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Clinical Traditional Chinese Medicine Research in Hospitals and Its Clinical Value Analysis

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Abstract: Clinical Chinese medicine, as an important component of traditional Chinese medicine, has played an increasingly important role in disease treatment, prevention, and rehabilitation in recent years. This article explores the current research status of clinical Chinese medicine in hospitals and its value in clinical practice. This article proposes a traditional Chinese medicine efficacy evaluation algorithm and a clinical value analysis model by reviewing relevant literature and analyzing clinical data, and conducts empirical testing and effectiveness analysis. The results indicate that these methods and models have certain practicality and effectiveness in traditional Chinese medicine research and clinical applications. The highest accuracy of this model can reach 91%, and the lowest is 82%. It can be seen that the accuracy fluctuates between 83% and 91%. The accuracy of most tests is concentrated around 85%, with only a few tests having accuracy lower or higher than this value. Overall, the accuracy remains at a high level with no significant downward trend. These data indicate that the system studied in this article has shown very high accuracy in testing, with an average accuracy rate much higher than 80%.

1. Introduction

Traditional Chinese medicine, as an important component of traditional medicine, has a long history and profound cultural heritage. In recent years, with the continuous development of modern medical technology, the role of traditional Chinese medicine in clinical treatment has gradually been recognized. However, the complexity and diversity of traditional Chinese medicine also pose certain challenges to its research and application. Therefore, conducting clinical research on traditional Chinese medicine in hospitals, exploring the mechanism of action and clinical value of traditional Chinese medicine in depth, has important practical significance and theoretical value.

This article focuses on the efficacy evaluation and safety analysis of traditional Chinese medicine in clinical practice. This article establishes a traditional Chinese medicine efficacy evaluation algorithm and clinical value analysis model by collecting and analyzing clinical data, using statistical and machine learning methods, in order to achieve quantitative evaluation and prediction of the therapeutic effect of traditional Chinese medicine. This article conducts in-depth research on the pharmacological effects, mechanisms of action, and efficacy evaluation of traditional Chinese medicine and its preparations, revealing the ways and effects of traditional Chinese medicine in the human body, establishing quality evaluation standards and quality control methods for traditional Chinese medicine, and ensuring the stability of its quality.

The innovation of this article lies in combining modern technological means with traditional Chinese medicine, improving the accuracy and efficiency of Chinese medicine research through data mining and algorithm optimization. This article utilizes big data and artificial intelligence technology to mine and analyze clinical application data of traditional Chinese medicine, in order to discover new treatment strategies and predict treatment effects, optimize the medication plan of traditional Chinese medicine, optimize personalized medication and precision treatment, and provide scientific guidance for the clinical application of traditional Chinese medicine.

2. Related Work

Scholars generally believe that the study of clinical traditional Chinese medicine has profound value and significance. Traditional Chinese medicine plays an important role in the prevention and treatment of various diseases, and its clinical value cannot be ignored. With the development of science and technology and the improvement of clinical medical level, research on clinical pharmacy of traditional Chinese medicine is also constantly deepening. Rech et al. analyzed the reasons for the loss of clinical pharmacists, strengthened professional training for clinical pharmacists, improved work environment and benefits, and established a comprehensive career development path to ensure the stability and improvement of medical quality [1]. De With M et al. used preprocessed uracil as a detection method for DPD phenotype and evaluated it based on data from large-scale prospective clinical studies [2]. Trakulsunti Y et al. used the Lean Six Sigma method to improve medication errors in a pharmacy in a hospital in Thailand. They reduced the incidence of medication errors in pharmacies through detailed data analysis and process optimization [3]. Shubows et al. explored the application and challenges of biologically similar drugs in clinical practice from different perspectives, and they believed that clinical pharmacology played an important role in the evaluation, selection, and monitoring of biologically similar drugs [4]. Le L M et al. conducted an updated systematic evaluation and meta-analysis on the impact of pharmacist involvement on immunization rates and other outcomes. Through comprehensive analysis of multiple research data, they found that pharmacist participation can significantly improve immunization rates and have a positive impact on other health outcomes [5]. Cooper DeHoff R M et al. introduced the Clinical Pharmacogenomics Implementation Alliance guidelines on the association of SLCO1B1, ABCG2, and CYP2C9 genotypes with statin related musculoskeletal symptoms, providing genotype based statin medication recommendations for clinical physicians to reduce the occurrence of musculoskeletal symptoms [6]. Huang X et al. evaluated the performance of ChatGPT in clinical pharmacy and compared it with clinical pharmacists [7]. Sandaradura et al. explored the application of TDM in the management of anti-infective drugs, as well as the factors affecting its widespread implementation, and analyzed the current situation of TDM in Australia [8]. Van der Lee et al. discussed how artificial intelligence can change research methods and clinical practices in the field of pharmacology. They believed that artificial intelligence can provide new perspectives and tools for pharmacology research through data analysis, model prediction, and personalized healthcare, thereby improving drug development efficiency and treatment effectiveness [9]. Reckweg J T et al. delved into the pharmacological mechanisms of 5-MeO-DMT and its potential therapeutic effects in various diseases [10]. Scholars make full use of modern technological means, such as molecular biology and genomics, to explore the interaction mechanism between traditional Chinese medicine and human cells, providing scientific basis for the rational application of traditional Chinese medicine. At the same time, emphasis is also placed on observing and summarizing clinical practice to improve the efficacy and safety of traditional Chinese medicine. By sorting and summarizing the work of predecessors, it can provide useful references and guidance for this article, as well as ideas for innovation and improvement directions.

3. Method

3.1 Algorithm for Evaluating the Efficacy of Traditional Chinese Medicine

In the evaluation of the efficacy of traditional Chinese medicine, it is necessary to compare the differences in therapeutic effects between different Chinese medicine treatment plans [11-12]. At this point, hypothesis testing methods in statistics, such as t-test or chi square test, can be used to determine whether there is a significant difference between two or more groups of data. Taking t-test as an example, its basic formula is:

$$t = \frac{X_1 - X_2}{n_1} + \frac{1}{n_2} \tag{1}$$

Among them, X_1 and X_2 are the mean values of the two sets of data, while n_1 and n_2 are the sample sizes of the two sets of data. By calculating the t-value and corresponding p-value, this article can determine whether there is a significant difference in the mean values of the two groups of data, and thus evaluate the differences in the efficacy of different traditional Chinese medicine treatment plans [13-14]. The pharmacological effects of traditional Chinese medicine often involve interactions between multiple components and targets. To reveal these complex interactions, a drug efficacy mechanism analysis model based on complex networks is constructed. Among them, the linear regression model predicts the value of the dependent variable by fitting the linear relationship between the independent variable and the dependent variable. The basic formula of the linear regression model is:

$$Y = 0 + 1X_1 + 2X_2 + ... + nX_n \tag{2}$$

Among them, Y is the dependent variable (such as the effectiveness of traditional Chinese medicine treatment), X is the independent variable (such as patient age, gender, severity of the condition, etc.), and n is the regression coefficient. After learning the regression coefficients through training data, this article can use the model to predict new data. In complex networks, nodes typically represent traditional Chinese medicine components or biological targets, while edges represent their interaction relationships. By analyzing the structure and properties of the network, this article aims to understand the process and mechanism of action of traditional Chinese medicine components in living organisms. Among them, key nodes and paths in the network often play a decisive role in the efficacy of traditional Chinese medicine, and the strength of the interaction is represented by the weight of the edges between nodes in the network [15-16]. Supposing there is a weighted network where nodes represent drugs or biomolecules, edges represent their interactions, and edge weights represent the strength of these interactions.

$$W_{ij} = f(C_{ij}, D_{ij}) \tag{3}$$

Among them: W_{ij} is the weight of the edge between node i and node j, representing the strength of their interaction. f represents the function for calculating weights, which can be defined based on specific research questions and data. C_{ij} is a measure representing the direct interaction between node i and node j, such as experimentally measured binding affinity or expression correlation [17-18].

3.2 Clinical Value Analysis Model

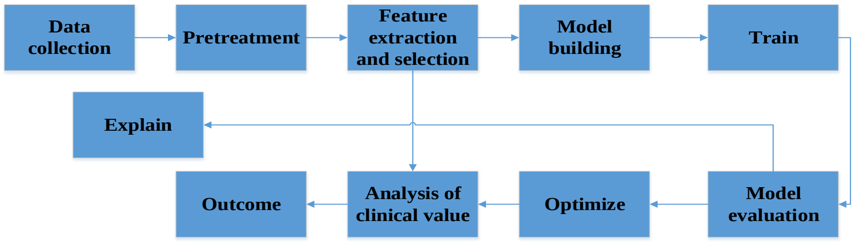

Figure 1: Clinical value analysis model

The clinical value analysis model can help healthcare providers comprehensively evaluate patient conditions, thereby providing scientific basis for diagnosis and treatment decisions. Through the clinical value analysis model, medical institutions can objectively evaluate the effectiveness of different treatment plans, choose the most favorable treatment plan for patients, improve treatment effectiveness, reduce unnecessary medical interventions, lower medical costs, and help medical institutions monitor and manage medical quality. By analyzing a large amount of clinical data, problems and shortcomings in the medical process are identified, and adjustments and improvements are made in a timely manner to improve the quality of medical services [19-20]. Based on the content of Figure 1, the analysis process is as follows: Firstly, data collection and preprocessing are carried out for medical treatment, collecting clinical data related to traditional Chinese medicine, including patient medical records, treatment records, and efficacy evaluations. The collected data is cleaned, organized, standardized, noise eliminated, and missing values filled in to promote the processing of outliers and ensure the accuracy of the data. Next is the feature extraction of clinical data. Through feature selection, we can accurately capture the key factors of the clinical value of traditional Chinese medicine, and construct and train the established model. According to the extracted features, the parameters are selected and the mathematical model is constructed. Through the training model, it can learn the rules and patterns in the data, and provide the basis for subsequent evaluation and prediction. After the model is built, it will be comprehensively evaluated. Through the comparison and analysis with other models, the advantages and disadvantages of the model are found out, and the corresponding optimization and improvement are carried out. According to the prediction results and evaluation results of the model, the clinical value of traditional Chinese medicine was deeply analyzed and explained.

4. Results and Discussion

4.1 Clinical Value Analysis Model Performance Testing

(1) Preparation of testing environment

a. Hardware environment setup:

This article evaluates the computational resources required for the model to process data, selecting servers or high-performance computing clusters with sufficient computing power. According to the storage requirements of the model, configuring sufficient hard disk space to ensure fast reading and writing of data during model training and testing, and ensure stable network connection of servers or clusters for data transmission and remote access.

b. Software environment configuration:

This article installs a suitable operating system to ensure compatibility with the programming language and toolchain of the model, configures the required database management system, provides stable data storage and query services for the model, installs and configures the programming environment, and related data analysis tool libraries.

(2) Dataset preparation

a. Data collection:

This article collects clinical data from multiple sources such as hospital information systems and electronic medical record systems to ensure the comprehensiveness of the data. Collaborating with hospitals, we obtain patient treatment record information and provide rich training samples for the model, as shown in Table 1.

Table 1: Training sample

Patient -label	Primary Diagnosis	Secondary Diagnosis	Diagnosis coding	Surgical Records	Medication Use Record	Record of Use of Chinese Medicines	Treatment effect
1	Coronary heart disease	Hypertension	I10, I25	Heart Bypass Surgery	Aspirin	Ginseng, Astragalus	Symptom relief
2	Lung Cancer	/	C34	Lung Lobectomy	Chemotherapy drugs	Six flavoured Dihuang Pill, Angelica sinensis	Stabilisation
3	Cerebral haemorrhage	Hypertension	I61, I10	Intracranial decompression	Diuretics, antihypertensives	Radix Angelicae Sinensis, Rhizoma Ligustici Chuanxiong	Symptoms significantly improved
4	Coronary heart disease	Hypertension	I10, I25	Heart Bypass	Aspirin	Ginseng, Astragalus	Symptom relief
5	Lung Cancer	/	C34	Lobectomy	Chemotherapeutic drugs	Radix Rehmanniae Pill, Angelica Sinensis	Stable condition
6	Cerebral haemorrhage	Hypertension	I61, I10	Intracranial decompression	Diuretics, antihypertensives	Radix Angelicae Sinensis, Rhizoma Ligustici Chuanxiong	Symptom-s improved significantly
7	Diabetes	Coronary heart disease	E11.9, I25	Coronary Stenting	Insulin, hypoglycaemic agents	Bitter Melon, Phellodendron Bark	Control
8	Hepatitis	/	K75.9	Liver Transplantation	Antivirals, immunomodulators	Licorice, Chai Hu	Improvement
9	Rheumatoid arthritis	Hypertension	M06.9, I10	Arthroplasty	Anti-inflammatory drugs, painkillers	Fenghuang, Guizhi	Pain Relief
10	Kidney stones	Hypertension	N20.0, I10	Nephrolithotomy	Diuretics	Bitter ginseng, Pueraria Mirifica	Stone removal

b. Data preprocessing:

This article cleans data, removes duplicate, incorrect, or irrelevant data, improves data quality, standardizes data, and eliminates dimensional differences between different features. Based on the requirements of the model, extracting and selecting features from the data to construct an appropriate feature set.

(3) Model performance testing

a. Accuracy testing:

Dividing the dataset into multiple subsets, conduct multiple training and testing to ensure the consistency of the model's performance on different data, analyze the average accuracy of the model under different folds, evaluate the stability of the model, use the same dataset and evaluation indicators to compare the performance of multiple models, and analyze the advantages and disadvantages of this model in accuracy.

b. Robustness testing:

This article adds noise or outliers to the data, observes the model's ability to handle bad data, analyzes the output changes of the model under noise interference, and evaluates the robustness of the model.

4.2 Analysis of Testing Effectiveness

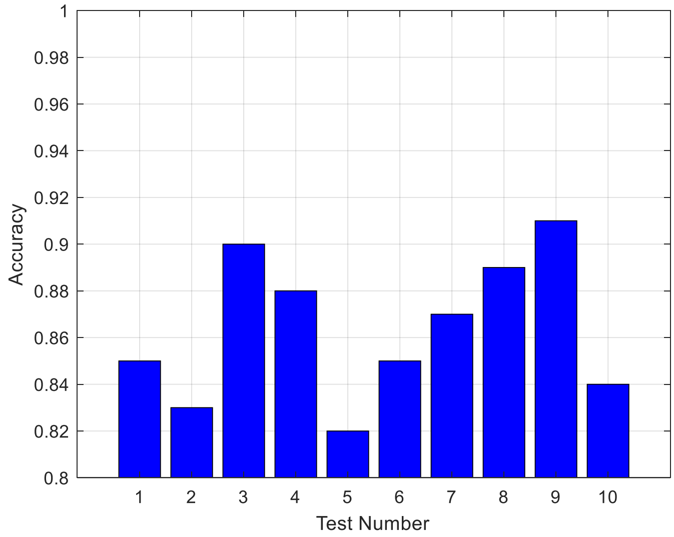

Figure 2: Value analysis accuracy

In order to improve the accuracy of the clinical value analysis model, this article comprehensively utilizes data cleaning and combines expert knowledge and experience to improve medical quality and patient satisfaction. According to the data in Figure 2, the accuracy of its value analysis is 85%, 83%, 90%, 88%, 82%, 85%, 87%, 89%, 91%, and 84%, respectively. Among them, the highest accuracy of the model can reach 91%, and the lowest is 82%. It can be seen that the accuracy fluctuates between 83% and 91%. The accuracy of most tests is concentrated around 85%, with only a few tests having accuracy lower or higher than this value. Overall, the accuracy remains at a high level with no significant downward trend. These data indicate that the system studied in this article has shown very high accuracy in testing, with an average accuracy rate much higher than 80%. From Figure 2, it can also be seen that although the accuracy has fluctuated, there is no obvious trend indicating that the accuracy is constantly improving or decreasing. This means that the performance of the system or method is stable and not affected by changes in testing conditions.

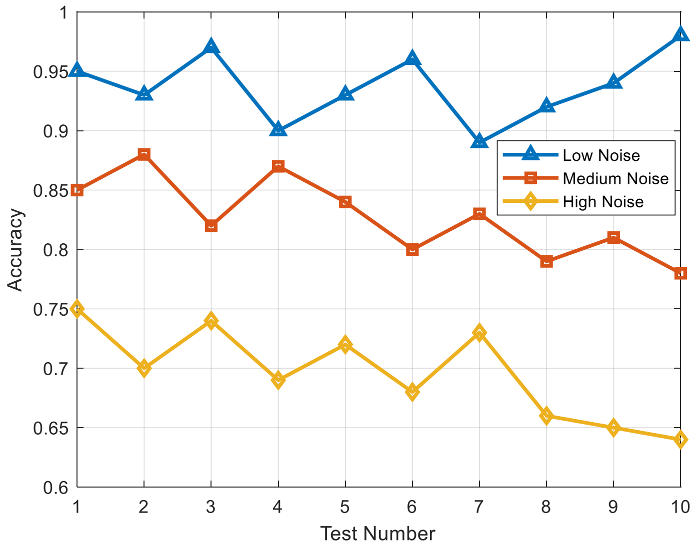

Figure 3: The robustness of the model

In order to improve the robustness of the model, this article comprehensively considers the factors of data noise and adopts data regularization technology to optimize the model. Figure 3 shows the accuracy results of the model after 10 tests at different noise levels (low noise, medium noise, high noise). The robustness of low noise is 0.95, 0.93, 0.97, 0.90, 0.93, 0.96, 0.89, 0.92, 0.94, 0.98; the medium noise is 0.85, 0.88, 0.82, 0.87, 0.84, 0.80, 0.83, 0.79, 0.81, 0.78; high noise levels are 0.75, 0.70, 0.74, 0.69, 0.72, 0.68, 0.73, 0.66, 0.65, 0.64. It can be observed from the data that accuracy shows different trends under different noise levels. At low noise levels, the accuracy of the model is generally high and there is little fluctuation, indicating that the model performs stably under these conditions. At moderate noise levels, accuracy decreases and volatility increases, indicating that the model is beginning to be affected by noise. Under high noise levels, the accuracy of the model further decreases and the volatility is greater, indicating poor performance of the model under these conditions. From the trend in Figure 3, it can be observed that the performance of the model decreases with the increase of noise level, indicating that the model has a certain sensitivity to noise. Under low noise conditions, the model performs stably, indicating its high reliability in a good environment. The accuracy fluctuates greatly under medium and high noise conditions, indicating poor robustness of the model in these environments and may require further improvement or adjustment.

5. Conclusion

After in-depth research and analysis, this article systematically explores the clinical pharmacy and its clinical value in hospitals. By constructing traditional Chinese medicine efficacy evaluation algorithms and clinical value analysis models, not only was the therapeutic effect of traditional Chinese medicine quantitatively evaluated, but its application value in clinical practice was comprehensively analyzed. This article conducts in-depth research and analysis on clinical Chinese medicine in hospitals by constructing a traditional Chinese medicine efficacy evaluation algorithm and a clinical value analysis model. The results indicate that these methods and models have certain practicality and effectiveness in traditional Chinese medicine research and clinical applications. However, during the research process, this article also identified some shortcomings and based on this, looked forward to future development directions. Firstly, although the efficacy evaluation algorithm and clinical value analysis model proposed in this article can to some extent reflect the therapeutic effect of traditional Chinese medicine, the reliability of the algorithm still needs to be further improved due to the complexity and diversity of traditional Chinese medicine components, as well as the influence of individual patient differences. Secondly, this article mainly focuses on the overall therapeutic effect of traditional Chinese medicine, while the research on its specific mechanism of action and pharmacological effects is not yet in-depth enough. In order to better guide the clinical application of traditional Chinese medicine, this article needs to strengthen the research on the mechanism of action of traditional Chinese medicine, reveal its pharmacological process, provide scientific basis for the improvement and optimization of traditional Chinese medicine, strengthen cross cooperation with other disciplines, and jointly promote the innovation and development of traditional Chinese medicine. It is believed that in the near future, traditional Chinese medicine will play a more important role in clinical practice and make greater contributions to human health. Clinical Chinese medicine research in hospitals will focus on data-driven precision treatment and personalized medication, continuously improving and optimizing algorithm models to enhance the effectiveness and safety of traditional Chinese medicine treatment. At the same time, it is necessary to strengthen cross disciplinary cooperation with other disciplines and jointly promote the innovation and development of traditional Chinese medicine.

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