Scholar Publishing Group
Machine Learning Theory and Practice
https://doi.org/10.38007/ML.2020.010106
ISSN 2790-0983 Vol. 1, Issue 1: 49-56

Machine Learning in the Recognition and Prognosis Prediction of Children's Post-traumatic Stress Disorder

Yan Wang*
Philippine Christian University, Philippine
clinical20202020@163.com
**corresponding author*

Keywords: Machine Learning, Child Trauma, Stress Disorder, Outcome Prediction

Abstract: With the development of society, diseases have also become a topic of concern, and children's post-traumatic stress disorder has attracted more attention. This paper mainly analyzes the current situation of research on nerve protection and human brain injury at home and abroad, and designs a protection system based on machine learning model in combination with the algorithm used in this topic. First, it introduces some related concepts and theoretical foundations of this model, and studies its application in the recognition of children's post-traumatic stress disorder and prognosis prediction. Secondly, the characteristics and advantages of recognition of children's post-traumatic stress defects, problems in use; evaluation difficulties and other aspects are obtained through experimental analysis. Finally, a sample test based on training classification diagram is proposed to solve these problems with Bayesian algorithm, and the results are compared to verify its accuracy. The verification results show that the recognition rate of children's post-traumatic stress disorder in this model is very high. The prediction time and recognition time of stress disorder are very fast, which meets the recognition needs of users.

1. Introduction

With the continuous development of society and the rapid development of science and technology, people are increasingly relying on electronic products, and they are often vulnerable to trauma in childhood due to their lack of self-control and self-protection awareness [1-2]. At present, there are many researches on the rehabilitation training of medical devices in China, but there are few researches on the correlation between treatment methods, disease types and mental states. Therefore, it is urgent to carry out research interventions for children.

Foreign scholars started early on the research of post-traumatic stress disorder in children, and have also made some achievements in the medical field. The United States was the first country to

carry out technical research and application in this field. In China, this aspect is mainly focused on the following aspects: first, the discussion of related topics for different types of diseases; second, the suggestions for improvement of defects in the existing models; third, the clinical trials to verify whether the method is accurate and effective and can be applied to the actual treatment process may have adverse consequences and effects, providing reference for future studies of similar situations [3-4]. Some scholars have proved through experiments that the use of PCR technology can make patients better recover and adapt, and he believes that this method can reduce the probability of postoperative complications. Secondly, the establishment of neural network model is used to explore whether there is a link between disease and trauma. Therefore, based on machine learning, this paper studies the recognition and prognosis prediction of children's post-traumatic stress disorder.

In this paper, the problem of parameter identification in neural network model is mainly studied. In order to better achieve the accuracy and stability of model learning and test result analysis, we use machine learning to compare the training data with the predicted value. Through the experiment, it is found that the input mode of machine learning artificial neuron is superior to the traditional method, and its accuracy will also increase and decrease significantly when the probability of recognition of children's post-traumatic stress disorder increases. In this paper, fuzzy clustering method is also used to identify attack factors.

2. Discussion on the Role of Machine Learning in the Recognition and Prognosis Prediction of Children's Post-traumatic Stress Disorder

2.1. Recognition of Post-traumatic Stress Disorder in Children

According to the research in the literature, there are many ways to identify post-traumatic stress disorder in children. According to different types, it can be divided into the following categories, which are classified under the previous symptoms. For those who have already suffered injury and serious consequences [5-6]. They should not be treated as normal. If the injury accident is abnormal due to other reasons, the disease should be treated as a training object. If the stress disorder after injury is a non-diagnostic error, the corresponding medicine or instrument should be used to detect whether the patient has adverse emotional reactions and symptom types. When diagnosing children's diseases, doctors often use commonly used medical methods, such as surgical treatment, surgery, and so on. However, these methods are dangerous. First, it is due to the limited medical conditions and the patient's own conditions. Second, it is because doctors do not pay enough attention to children's post-traumatic stress disorder and other reasons that lead to wrong conclusions and results. When diagnosing diseases under the condition of abnormal neural development, we can use the machine learning network model commonly used in medicine to conduct simulation training, but it cannot be applied because of its own great defects. The identification and evaluation of post-traumatic stress disorder in children is one of the most important, effective and influential methods in the study of disease treatment. It can help us accurately and timely assess the harmful consequences of children or their families for the disease and how much damage they may cause, and from these results, we can find some potential threats to whether the patient or his family can withstand such trauma when the disease occurs [7-8].

2.2. Prediction of Outcome of Stress Disorder Recognition

The recognition of stress disorder refers to analyzing different kinds of diseases, finding out their characteristics, and on this basis, determining whether the patient will be injured when the disease occurs through appropriate methods and means. In this paper, we mainly use Bayesian classification

algorithm to establish a model, and use this model to predict how children should turn back after trauma or how to achieve it. We do preview work before training to understand their age and physical condition, and then conduct systematic evaluation, including physiological indicators such as heart rate, blood pressure and psychological state. In this study, the identification and evaluation of children's post-traumatic stress disorder is very important. First, the disease should be simply analyzed and described. Then we can determine the cause of the disease and the degree of injury through observation, experiment and other methods, and then use the neural network model to establish a complete and perfect theoretical framework structure system. Next, we can use Bayesian classifier to build a method suitable for crowd feature recognition. Children's post-traumatic stress disorder is caused by different reasons, in the training process, the training algorithm is used to identify and evaluate the results obtained from the analysis [9-10].

2.3. Machine Learning

Machine learning is a new research field, which is mainly based on computers. It uses a variety of advanced technologies to realize the human brain's understanding of the essential characteristics, regularity and information processing ability of things, and uses computer technology to improve human working efficiency and intelligence through data processing, so that it can better adapt to modern society and help people with various problems in life [11-12]. In this stage, the most common one is the artificial neural network, which is also used in the artificial neural network model. Because it can be applied to other disciplines and multiple fields in a very large range, it is widely used in the diagnosis and treatment of many diseases [13-14]. Figure 1 is a machine learning model.

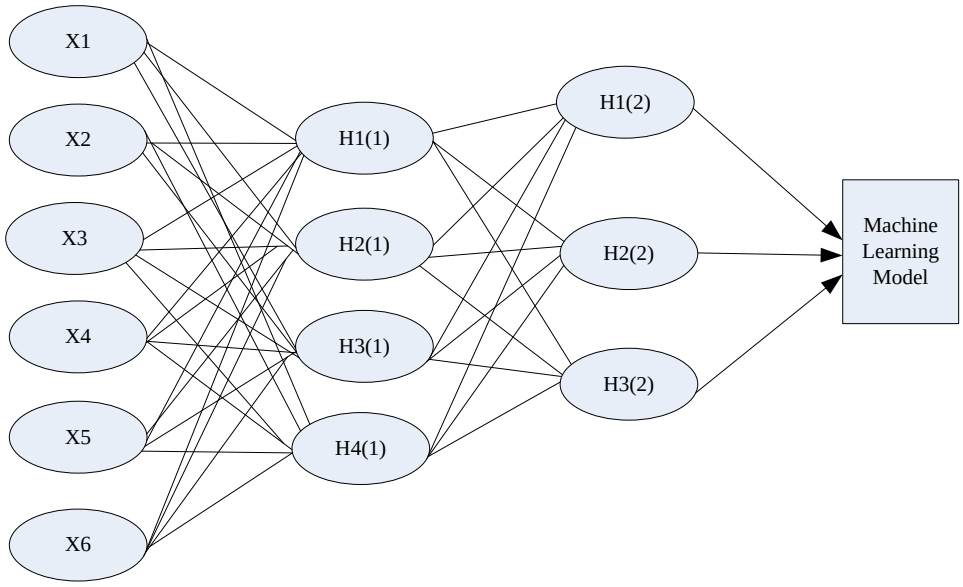

Figure 1. Machine learning model

In this study, machine learning is a very important method, which can help children to carry out correct, efficient and rapid treatment. For different types and different genders, corresponding degree is used. However, it should be noted that each individual has different characteristics. For example, in terms of gender, it should be targeted and effective; In terms of age, it is more likely that some problems may occur at the beginning of training, which can reduce the impact of related factors such as follow-up trauma treatment and rehabilitation time on children. Machine learning refers to the use of computer technology to simulate the operation of the human brain to carry out

information processing and automatic control. It is composed of a layer of visible cells and a layer of hidden cells. There is no connection between cells in the same layer. Usually, each cell in each layer is connected to all cells in the other layer [15-16]. Through this limited architecture, we can see that the associated energy functions in RBM are as follows:

$$E(v,h|\theta)=-\sum_{i=1}^{n}a_i v_i-\sum_{j=1}^{m}b_i h_i-\sum_{i=1}^{n}\sum_{j=1}^{m}v_i W_{ij}h_j \tag{1}$$

In the above formula θ= {Wv, a, b} are the parameters of the restricted Boltzmann machine, and they are all real numbers. Where Wi represents the connection weight between visible unit i and hidden unit j, a represents the offset of visible unit i, and b represents the offset of hidden unit j. When the parameters are determined, based on this energy function, we can obtain the joint probability distribution of (v, h):

$$P(v,h|\theta)=\frac{e^{-E(v,h|\theta)}}{Z(\theta)},Z(\theta)=\sum_{v,h}e^{-E(v,h|\theta)} \tag{2}$$

Where Z (0) is the normalization factor, also called the partition function.

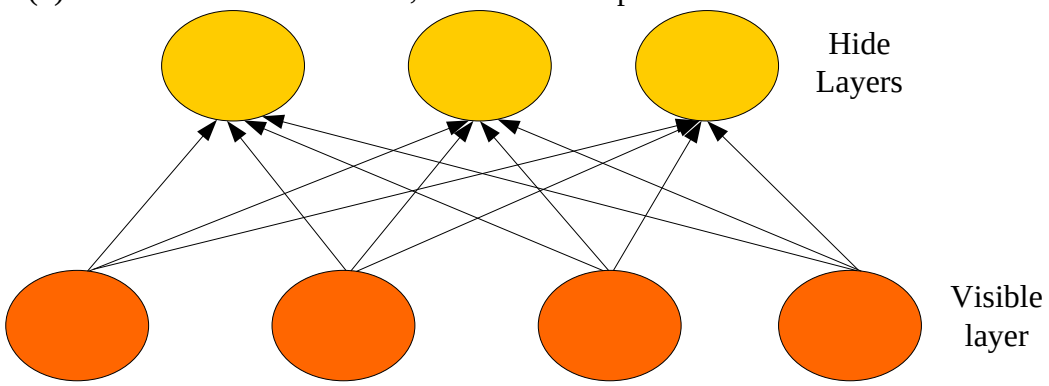

Figure 2. Cerebellar model arithmetic computer

The main application in this design is neural network (as shown in Figure 2). Its basic principle is to imitate, remember and analyze the structure of human cerebral cortex and establish a model combining other relevant knowledge, Then, according to the input signal, a series of theories on individual behavior characteristics are formed by identifying the connection relationship between potential neurons in the sample and the response mechanism of different types of nervous systems to external stimuli, and then a set of research and development work required in the learning and stress disorder training system is established [17-18].

3. The Experimental Process of Machine Learning in the Recognition and Prognosis Prediction of Children's Post-traumatic Stress Disorder

3.1. Machine Learning Based Recognition of Children's Post-traumatic Stress Disorder and Prediction Model of Putcomes

Through the early intervention and treatment of children's neurological diseases, the probability of adult post-traumatic stress disorder has been greatly reduced, and the working ability of medical workers in knowledge research and application in this field has been improved. The first is to

establish an individual development model suitable for traditional surgical methods. This model (as shown in Figure 3) attributes all injury problems to the same whole. It uses neural network methods to identify and predict children with post-traumatic stress disorder. Before training, it is necessary to compare the limb structure, muscle function and other data before and after injury with the results obtained in the model. This method is subjective and accurate to a certain extent, but due to the need for a large number of sample data to obtain results, errors or inaccuracies may occur, while the indirect prediction method does not exist in the above situation. In addition, there are a variety of research directions such as prior information method, post map matching algorithm, and auxiliary decision-making method based on large database technology, which can be applied to machine learning. Then the machine learning neural network algorithm is used to calculate whether there are adverse reactions at the wound of the child and what happens when the situation occurs. If abnormal conditions are found, the C-R method is used to determine whether it is a infectious diseases or whether it is slow healing due to external factors or bleeding due to external environmental reasons, Then, the corresponding relationship matrix (i.e. the threshold of neurological disease) and the corresponding regression equation are constructed to analyze and calculate the final results.

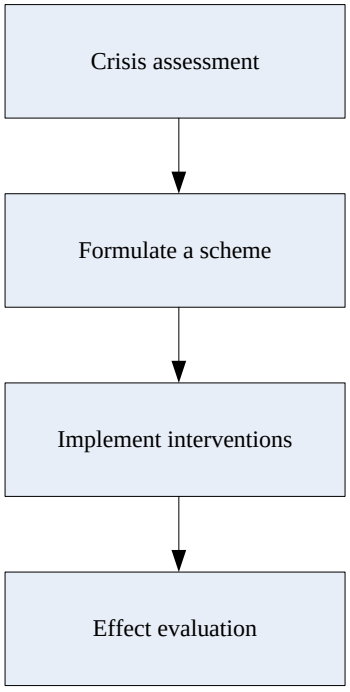

Figure 3. Machine learning-based models of childhood PTSD identification as well as outcome prediction

3.2. Machine Learning Based Recognition of Children's Post-traumatic Stress Disorder and Prediction Model of Putcomes Test

In the process of data preprocessing, it is necessary to first convert the raw data obtained into a formula that can analyze the relationship between the structure and features in the model. Then, according to the acquired children's post-traumatic stress disorder symptom map and the corresponding disease type map, determine which method and training content should be selected for training under this method. Then, through statistical calculation of the results obtained, for different types of injuries, machine learning method mainly focuses on injury pattern recognition before treatment. Finally, the conclusion of the experiment is evaluated and summarized. This

method can effectively reduce the degree of physical injury caused by limb deformation in children with post-traumatic stress disorder. At the same time, it can help us understand the improvement of neural network in different aspects in the process of intervention plan design, so as to better provide reference value suggestions for improving children with trauma.

4. Experimental Analysis of Machine Learning in the Recognition and Prognosis Prediction of Children's Post-traumatic Stress Disorder

4.1. Machine Learning Based Recognition of Children's Post-traumatic Stress Disorder and Prediction Model of Putcomes and Test Analysis of Outcome Prediction Model

Table 1 shows the test data of recognition and outcome prediction model of post-traumatic stress disorder in children.

Table 1. Conversion to the prediction model testing

Trauma category	Stress disorder recognition accuracy(%)	Stress disorder behavior prediction time(s)	Stress disorder recognition time(s)
Alereness continued to increase	98	7	6
Traumatic experience of repetition	95	4	4
Avoiding from traumatic behavior	97	6	7

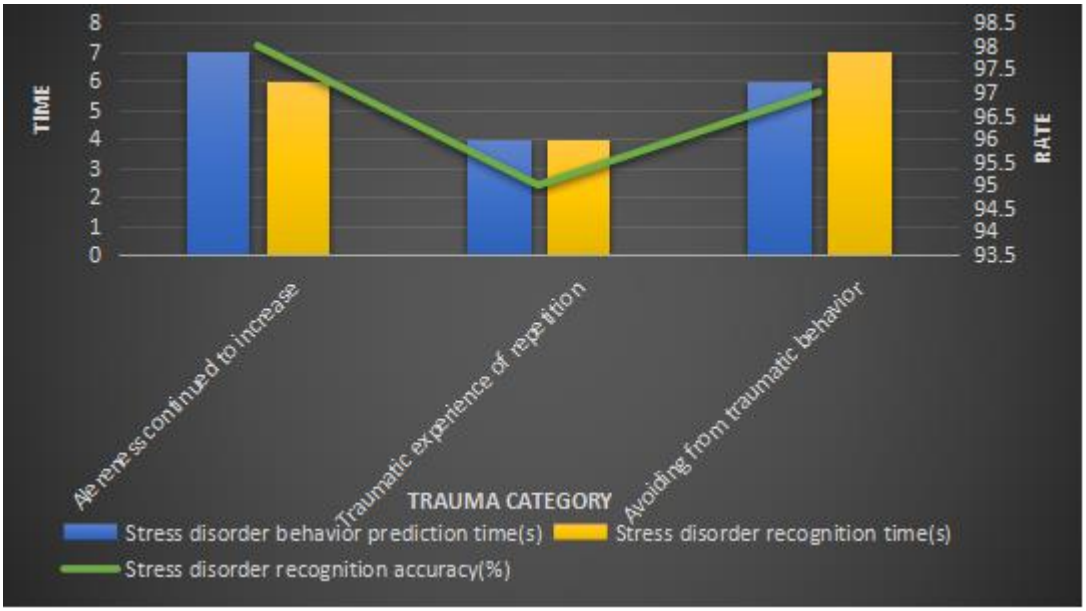

Figure 4. Machine learning-based models of childhood PTSD identification as well as outcome prediction

The method of machine learning can effectively evaluate the physical function and psychological status of patients with post-traumatic stress disorder. This paper mainly studies the application of neural network model in children's rehabilitation training. First of all, we need to understand that there are two basic aspects of the relationship between pre injury and post injury. One is whether there is a linear correlation between pre injury and post injury. The other is whether there is a clear

causal relationship between the damaged part and pre injury, or whether the underlying influencing factors will change when the disease occurs. It is important to know that the neural network model plays an important role in the intervention of children's physical rehabilitation. It can be seen from Figure 4 that the recognition rate of children's post-traumatic stress disorder in this model is very high, and the prediction time and recognition time of stress disorder are very fast, which meets the recognition needs of users.

5. Conclusion

This paper mainly discusses how to carry out manual intervention and evaluate children's post-traumatic stress disorder, and discusses a method of training children in combination with traditional medicine. Through experimental comparison, it is concluded that adding parental protective equipment during neural network training can significantly improve the therapeutic effect. Moreover, evaluation data is established using Bayesian model and support vector machine theory. Research shows that, This technology can effectively reduce the incidence of wound infection in children and improve the incidence of complications.

Funding

This article is not supported by any foundation.

Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

References

[1] Nikhilanand Arya, Sriparna Saha:Multi-Modal Classification for Human Breast Cancer Prognosis Prediction: Proposal of Deep-Learning Based Stacked Ensemble Model. IEEE ACM Trans. Comput. Biol. Bioinform. 19(2): 1032-1041 (2020).

[2] Toufik Aggab, Manuel Avila, Pascal Vrignat, Frédéric Kratz:Unifying Model-Based Prognosis With Learning-Based Time-Series Prediction Methods: Application to Li-Ion Battery. IEEE Syst. J. 15(4): 5245-5254 (2020).

[3] Luca Parisi, Narrendar RaviChandran, Marianne Lyne Manaog:A novel hybrid algorithm for aiding prediction of prognosis in patients with hepatitis. Neural Comput. Appl. 32(8): 3839-3852 (2020). https://doi.org/10.1007/s00521-019-04050-x

[4] Jie Hao, Youngsoon Kim, Tae-Kyung Kim, Mingon Kang:PASNet: pathway-associated sparse deep neural network for prognosis prediction from high-throughput data. BMC Bioinform. 19(1): 510:1-510:13 (2018). https://doi.org/10.1186/s12859-018-2500-z

[5] Najmeh Daroogheh, Nader Meskin, Khashayar Khorasani:An improved particle filtering-based approach for health prediction and prognosis of nonlinear systems. J. Frankl. Inst. 355(8): 3753-3794 (2018). https://doi.org/10.1016/j.jfranklin.2018.02.023

[6] Cameron Cooper:Using Machine Learning to Identify At-risk Students in an Introductory Programming Course at a Two-year Public College. Adv. Artif. Intell. Mach. Learn. 2(3): 407-421 (2020).

[7] Elisabete A. De Nadai Fernandes, Gabriel A. Sarriés, Yuniel T. Mazola, Robson C. de Lima, Gustavo N. Furlan, Márcio A. Bacchi:Machine learning to support geographical origin traceability of Coffea Arabica. Adv. Artif. Intell. Mach. Learn. 2(1): 273-287 (2020).

[8] Dmitry V. Vinogradov:Algebraic Machine Learning: Emphasis on Efficiency. Autom. Remote. Control. 83(6): 831-846 (2020). https://doi.org/10.1134/S0005117922060029

[9] Milos Kotlar, Marija Punt, Veljko Milutinovic:Chapter Four - Energy efficient implementation of tensor operations using dataflow paradigm for machine learning. Adv. Comput. 126: 151-199 (2020).

[10] Veeramuthu Venkatesh, Pethuru Raj, R. Anushiadevi:Chapter Ten - A smart framework through the Internet of Things and machine learning for precision agriculture. Adv. Comput. 127: 279-306 (2020).

[11] Bdallah M. H. Abbas, Khairil Imran Bin Ghauth, Choo-Yee Ting:User Experience Design Using Machine Learning: A Systematic Review. IEEE Access 10: 51501-51514 (2020).

[12] Mohamed Saleh Abouelyazid, Sherif Hammouda, Yehea Ismail:Fast and Accurate Machine Learning Compact Models for Interconnect Parasitic Capacitances Considering Systematic Process Variations. IEEE Access 10: 7533-7553 (2020).

[13] Murad A. Abusubaih, Sundous Khamayseh:Performance of Machine Learning-Based Techniques for Spectrum Sensing in Mobile Cognitive Radio Networks. IEEE Access 10: 1410-1418 (2020).

[14] Muhammad Adel, Sabah M. Ahmed, Mohamed Fanni:End-Effector Position Estimation and Control of a Flexible Interconnected Industrial Manipulator Using Machine Learning. IEEE Access 10: 30465-30483 (2020).

[15] Ghulab Nabi Ahmad, Hira Fatima, Shafi Ullah, Abdelaziz Salah Saidi, Asghar Imdadullah:Efficient Medical Diagnosis of Human Heart Diseases Using Machine Learning Techniques With and Without GridSearchCV. IEEE Access 10: 80151-80173 (2020).

[16] Nur Ahmadi, Trio Adiono, Ayu Purwarianti, Timothy G. Constandinou, Christos-Savvas Bouganis:Improved Spike-Based Brain-Machine Interface Using Bayesian Adaptive Kernel Smoother and Deep Learning. IEEE Access 10: 29341-29356 (2020).

[17] Dina Bousdar Ahmed, Estefania Munoz Diaz:Survey of Machine Learning Methods Applied to Urban Mobility. IEEE Access 10: 30349-30366 (2020).

[18] Chandni Akbar, Yiming Li, Narasimhulu Thoti:Device-Simulation-Based Machine Learning Technique for the Characteristic of Line Tunnel Field-Effect Transistors. IEEE Access 10: 53098-53107 (2020).