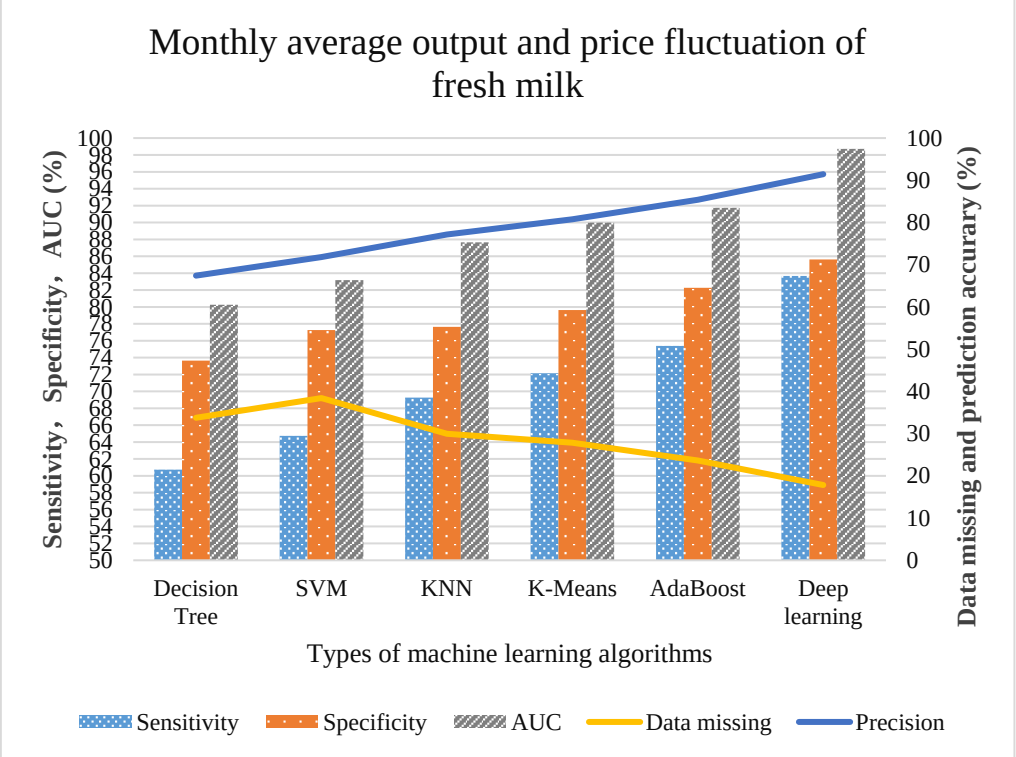

Figure 1: Machine learning algorithm data processing prediction score

4.2 Convolutional Neural Network Structure Learning of Deep Learning Algorithm

Deep learning is a set of algorithms in machine learning. These algorithm models are composed of multiple levels or multiple non-linear information processing modules. By combining low-level features, they form more abstract high-level features that represent attribute categories or features for pattern analysis and classification. The concept of deep learning comes from the study of neural networks. A feedforward neural network with multiple network layers is a classic example of deep learning. The deep neural network simulates the neural network structure of the human brain. It uses a hierarchical structure similar to traditional neural networks, including input layer, hidden layer and output layer. Only the nodes between adjacent layers are connected, and there is no connection in the same layer or cross layer. However, deep networks contain more hidden layers. The structure of traditional neural network and deep neural network is shown in Figure 2 below.

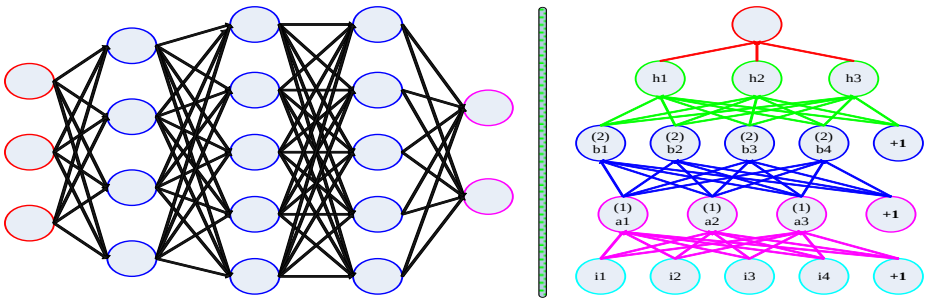

Figure 2: Deep learning convolutional neural network structure

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4.3 Analysis of Data Score before and After Treatment of Stroke Patients with Limb Dysfunction

Regarding the effectiveness of the giant needling method combined with conventional acupuncture therapy in treating stroke-related limb dysfunction, this article refers to related studies and presents it through various limb function scores. And use independent sample t test and non-parametric hypothesis test to verify whether the difference of experimental data is statistically significant and whether it can be used to predict the patient's limb function. As shown in Table 2 below, the patient's upper limb function score, lower limb function score and overall score before and after treatment. According to the experimental data, the P values of the non-parametric hypothesis test are all less than 0.05, with significant statistical differences, and can be used as reference data for the prediction of patient limb function.

Table 2: Machine learning algorithm processing of clinical data of stroke and limb dysfunction

Limb function index	Before treatment	After treatment	t value	P value
Upper limb motor function score	3.05±1.65	16.65±8.05	-8.736	<0.05
Lower limb motor function score	3.76±1.44	17.32±6.88	-10.803	<0.05
Improvement index score	14.66±1.24	34.97±6.73	-14.374	<0.05
Total score	7.98±2.32	33.25±12.75	-9.975	<0.05

In order to study the clinical treatment effect of the deep learning-based giant needling method combined with conventional acupuncture therapy on the limb dysfunction of stroke and the accuracy of limb function prediction. This article uses four scores to score and analyze the collected data. They are the Barthel score of the patients' activities of daily living, the Ashworth score of limb spasticity, the FMA score of limb motor function and the NDS score of limb neurological deficit. The effect before and after treatment is shown in Figure 3. It can be seen from the figure that the treatment group that used the giant needling method combined with conventional acupuncture has significantly more significant effects than the control group that received the conventional treatment. From this, it can be concluded that the giant needling method studied in this paper is used to treat stroke patients with limb dysfunction It has a significant effect.

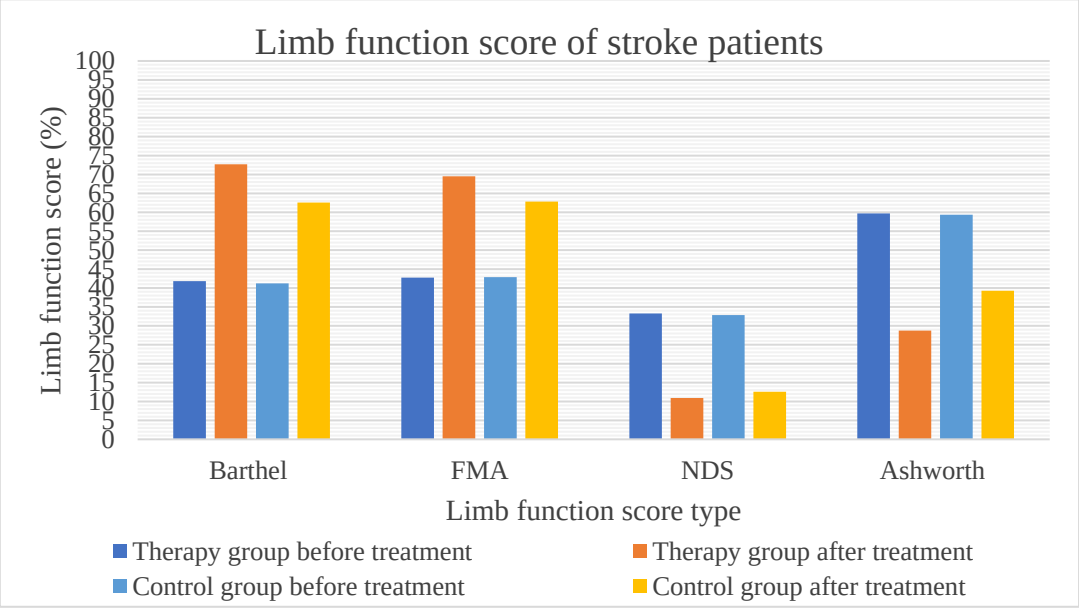

Figure 3: Limb function score of stroke patients

4.4 Prediction Accuracy Analysis of Deep Learning Algorithm for Stroke Disease Limb Function

When making predictions through deep learning convolutional neural networks and cyclic neural networks and improved long and short-term memory neural networks, this paper also selects different network structures. Analyze their prediction accuracy by controlling the number of convolution kernels or the number of hidden layers. Through comparative analysis, it is found that with the increase of the number of convolution kernels or hidden layers within a certain range, the prediction accuracy of the deep learning algorithm continues to improve. Since the deep learning algorithm simulates the structure

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and signal transmission of brain neurons, the prediction accuracy of neurological deficits is higher than that of other limb function score predictions, and the prediction accuracy can reach 97.8% as shown in Figure 4.

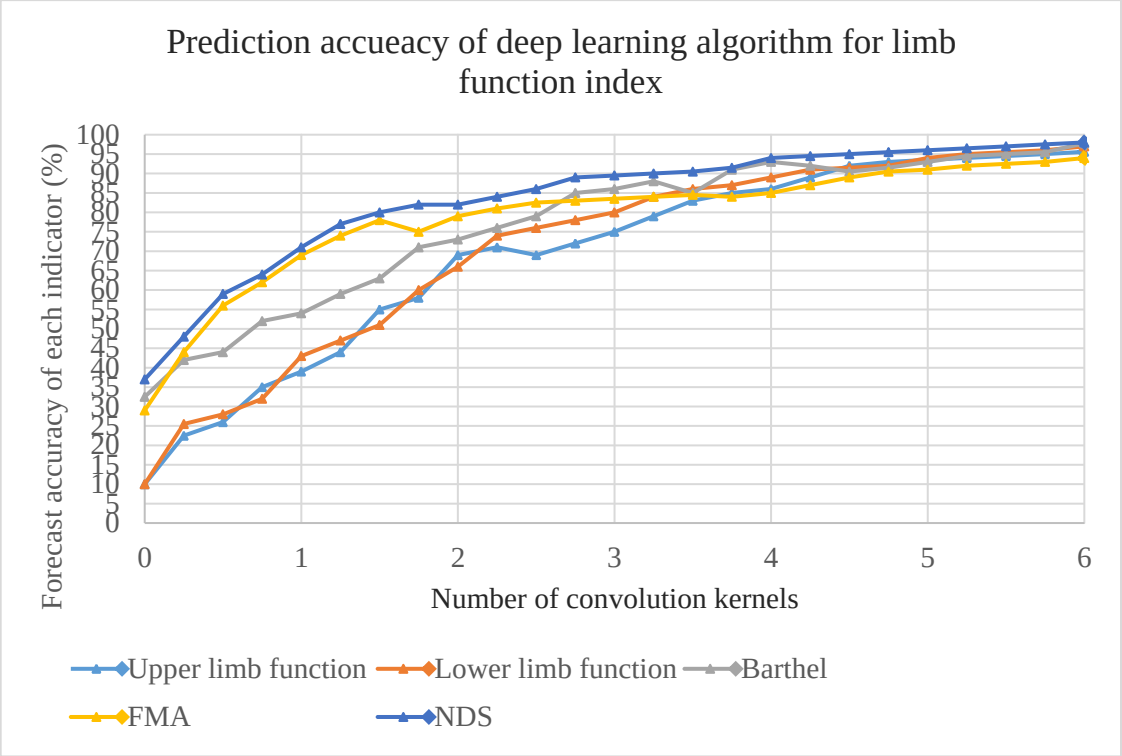

Figure 4: Prediction accuracy of deep learning algorithm for limb function index

5. Conclusions

This article first conducts a certain investigation on the treatment of limb dysfunction in stroke and related treatment cases, analyzes and summarizes some problems in the clinical treatment of limb dysfunction in stroke, and understands the current difficulties and deficiencies in the treatment of limb dysfunction in stroke place. Compared with traditional Chinese medicine and Western medicine in the treatment of stroke patients with limb dysfunction, it has found the advancement and shortcomings of this therapy. It is hoped that more in-depth research will help improve the treatment level of stroke patients with limb dysfunction.

Based on the experimental results of this research and the above analysis, the following conclusions can be drawn. First, the simple giant needling method and the simple ordinary acupuncture therapy as well as the traditional Chinese medicine external application method are very limited in the treatment of limb dysfunction caused by stroke. The external application of traditional Chinese medicine can effectively relieve the limb pain caused by stroke, while the giant needling method is effective on the meridian. The stimulus and neurological response treatment effect is more obvious. Second, the giant needling method combined with conventional acupuncture can effectively relieve the limb pain of patients with acute stroke. Third, the effect of the giant needling method combined with conventional acupuncture therapy is due to the simple use of two treatment methods. Fourth. The application of deep learning algorithms can efficiently process clinical data for the treatment of limb dysfunction in stroke patients, and the accuracy of the analysis and prediction of the disease is also high.

References

[1] Kang E J , Ryu H R , Kim Y K , et al. Review of Clinical Research about the Treatment of Hiccup After Stroke with Herbal Medicine - Based on Traditional Chinese Medicine Journals. The Journal of Internal Korean Medicine, 2018, 39(3):323-337.

[2] Gao M Y , Xie Y M , Zhang Y , et al. Research on clinical application of Fufang Kushen Injection in treating indication(therioma) in real world based on hospital information system database. Chinese

ISSN 2706-6819 Vol.4, Issue 6: 5-15, DOI: 10.25236/IJFM.2022.040602

Traditional and Herbal Drugs, 2018, 49(13):3143-3147.
[3] Yuan P , Rezvan A , Li X , et al. Phasetime: Deep Learning Approach to Detect Nuclei in Time Lapse Phase Images. Journal of Clinical Medicine, 2019, 8(8):1159-1174.
[4] Wang N , Wang J , Wang Y . The Application of Intelligent Control in Clinical Medicine. Matec Web of Conferences, 2019, 267(1):02006-02014.
[5] Yuan L I , Zhi-Gang L , Nai-Yang G , et al. Applications of Deep Learning in Biological and Medical Data Analysis. Progress in Biochemistry and Biophysics, 2016, 43(5):472-483.
[6] Lai Y H , Chen W N , Hsu T C , et al. Overall survival prediction of non-small cell lung cancer by integrating microarray and clinical data with deep learning. entific Reports, 2020, 10(1):4679-4688.
[7] Wu G F , Wang W M . Indication rules of Baliao points based on the clinical literature research. Chinese Acupuncture & Moxibustion, 2019, 39(1):96-102.
[8] Feng R , Badgeley M , Mocco J , et al. Deep learning guided stroke management: a review of clinical applications.. Journal of Neurointerventional Surgery, 2017,34(1):013355-013362.
[9] Belyalov F I . Application of prediction scores in clinical medicine. Russian Journal of Cardiology, 2016, 140(12):23-27.
[10] Naylor C D . On the Prospects for a (Deep) Learning Health Care System. JAMA: The Journal of the American Medical Association, 2018, 320(11):1099-1123.Perng J W , Kao I H , Kung C T , et al. Mortality Prediction of Septic Patients in the Emergency Department Based on Machine Learning. Journal of Clinical Medicine, 2019, 8(11):1906-1924.
[11] Ariel Hernán Curiale, Flavio Daró Colavecchia, Mato G . Automatic quantification of the LV function and mass: A deep learning approach for cardiovascular MRI. Computer Methods and Programs in Biomedicine, 2019, 169(10):37.
[12] Biswas M , Kuppili V , Saba L , et al. Deep learning fully convolution network for lumen characterization in diabetic patients using carotid ultrasound: a tool for stroke risk. Medical & Biological Engineering & Computing, 2018, 57(7):94-99.
[13] Rio J M N D , Sen P , Rasheed R , et al. Deep Learning-Based Segmentation and Quantification of Retinal Capillary Non-Perfusion on Ultra-Wide-Field Retinal Fluorescein Angiography. Journal of Clinical Medicine, 2020, 9(8):2537-2544.
[14] Lee E J , Kim Y H , Kim N , et al. Deep into the Brain: Artificial Intelligence in Stroke Imaging. Journal of Stroke, 2017, 19(3):277-285.
[15] Li L , Yu F , Shi D , et al. Application of virtual reality technology in clinical medicine. American Journal of Translational Research, 2017, 9(9):3867-3880.
[16] Wun-Jae K . Knowledge-based diagnosis and prediction using big data and deep learning in precision medicine. Investigative & Clinical Urology, 2018, 59(2):69-74.
[17] Zhou L Q , Wang J Y , Yu S Y , et al. Artificial intelligence in medical imaging of the liver. World Journal of Gastroenterology, 2019, 25(6):672-682.
[18] Yang Y J , Bang C S . Application of artificial intelligence in gastroenterology. World Journal of Gastroenterology, 2019, 25(14):31-48.
[19] Islam M M , Poly T N , Yang H C , et al. Artificial Intelligence in Ophthalmology: A Meta-Analysis of Deep Learning Models for Retinal Vessels Segmentation. Journal of Clinical Medicine, 2020, 9(4):1-19.
[20] Ryu, Baek, Gho, et al. Validation of Deep Learning-Based Artifact Correction on Synthetic FLAIR Images in a Different Scanning Environment. Journal of Clinical Medicine, 2020, 9(2):364-376.
[21] Campanella G , Hanna M G , Geneslaw L , et al. Clinical-grade computational pathology using weakly supervised deep learning on whole slide images. Nature medicine, 2019, 25(8):1-6.
[22] Rajalingam B , Priya R . Multimodal Medical Image Fusion based on Deep Learning Neural Network for Clinical Treatment Analysis. International Journal of ChemTech Research, 2018, 11(6):160-176.
[23] Park S J , Choi K H , Park J , et al. A Study on Spatial Analysis Using R-Based Deep Learning. International Journal of Software Engineering and its Applications, 2016, 10(5):87-94.
[24] Klang E . Deep learning and medical imaging. Journal of Thoracic Disease, 2018, 10(3):1325-1328.
[25] Shi B , Grimm L J , Mazurowski M A , et al. Prediction of Occult Invasive Disease in Ductal Carcinoma in Situ Using Deep Learning Features. Journal of the American College of Radiology, 2018(6):527-534.