Mathematical Education in Clinical Science and R&D of Economic Products Based on Teaching Medical Platform and Neural Science analysis -From the perspective of teaching science: Mathematical model teaching in neural science

Hai Shao[1*a], Jiajun Jin[2, b], Shiyi Xu[1, c], Jialong Zhan[1, d*], Yi Qin [3*e], Alena Vasiukevich[3 f*]

[a]Co-First Author:digitalbm23@gmail.com, [b]04769naifenall@gmail.com, [c]romy154770225@gmail.com, [d]Major-corresponding author zhanjlclear@gmail.com, [e]Co-corresponding author:liangyuli0823@gmail.com, [f]Co-First Author: alena.vasiukevich@iseu.by

[1]School of business of Belarusian State University, Minsk, 220004, Belarus

[2]College of Arts and Science, University of Maine at Presque Isle,181 Main Street, Presque Isle, ME

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

Abstract: The research team carried out computer based teaching modeling for commonly used mathematical methods in clinical practice. The computer technology used in this model is mainly 5G technology, cloud computing platform and virtual reality technology. With the support of these three technologies, mathematical methods were taught based on the work of clinicians in medical institutions. At the same time, the research team has optimized the teaching mode based on neuroscience for this computer teaching model and clinical medical mathematical formula, aiming to stimulate the neurons of human brain to avoid synaptic fatigue. In the signal transmission mechanism of human biological neuroscience, the research team has designed the stimulation target for the brain nerves, using computer teaching as the medium, The research team conducted sociological experiments on this research, and integrated mathematical algorithms and applied mathematical models into computer modeling. The research team made analysis and report. And according to the economy, the model is discussed as a product.

Keywords: artificial intelligence，technology, computer model, education information system, economics, archives management, computer system

1 Background

The research team believes that the general trend of modern medicine is to move from qualitative research to quantitative research, that is, to be able to effectively explore the regularity of the relationship between the quantity and quantity of substances in the field of medical science, promote medical science to break through the shackles of narrow experience and develop towards the direction of quantitative, accurate, computable, predictable and controllable. With the gradual development of deep learning and neural network algorithms in

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medicine, Traditional disciplines such as basic medicine and clinical medicine are also trying to establish mathematical models and use mathematical theory to explore their quantitative laws [1-5]. And these all use mathematical knowledge. Mathematical models can help biologists isolate certain variables, predict the results of future experiments, or infer relationships that cannot be measured, because it is difficult to isolate the things studied in experiments and observe them separately. Although these mathematical models can not accurately simulate the operating mechanism of life systems, they can help predict the results of future experiments. The experimental data can be analyzed mathematically [6-10]. When there are a lot of experimental data, the traditional methods are no longer applicable, and the relevant theories of numerical calculation can only be used to find the associations and rules in the data. Based on neural network and deep learning, the research team of this paper has conducted in-depth research in the cross field of mathematics and medicine, and has published some results, aiming to deeply integrate medicine and mathematics, so as to predict and analyze diseases. Therefore, the research team believes that it is very necessary to integrate medicine and mathematics teaching, and strengthening the mathematical thinking of medical students is also the key content, Therefore, the research team designed the model with computer teaching as the medium, in order to use this model to strengthen the quality of students so as to serve the health of the global people. The research team dedicated to analyzing and reporting the results.

2 Designing method of research

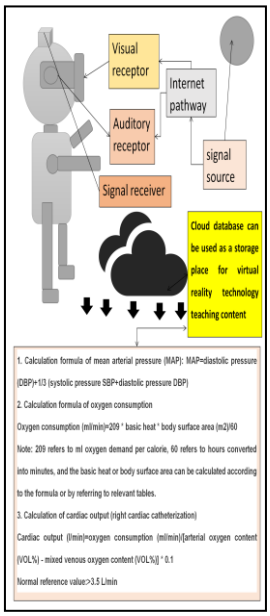

Figure1 A teaching system model based on VR technology and necessary model of math of teaching

As shown in Figure 1, The research team proposed a method of learning mathematics in clinical medicine by using virtual reality technology, because during the clinical treatment

period, mathematical calculation is indispensable. The calculation of cardiac output (right heart catheterization), the formula of total peripheral resistance, blood urea nitrogen and the degree of renal function damage and other mathematical calculations can not make any mistakes. These mathematical teaching needs to be realized through human-computer interaction, However, young doctors are unable to skillfully use these formulas. In view of this situation, the research team proposed this model. Through the stimulation of the optic nerve and auditory nerve, the virtual reality technology is used to complete the stimulation of the whole neuron, and create a scene of rescuing critically ill patients in neuroscience. In this scene, the rescue and mathematical calculation for clinical medicine can complete the rescue task for patients, Very powerful information stimulation can be carried out in neuroscience and mathematics. When the human nerve transmits the stimulation from the virtual reality technology equipment, the brain nerve will transmit the signal and excite the sympathetic nerve, but the sympathetic nerve excitation often brings about the instability of the heart rate in the count, and also leads to the doctors' wrong calculation. But for error calculation, the calculation under virtual reality technology allows fault tolerance. Through continuous training of this model, doctors can reduce the frequency of errors.

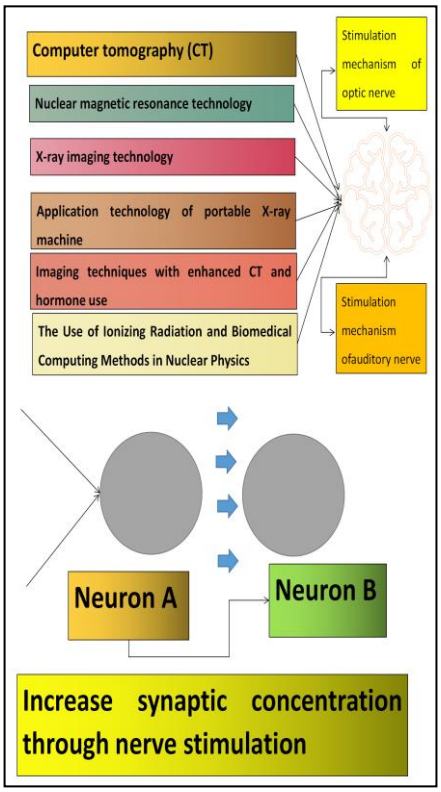

Figure2 Learning Strategy of Computer Medical Imaging and Diagnosis Based on Human Neuroscience and Computer Teaching

As shown in Figure 2,As shown in Figure 2, we have proposed a specific neuroscience mechanism, which uses the principle of neuroscience and the optic nerve of the cranial nerve

to directly intervene the memory layer of the human brain under the stimulation of the computer teaching model. Similarly, we have listed six teaching strategies in the figure, including medical and mathematical methods, and mathematical methods of computational biology, with the purpose of diagnosing anatomical marks after imaging, A large number of patients often suffer from disease after the anatomical position changes again, but the medical anatomical angle cannot be accurately expressed by mathematical calculation formula. In medicine, this belongs to the scope of a disease and there is no direct calculation formula. The main reason is that the anatomical position after imaging varies from person to person.Our research team has conducted research on ionizing radiation. In radiation sources and related areas, we can conduct mathematical visualization in environmental science according to nuclear physics formulas. If γ The radiation source irradiates the P point in the air field, γ The stronger the radiation source, the greater the exposure of P point. If the ray source is a point γ Ray source, according to the definition, can get the mathematical formula. Where, A is the point γ Radioactivity of the source, unit: Bq, R is the distance from point P to the source, unit: m, t is the exposure time, unit: s. β and θ The exposure and exposure rate of P point respectively. Γ Is the exposure constant of the radiation source, and its size is only related to the nature of the radiatin source itself. Formula: $\beta = (RxAxt) \div (RxR)$, $\theta = (\Gamma \times A) \div (RxR)$

The research team believes that this formula is also necessary for computer teaching, because the protection of medical workers for themselves is also the top priority.

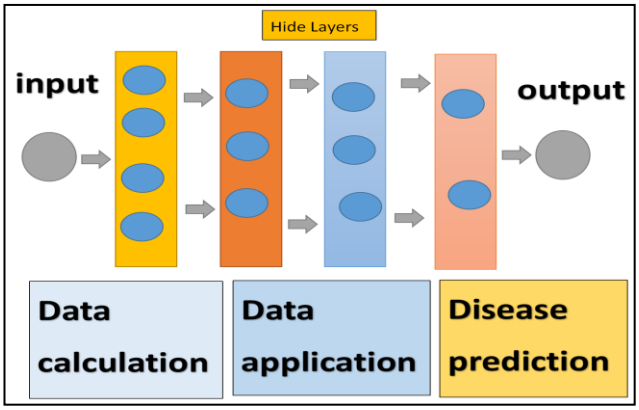

Figure3 Computer teaching model for disease prediction based on deep learning in genome technology

As shown in Figure 3, We try to use deep learning technology to teach gene mediated preventive medicine. In view of this situation, the research team believes that the teaching focus of neural networks is mainly on activation functions, because the models in medical neuroscience are more complex than those in computational neuroscience, and the source of neural networks is also proposed by neuroscientists. Therefore, medical students understand the principle of deep learning very simply, However, due to different learning tasks, medical students often have.

For example, Sigmaid function is an S-shaped function commonly seen in biology, also known as S-shaped growth curve. In information science, because of its single increment and inverse function single increment properties, Sigmaid function is often used as the threshold function of neural network, mapping variables between 0,1.

$$F(x) = \frac{1}{e-x}$$

Tanh function, Tanh is one of the hyperbolic functions, and Tanh is the hyperbolic tangent. In mathematics, the hyperbolic tangent "Tanh" is derived from the hyperbolic sine and hyperbolic cosine of the basic hyperbolic function. The formula is as follows [9].

$$F(x) = \frac{e^{x} - e^{-x}}{e^{x} + e^{-x}}$$

Because this is the most difficult part for medical students to understand, medical students can correctly understand the computer system of the overall neural network only after they have explained and understood the definition of the activation function of the algorithm played by the nerve in the deep learning [10].

As shown in Figure 4, The research team has designed the cytogenetic molecular mechanism in the work of doctors. As shown in Figure 3, we have marked the mutation of susceptibility gene of esophageal cancer. In the computational teaching of genetics, we propose this strategy to solve the current difficulties in biomedical knowledge learning. Genes are on chromosomes. Changes in chromosomes lead to gene mutations. The above process requires specific visual modeling, and the visual modeling is used to complete the visual identification of necessary gene fragments. At the same time, in the calculation of gene mutation, it is very necessary to use DNA molecular technology for gene sequencing. The test method of all relevant genes in the measurement process is also more suitable for display in the computer teaching model. In the display process, it is also one of the teaching contents to use molecular docking or other experimental techniques to complete necessary verification. As shown in Figure 4, the research team has designed the relevant molecular mechanism teaching for the current research hotspot genes in esophageal cancer. The receptor gene fragments including point mutations are amplified by PCR method, and point mutation sites can be found by nucleotide sequence analysis. The point mutation affecting the digestion site can be detected by PCR amplification, specific restriction enzyme digestion and electrophoresis.

Oligonucleotide probe method. This method uses a pair of oligonucleotide probes, one of which is complementary to the normal gene sequence, and the other is complementary to the mutation sequence. Therefore, a variety of specific oligonucleotide probes are required, which is a fast and simple method to identify point mutations. When one or two point mutations become the main cause of mutation in a specific population, This method can be established to screen a major mutation in a region. RFLP linkage analysis: Restrictive fragment length polymorphism (RFLP) uses different restriction endonuclease digestion and multiple cDNA fragment probes to determine the linkage phase of LDL-R gene according to the appearance of DNA polymorphic fragments. We need to carry out the teaching of specific experimental steps for these methods on the computer. As a part of smart archives, many archives departments have included intelligent security systems in their planning and construction. At present, advanced intelligent security systems mostly adopt multimodal recognition technology that integrates face recognition, gait recognition, human feature recognition and voice recognition, further improving the security level of intelligent security systems and providing better technical support for file security.

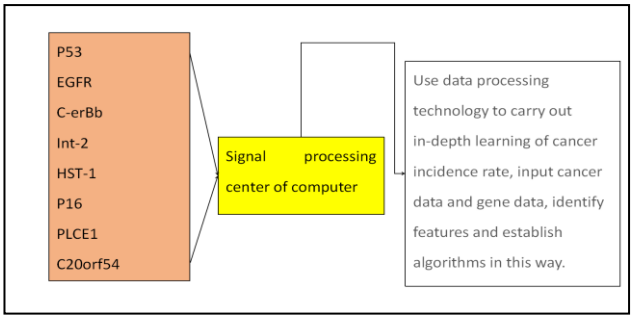

Figure4 The Model Strategy of Predicting Esophageal Cancer Using Deep Learning

As shown in Figure 5, DES algorithm is a symmetric cryptosystem in the cryptosystem, also known as the American Data Encryption Standard. It is a symmetric cryptosystem encryption algorithm developed by IBM in 1972. The plaintext is grouped by 64 bits, and the key is 64 bits long. In fact, the key is an encryption method that uses 56 bits to participate in DES operations (the 8th, 16th, 24th, 32nd, 40th, 48th, 56th, and 64th bits are check bits, so that each key has an odd number of 1s). The plaintext group after grouping and the 56 bit key are replaced or exchanged bit by bit to form a ciphertext group. DES algorithm has very high security. In addition to using exhaustive search to attack DES algorithm, no more effective method has been found. The exhaustion space of 56 bit long keys is 2 ^ 56, which means that if a computer detects one million keys every second, it will take nearly 2285 years for it to search all the keys. It can be seen that this is difficult to achieve. However, this does not mean that DES is unbreakable. In fact, with the development of hardware technology and the Internet, it is more and more likely to be cracked, and the time required is less and less. Parallel processing with specially designed hardware takes several hours. In the DES algorithm, only 56 bits of the 64 bit key are used, while 8 bits of the 8th, 16th, 24th,... 64 bits do not participate in the DES operation. This puts forward an application requirement for us, that is, the security of DES is guaranteed based on 256 changes in the combination of other 56 bits except 8, 16, 24,... 64 bits. Therefore, in practical applications, we should avoid using bits 8, 16, 24,... 64 as the effective data bits, and use other 56 bits as the effective data bits to ensure that the DES algorithm can play a safe and reliable role. If you do not understand this, using bits 8, 16, 24,... 64 of the key as valid data will not guarantee the security of DES encrypted data, and will cause the risk of data being cracked for systems that use DES to achieve confidentiality. This is exactly the misunderstanding of DES algorithm in application, leaving a great hidden danger of being attacked and cracked.

The grouping is short, the key is too short, the password life cycle is short, and the operation speed is slow. DES algorithm changes 64 bit plaintext input block into 64 bit ciphertext output block, and its key is also 64 bit. We try to integrate DES algorithm into the mathematical modeling of gene reporting. We will continue to show the necessary strategic research results.

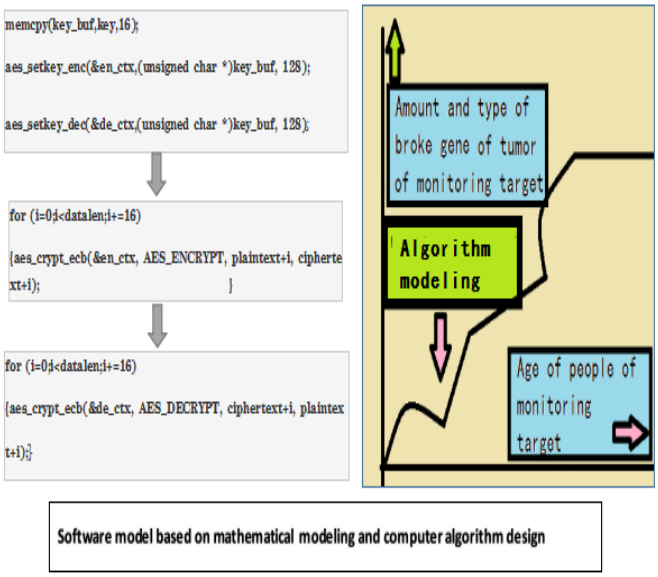

Figure5 A Way of Thinking Expansion for Prospective Scientific Research Teams - Taking Encryption of Cryptographic Modeling in Gene Reporting Detection as an Example

In this computer system, we try to encrypt the gene reporting system with DES algorithm encryption as the core, and build a mathematical visualization model of gene mutation and incidence ratio after design. This model is aimed at the staff of medical institutions, and all doctors related to preventive medicine and cancer can log in this program to visually identify this situation. The purpose of this model is to solve the problem that it is difficult to monitor the clinical asymptomatic gene mutation.

3 Experiment and data analysis

Design of 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 Sakharov International National Institute of Ecology of the Republic of Belarus, clinical medical expert students of Belarusian National Medical University, and interns of the Second Affiliated Hospital of Chifeng University of China and Chinese Hunan medicine university. The main contents of questions 1 to 10 are: deep learning, activation function, blood drug concentration calculation, neural network algorithm, mathematical modeling, physical medicine, radiation medicine, virtual reality technology, and neuroscience. A is very clear B is very clear C is not very clear D knows a little Number of participants: 100.Test method: questionnaire survey; The questionnaire is as follows:

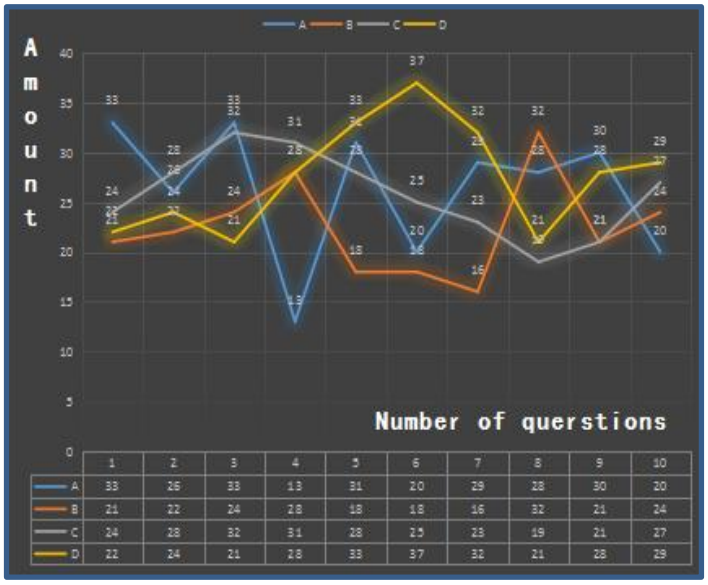

Figure6 Data-analysis

Data analysis: As shown in the figure, during the whole experiment, we think that the current students, especially the local students in Belarus, have a good grasp of mathematics. By contrast, the students in China also have a good grasp of mathematics. Therefore, this experiment verifies that we can carry out interdisciplinary frontier training for students in China and Belarus.

4 Conclusion

Conclusion: The model which is designed by researching team is able to deal with many difficulties math of medicine, So researching team decide that it is necessary and feasible. This model is worth popularizing. The use of virtual reality technology in the teaching of this clinical mathematical science has market demand, and the research team also needs to carry out more exchanges and cooperation in the future to transform this model

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