Computer Engineering and Neural Network: Design and Data Structure Exploration of Predictive Algorithms for Gastrointestinal Tumors

Yi Qin[1, a], Jiajun Jin[2, b], Liangyu Li[3, c], Bai Yang[1, d], Yan Zhang[1, e], Jun Luo[4, f], Xuean Yang[4, *]

[1]International Sakharov Ecological Institute of Belarusian State University, Minsk, 220004, Belarus

[2]University of Maine at Presque Isle, College of Arts and Science, 04765, Chengdu, China

[3]Chifeng Cancer Hospotal, Medical School of Inner Mongolia state college of Chifeng ,024000, China

[4]Business School of Belarusian National University Minsk, 220004, Belarus

* Corresponding Author Email: lhn2932@wfd.edu.ug, [a]lliangyuli0823@gmail.com, [b]lwanglanter@126.com, [c]lwangzd@csg.cn, [d]liansdasdasdai0823@gmail.com, [e]lliangyuli0992@gmail.com, [f]liali0832423@gmail.com

Abstract. The research team has proposed a neural network modeling strategy for human changes in neuroscience in the clinical research of sympathetic nerve in digestive tract tumor diseases. This strategy is to solve the prediction of cancer pain scores caused by cancer invading nerves or other molecular change pathways in patients with digestive tract tumors. In computer engineering, The research group has analyzed the data classification and data classification mechanism for the database required by the neural network, and proposed the strategy of continuously optimizing the model and improving the prediction accuracy on the neural network, as well as computer modeling. This scientific research achievement mainly gathers the models related to oncology, neuroscience, and computer engineering, and solves the problem of pain prediction for cancer patients, It puts forward new strategies and new ideas for clinical treatment.

Keywords: artificial intelligence, technology, computer model, education information system, cancer, archives management, computer system, teaching.

1. Introduction

After the occurrence of cancer, pancreatic cancer tends to develop insidiously, and clinical findings are already in the late stage. At the same time, according to the characteristics of pancreatic cancer, cancer infiltration will often occur. Under the stimulation of tumor growth factors, there will be stimulation of peripheral nerves. This stimulation, accompanied by severe pain, will have an impact on clinical treatment and will also bring great pain to patients. The depth neural network can be used to predict the pain situation according to the existing clinical data, which can provide doctors with new ideas. In medicine, computer technology can be used to carry out reasonable interventions for patients with the predicted results. [1-6]The research team has built a computer engineering platform, consisting of a network platform for pain data collection - data cleaning - neural network training - neural network information collection - clinician verification - optimization algorithm - improving prediction rate.[1-5]

2. Model Design

As shown in Figure 1, Before data collection, the research team used neuroscience to model and elaborate the pain problem in clinical medicine. This situation is often caused by the compression of nerves caused by tumor biological growth. In clinical practice, doctors need to master the pain score of pancreatic cancer patients during pain, and build a database based on this score, This database can be used for better diagnosis and treatment of clinical indications. The research group applied this

technology to mark the treatment method of post tumor patients in Figure 1. At the same time, this medical mechanism is also a supporting rule for the selection of in-depth learning databases. Only medical data can be applied to deep learning.As shown in Figure 2,The research team has proposed a model strategy for the artificial neural network. In data selection, it is also necessary to select the data of pathology department and medical imaging department into the neural network. The characteristics of neural network recognition are mainly aimed at the depth and location of tumor invasion in imaging. Corresponding data should be provided in the database. At the same time, we have also shown the necessary pathological credit types in Figure 2, aiming at different pathological credit types, The clinical symptoms will also be different, so this is one of the important features that the deep neural network needs to identify. At the same time, the general conditions are also provided to the neural network as data for identification, including the age and gender data in clinical medicine.His operating mechanism also includes the most important clinical pain record data of patients. Based on the impact of pancreatic cancer on neuroscience, it is mainly necessary to consider the depth and location of invasion. After these, the research team will classify the predicted amount data of the overall neural network and provide them to doctors to support treatment in various periods.

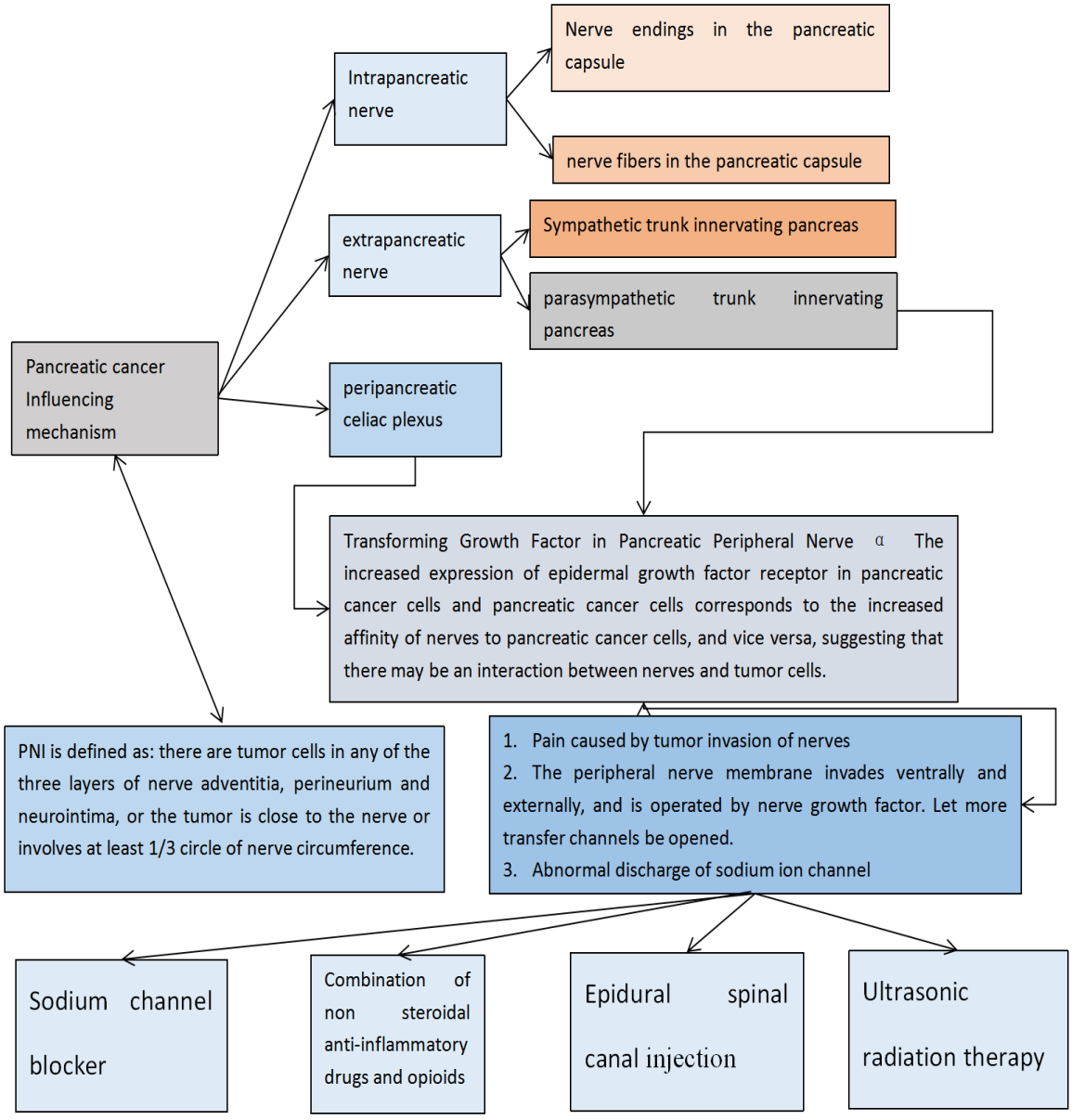


Fig. 1 Sample collection mechanism and medical support theory of neural network training database

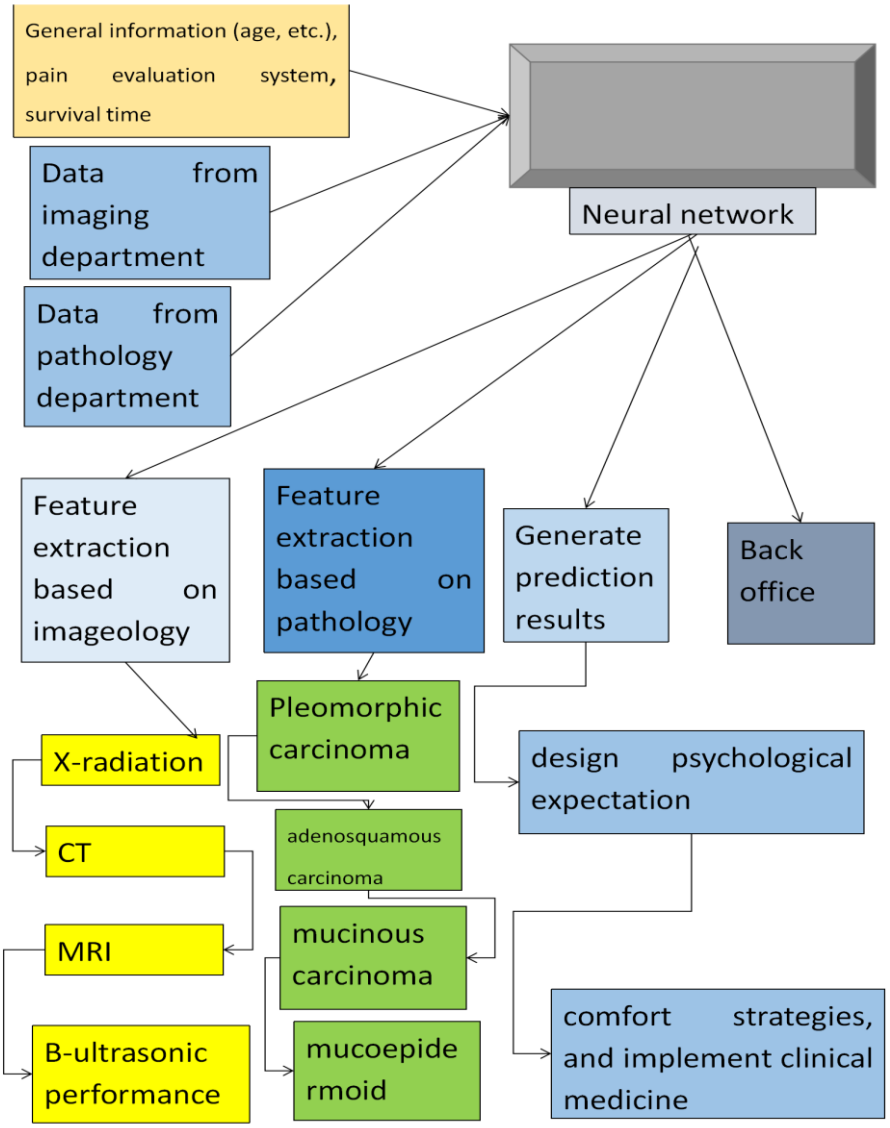


Fig. 2 Training method using database geo neural network and predicted data usage mechanism

As shown in Figure 3, In the neural network, pain data needs to be displayed. Because medicine is an empirical science, neuroscience in medicine is greatly different from neural networks in mathematics. Therefore, in terms of pain perception in neuroscience, the system scoring rules are mainly based on people's subjective feelings. Therefore, during the data inclusion period, patients' pain feelings after different operations are different in different periods. After clinical intervention, Pain is also different. Therefore, when the database is included in the data, it is very necessary to classify, and the neural network algorithm also needs to classify for feature recognition.During the period when doctors use pain data to predict, clinical processing needs to be analyzed according to specific situations. The data provided by machine learning needs to take into account the commonly used clinical methods, and the commonly used methods are also trained as the characteristics of initial recognition. Only in this way can the prediction rate of clinical use be meaningful.As shown in Figure 4 and Figure 5, the research team used neural networks to set optimized strategies for algorithm updating. Figure 4 mainly shows the role nodes of clinical use of these data, which are mainly provided for doctors and nurses to use. However, for the overall algorithm optimization, doctors and nurses need to constantly update data and include them into the system after classification. The overall prediction rate needs to reach at least 90% before they can be fully applied to medicine, The same medical science IV does not allow mistakes. Constantly updating data can improve the prediction rate of the algorithm. Medical institutions also need to constantly update the data set to meet the requirements of neural network training.

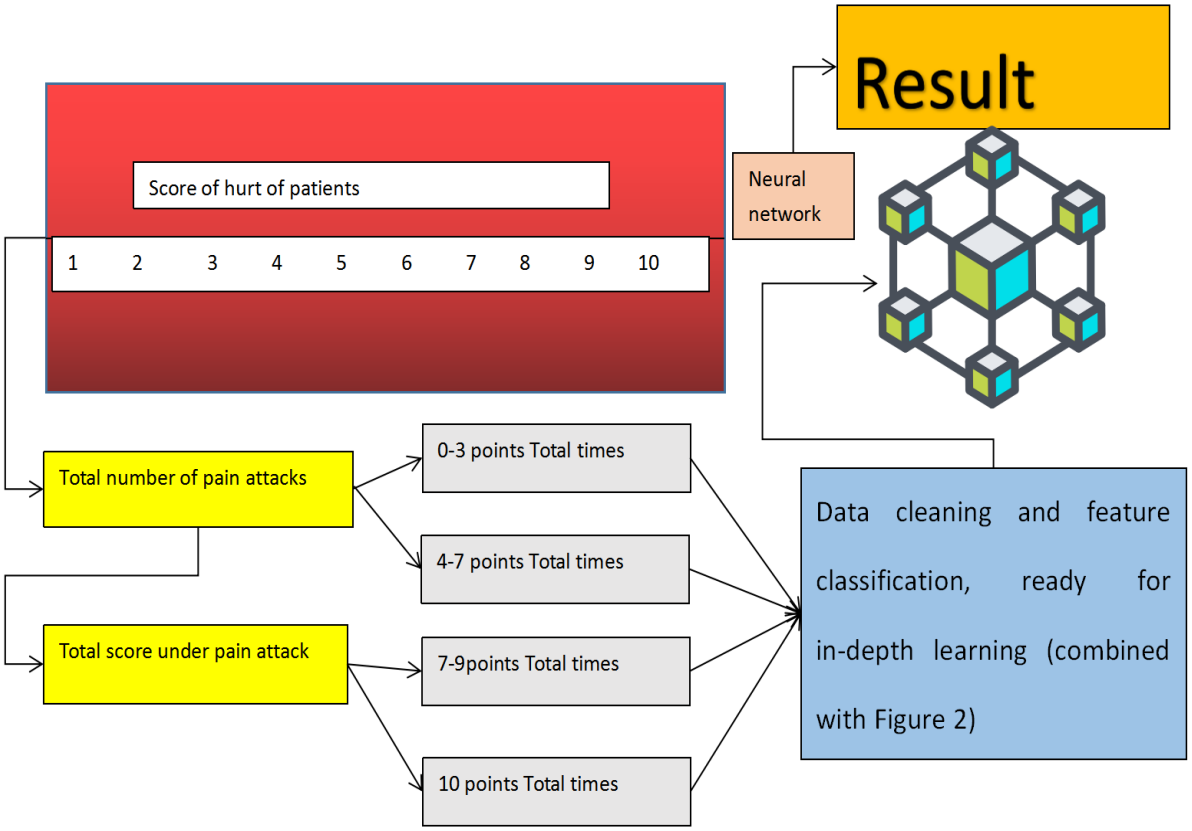


Fig. 3 Data collection method and classification rules of subjective pain based on clinical neuroscience

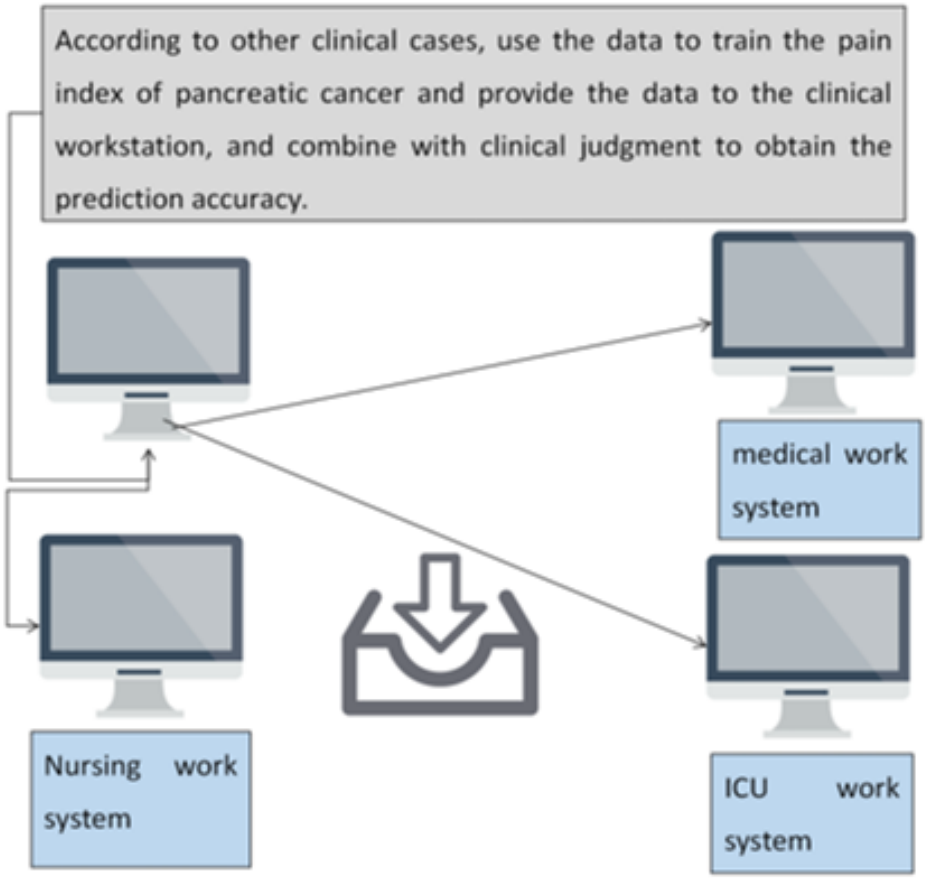


Fig. 4 Neural network prediction rate improvement network model diagram for the mechanism of continuous updating of clinical data

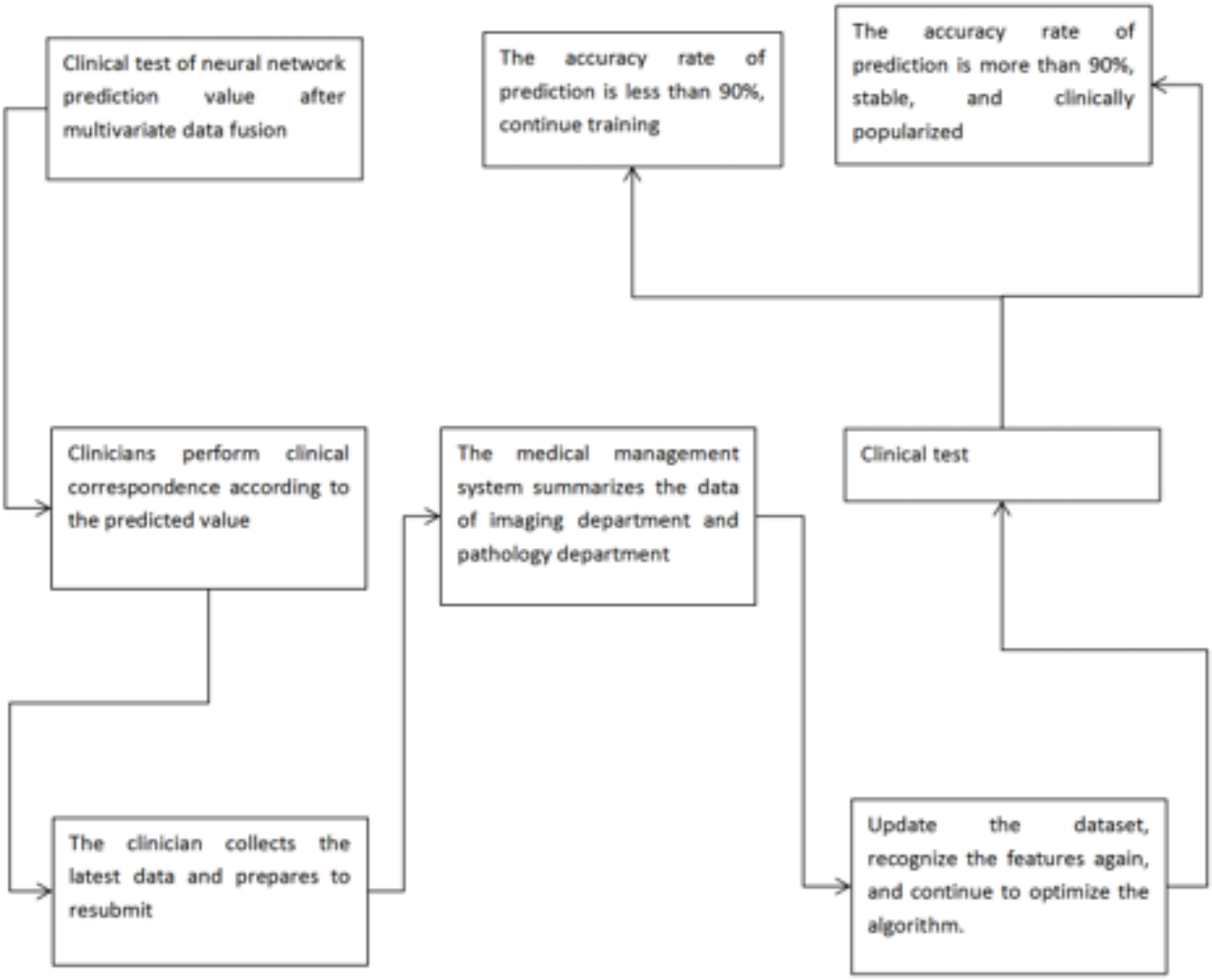


Fig. 5 A working mechanism of medical information system

As shown in Figure 4 and Figure 5, the research team used neural networks to set optimized strategies for algorithm updating. Figure 4 mainly shows the role nodes of clinical use of these data, which are mainly provided for doctors and nurses to use. However, for the overall algorithm optimization, doctors and nurses need to constantly update data and include them into the system after classification. The overall prediction rate needs to reach at least 90% before they can be fully applied to medicine, The same medical science IV does not allow mistakes. Constantly updating data can improve the prediction rate of the algorithm. Medical institutions also need to constantly update the data set to meet the requirements of neural network training.The research team displayed a large number of research details in the chart, and tried to show the overall model design through the chart process. This model relied on neural networks, took the symptoms of pancreatic cancer compressing the radial nerve as the target of data collection, and obtained a mathematical calculation method model that can really support and guide clinicians to carry out work. Through this model, pain can be predicted, The overall model can provide clinicians with data to enable them to adopt appropriate clinical diagnosis and treatment strategies.Similarly, the accuracy of this neural network in the early stage cannot meet the clinical standard, because the clinical requirements for data are very strict. As a direct means of human health intervention, the prediction accuracy of the neural network has no upper limit and does not include costs. Therefore, the strategy of constantly upgrading data and constantly predicting is feasible and necessary

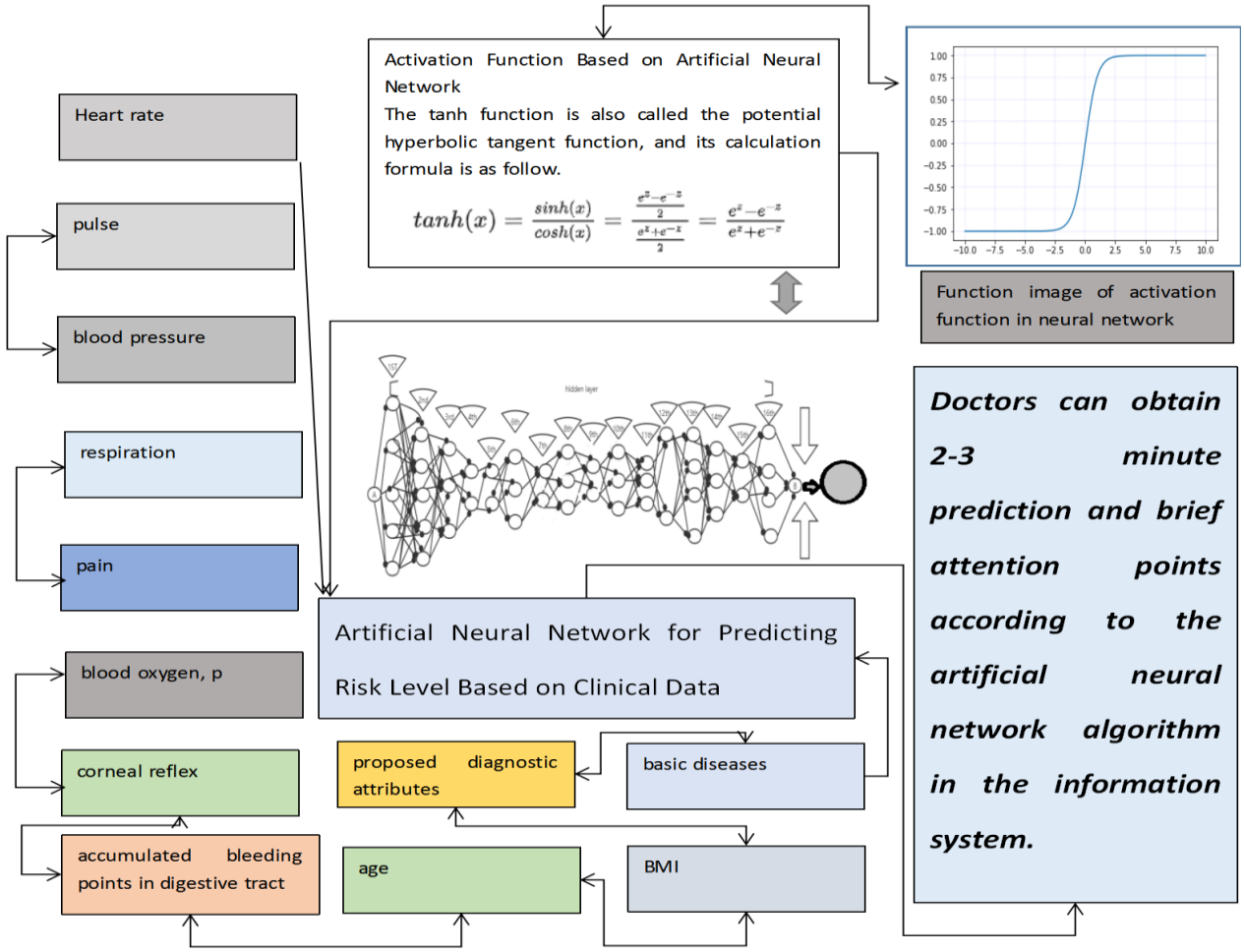


Fig. 6 Discussion based on soft which is about monitoring mach

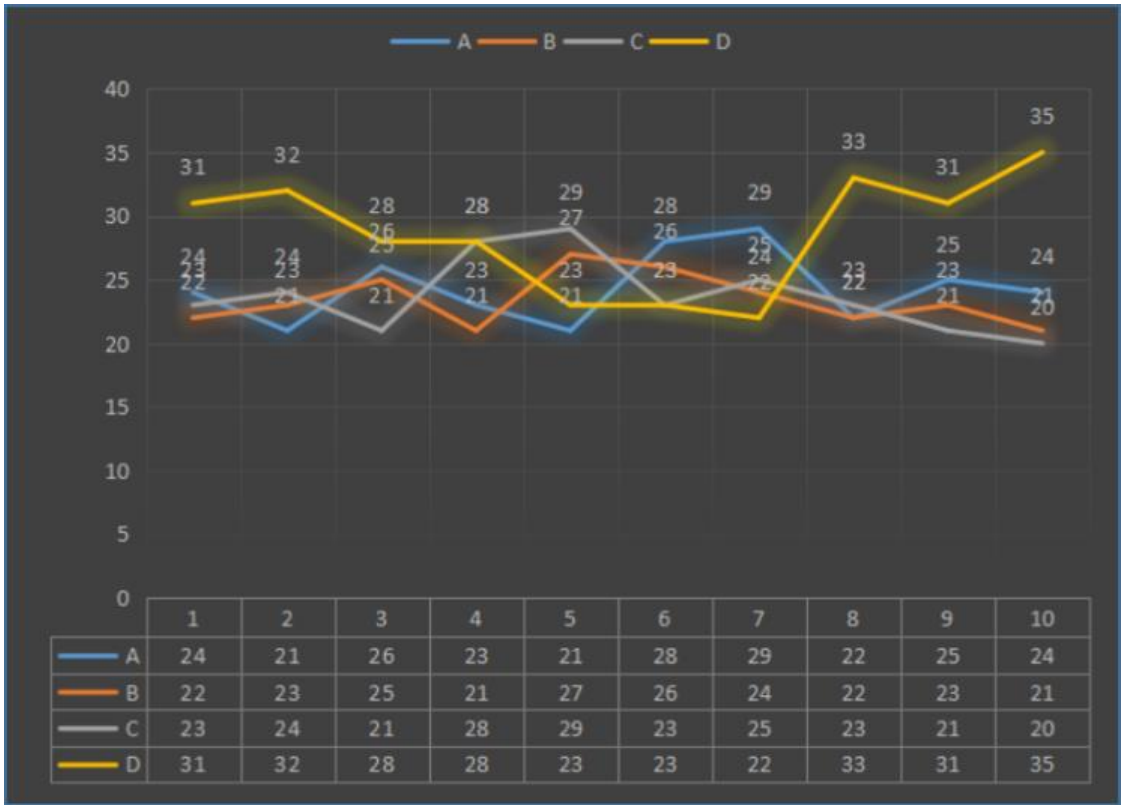
Firstly, as show in Figure 6,the research team can only analyze the data collection in the school and think that it is possible to use medical college students to collect relevant data after entering the clinical hospital, which can not only improve the learning level of clinical interns, but also use the resources of educational institutions to complete data collection at the lowest economic cost. Therefore, it is a very important measure for educational institutions to recruit more interns to complete this task.Secondly, Considering that the clinic has included more than 2000 kinds of diseases, including 7 specialties of internal medicine, external medicine, gynecology, children, facial features, skin and venereal diseases, and neuropsychiatry, a huge medical neural network has been formed by combining several knowledge element databases. The process includes: disease location → symptom selection → symptom diagnosis flow chart → comprehensive analysis, forming initial diagnosis → verification or correction diagnosis → diagnosis → disease databasename, category, subcategory, diagnosis basis, differential diagnosis, treatment procedure, western medicine, traditional Chinese medicine, warning) → relevant knowledge databaserelated drugs, related literature, Baidu Encyclopedia).Third, the research team tried to propose a modeling method that is universal for global medical institutions. This modeling method can be used to predict the survival status after diagnosis based on clinical basic data, such as BMI and age determination. We believe that this system is mainly used to diagnose various late stage tumors, and includes the improvement rate and quality of life after different interventions. Ethically, not all diseases can be cured, In this period, the task of clinical medical work is to focus on disease prediction after diagnosis. Our disease prediction can directly serve patients, mainly to improve the quality of life in the later period. In the last figure, we introduce the mechanism of algorithm model and the selection of activation function in detail.In medicine, computer imaging technology should be promoted. B-ultrasound is the first choice for diagnosis of pancreatic cancer. It can see whether the shape of the pancreas is regular, find tumors, see whether the pancreatic duct and bile duct are dilated,

and whether the gallbladder is enlarged. It can also judge whether there is intrahepatic metastasis. Fiber gastroscope ultrasonic examination, which can closely observe the posterior wall of the stomach, so as to conduct a thorough examination of the pancreas. This examination mode is not affected by stomach and intestinal gas, the diagnostic rate of pancreatic cancer is greatly improved, and it can also show the early pathological changes of pancreatic structure. CT scan and MRI MRICT scan can show the surrounding conditions of the tumor, as well as the size and location of the tumor. It can find tumors with smaller diameters. If enhanced scanning is available, it can more definitely show some lesions that are difficult to determine, and pancreatic cancer can be diagnosed and staged. In addition, it can also be checked by MRI, which has great advantages in judging pancreatic cancer, especially small pancreatic cancer, and whether there is peripancreatic hyperplasia and vascular invasion.

3. Experiment and data analysis

Design experiment

Objective: To understand the current situation of neuroscience teaching in China and Belarus, and to understand whether there are relevant teaching models and students' level. Participants: Master and undergraduate students of the Sakharov International National Ecological Research Institute of the Republic of Belarus, clinical medical expert students of the Belarusian National Medical University, Chinese students of Moscow University, students of the Ninth Clinical Medical College of Peking University, sensors, neuroscience, pancreatic cancer, computer medicine, esophageal cancer, susceptibility genes, tumor genetics, pain science, neural tissue, sodium ion blockers. A is very clear B is very clear C is not very clear what D knows. Number of participants: 100 Test methods: questionnaire survey; The results are as follows.



	1	2	3	4	5	6	7	8	9	10
A	24	21	26	23	21	28	29	22	25	24
B	22	23	25	21	27	26	24	22	23	21
C	23	24	21	28	29	23	25	23	21	20
D	31	32	28	28	23	23	22	33	31	35

Fig. 7 Figure Data-analysis

Data analysis: As shown in the figure, throughout the experiment, the research team found that the current medical students' understanding of pain science and medical science can support the early data collection of this model, proving the feasibility of the model.

We searched for 36 patients at the Chifeng Cancer Hospital, collected their data, constructed a deep neural network, and conducted testing. The training results of the neural network are as follows.

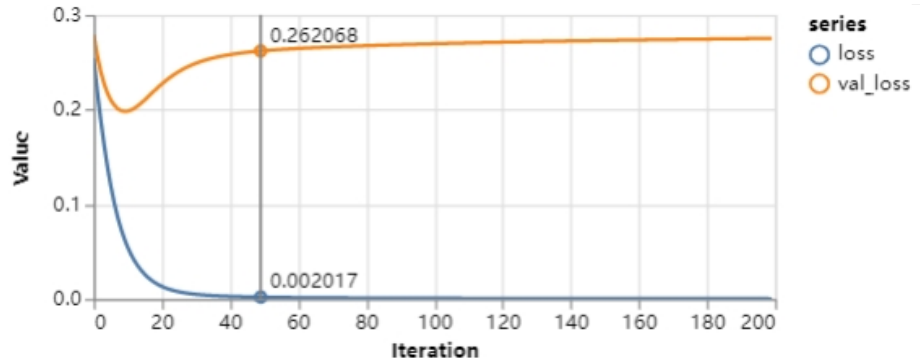


Fig. 8 Data-analysis (Neural network model loss)

Iteration countepoch): 200, batch size0 indicates no batch): 3, learning rate: 0.01Test set percentage%): 80, validation set percentage%): 20, loss function: meanSquaredError, optimizer: adam.

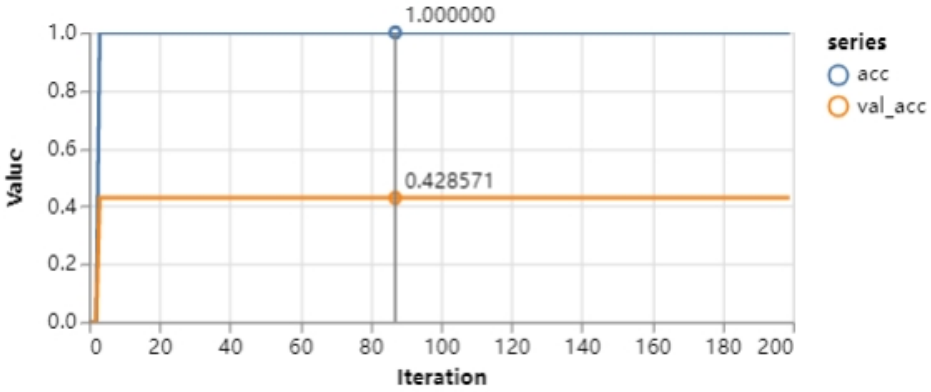


Fig. 9 Data-analysis (Model accuracy)

Acc is the accuracy of the training set, val_ Acc is the accuracy of the validation set.

The accuracy rate should be improved in the future, but we cannot obtain more effective data in the current unit.

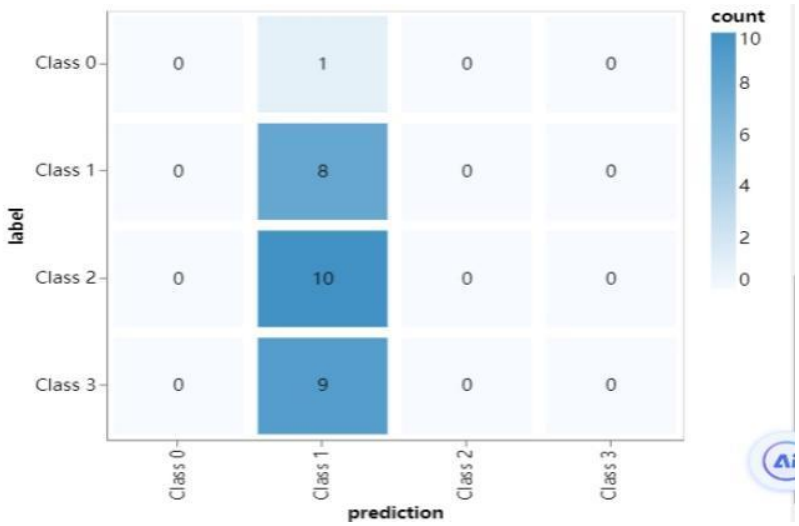


Fig. 10 Data-analysis (confusion matrix)

Final training set loss: 0.0003, accuracy: 1.0000;

Final validation set loss: 0.2753, accuracy: 0.4286;

Test set loss: 0.3442; Accuracy: 0.2857.

We believe that the possible reason for the current low accuracy is the relatively small sample size.

Data source: medical records of pancreatic cancer patients in Chifeng cancer hospital.The recognition features of the neural network, including gender, age, disease status and psychology, are output as the score of cancer pain in the feature results, with a total of four grade indicators.

4. Discussion

Considering the above factors, the accuracy rate of neural network is only 45%, so in this process, we think we should consider increasing the total number of samples. Adjust the sample size appropriately according to the reliability and effect of the sampling results of the questionnaire survey experiment.

It should be noted that the determination of sample size is a complex problem, which requires comprehensive consideration of multiple factors, and needs to be adjusted and evaluated according to the specific situation in actual operation. Our research team has put forward a preliminary model, hoping to train our neural network with more data in the future to provide accuracy.

5. Conclusion

The model designed by the research team can deal with many difficulties in medical mathematics. Therefore, the research team believes that it is necessary and feasible for institutions in Eastern Europe to achieve this goal. At the same time, the integration of applied mathematics and computer is more conducive to international communication in physical medicine.

Acknowledgments

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The original data of training neural network can be obtained through the scientific research center of Chifeng Tumor Hospital, and can be obtained by contacting the corresponding author of this article.

Ethics approval has been passed: chictr230078179

The author of this article has no conflict of interest

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