Woody International Publish Limited
An Multidisciplinary Academic Journal Publisher

Journal of Theory and Practice in Clinical Sciences, Volume 2, 2025
https://www.woodyinternational.com/

Machine Learning Drives Intelligent Diagnosis of Traditional Chinese Medicine

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Abstract: ***This article discusses artificial intelligence (artificial intelligence, AI) Machine learning algorithms, especially traditional machine learning and deep learning analysis of TCM four diagnostic information Overview of the applications and limitations of intelligent diagnosis, and combined with multi-source and multi-modal information processing, intelligent disease and syndrome differentiation, etc., the development status of intelligent diagnosis is discussed, For intelligent decision making Provides a basis for auxiliary diagnosis and treatment Based on the applicability of AI in TCM diagnosis, Analyze the current technical difficulties in enabling intelligent diagnosis of traditional Chinese medicine, such as the lack of four diagnostic collection standards and A priori dataset with annotations, There is a lack of research on the co-construction of intelligent diagnosis models by multiple algorithms., And research on the efficacy evaluation of intelligent diagnosis and treatment models, etc., and analyze the solution path in detail, by The aim is to provide development direction for intelligent application of TCM diagnosis.***

Keywords: Artificial intelligence; Machine learning; Deep learning; Traditional Chinese medicine diagnosis; Intelligent decision making.

Cited as: Ming, Y., & Hong, T. K. (2025). Machine Learning Drives Intelligent Diagnosis of Traditional Chinese Medicine. *Journal of Theory and Practice in Clinical Sciences*, *2*, 60–67. Retrieved from https://woodyinternational.com/index.php/jtpcs/article/view/266

1. Introduction

TCM diagnosis refers to the doctor's combination of four examinations (Observation, auscultation, questioning and palpation) Collect the patient's symptoms and signs, and through comprehensive reasoning to complete the dialectical the advantage of the treatment process is individualized diagnosis and treatment. Convenient and fast, but the information collection and treatment based on the four examinations are extremely dependent on the doctor's experience and flow. Schools and academic thoughts, strong subjectivity affects the diagnosis and treatment process Regulation Fan sex He Ke Observational nature. many study division pay fork of people work wisdom able (artificial intelligence, AI) With a holistic, open and dynamic The characteristics of the thinking mode of experience and predictive reasoning, which is consistent with the emphasis on the TCM thinking of correspondence, holistic concept, unity of form, qi and spirit, and functional connection Coincidentally Through data collection, organization, feature extraction and model building process, AI Technology can help patients Comprehensive analysis of the characteristics of Dynamic and other angles further prove AI and Combined with traditional Chinese medicine diagnosis Necessity.

At the same time, the government and relevant agencies AI In the medical field Provides strong support for basic and clinical research, and corresponding development strategies, Planning and major scientific and technological projects have also entered the stage of implementation, completion and achievement. The transformation stage, "14th Five- Year Plan" for scientific and technological innovation in traditional Chinese medicine Established the " AI + Chinese medicine diagnosis and treatment + Health services". Therefore, this paper AI, especially the machine Machine Learning learning, ML) In the four diagnostic information collection, multiple the research status of modal information fusion, intelligent disease and syndrome differentiation, and decision support is analyzed. AI and middle medical diagnosis and treatment consistency degree, analyze the deficiencies in current research and make further technical arrangements. To achieve AI Empowering the intelligence of traditional Chinese medicine diagnosis.

2. Method

2.1 Observation and image information

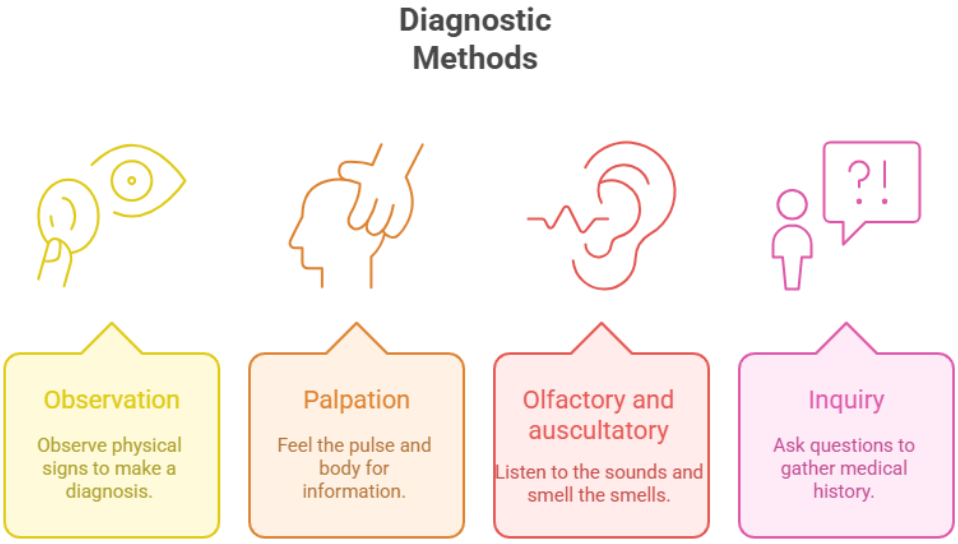

Figure 1: Four diagnostic methods in TCM

The patient image information obtained by the TCM clinic can be most intuitive

It reflects the external symptoms of the patient, so it is known as " "To know by sight is called God " Among them, inspection mainly includes inspection of the tongue and inspection of the face. It is an important part of TCM diagnosis. By observing the tongue texture (Expression state) and tongue coating (Quality Color) Can reveal the location and nature of the disease, As the Medical Stick and Shout says, Observing the root of the tongue can test the deficiency and excess of yin and yang. " By examining the dirt on the tongue, one can know whether the pathogenic cold or heat is shallow or deep." However, limited by subjective factors such as the doctor's experience and school of thought, traditional tongue diagnosis is inevitably ambiguous. and uncertainty. Therefore, AI Technology for tongue processing and patterning It is indeed necessary to build an intelligent recognition and analysis system for tongue diagnosis information.

Tradition ML is mainly used for tongue analysis SVM, k Nearest neighbor, neural network, At present, traditional ML In Smart The application of tongue diagnosis includes the following steps: 1) Using standard collection system The system can obtain high-resolution tongue images. (2) Pre-processing of tongue images processing, including color correction, contrast adjustment, etc. (3) Tongue Positioning and segmentation, Pass Pass people work set up Ji Te Levy and right number According to Line Standard Note.

(4) The classifier is used to classify the color, shape and texture of the tongue. include RF and SVM Analyze tongue texture and coating color, SVM point Differentiate between tooth-marked tongue and fissured tongue. At the same time, intelligent tongue diagnosis information and clinical The study of the association between clinical diseases and syndromes is helpful to improve AI Tongue diagnosis The guiding value for clinical practice. etc. Based on standard tongue image features Parameters, with the help of SVM The algorithm establishes a diagnostic model for diabetes. Ding Ran et al. established an objective quantitative information index for tongue diagnosis of chronic hepatitis B. The database was used to find the correlation between syndromes and objective indicators of tongue appearance. because ML The algorithm for analyzing tongue images relies on the extracted features. In paying attention On the basis of extracting key tongue features, we should avoid numerous network parameters caused by overfitting. Although ML Objective analysis of tongue diagnosis images It has made contributions to the quantification, standardization and There are certain limitations, such as the limited robustness of the artificially designed feature extractor, Transfer learning and generalization ability are poor. At the same time, different institutions and regions The low sharing of data also increases the risk of overfitting of the algorithm. therefore ML Algorithms have not yet achieved human-perceptual accuracy.

along with DL Theoretical Development, CNN As a convolution The feedforward neural network with deep structure has good representation learning ability and does not require manual design of feature extraction. and

classification tasks, Its robustness and transfer learning capabilities Better than traditional ML algorithm. Therefore, intelligent diagnosis is DL In An important breakthrough in the field of medical auxiliary diagnosis and treatment. CNN knowledge The process of tongue diagnosis is as follows (Figure 3): (1) With tradition ML Method Same as above, standardize the collection of tongue images, Tongue image preprocessing, Tongue segmentation.

(2) Design and optimize model structure, Based on the annotated tongue data The test set is used to train the network parameters. (3) based on DL Algorithm Tongue classification, including extraction and analysis of tongue texture and tongue coating. (4) Knot Combined with the knowledge base of TCM tongue diagnosis, the syndrome inference can be completed. Zhou exist CNN The features of tongue images are extracted based on the network. This method is effective in tongue diagnosis. The physical classification and recognition of images is better than traditional ML accuracy increased 9%.

2.2 Palpation and pulse information

Pulse diagnosis is palpation in a narrow sense. The traditional pulse diagnosis standard comes from the pulse through "" "Bianhu Pulse Science " and " The Clinician's Eyes, Refers to the doctor's Oral pulse Four Elements " position, number, shape and potential ” to diagnose, by Understand the deficiency and excess of internal organs, The situation of qi and blood being full and the struggle between good and evil, such as Lingshu The Pulse says: That The overflowing Qi irrigates the internal organs. In clinical practice, Factors such as doctor's knowledge, clinical experience and subjectivity of pulse diagnosis affect pulse diagnosis As a result, it is not conducive to the exchange of schools, theoretical inheritance and repeated research. There are also " Heart It's, The dilemma of " difficult to understand under the finger " is that the pulse diagnosis Observation, informatization and intelligent research is an inevitable trend. Currently, pulse diagnosis Objective research mainly includes the research on pulse acquisition sensor technology standards Research, pulse feature extraction and pulse waveform analysis and processing. pass Pressure sensors, photoelectric sensors, etc. convert pulse pulsation into The pulse graph of the body is combined with the current mainstream algorithms such as dynamic analysis Pulse analysis is performed by pulse analysis, time domain analysis, and frequency domain analysis, Based on CNN Network, BP Neural Network and Hilbert - Huang Transform Analysis etc. for pulse wave recognition and classification, Finally, with Chinese medicine clinical The diagnosis and treatment knowledge graph is deeply integrated. Other studies on elderly people Pulse wave cycle characteristics of different blood pressure grades, Pre-processing through pulse data After processing and period segmentation, pulse wave features are extracted for pulse diagnosis of heart blood Risk assessment of disease. etc. ML Algorithms for healthy people and the pulse waves of patients with hypertension for classification and prediction, Based on pulse diagnosis Broken Instrument PDA -1) Observe the frequency and time domain changes of the pulse wave to evaluate Risk of hypertension. However, in the pulse signal analysis, Time domain and frequency domain analysis It is difficult to study the nonlinear information of pulse. And traditional ML The algorithm requires artificial labeling of features. Yan Jianjun et al. proposed a method based on threshold-free iteration. Return to the graph and CNN The pulse analysis and identification method is VGG-16 of CNN Automatically extract nonlinear features and then build a pulse classification model. The accuracy rate is 98. 14%.

In the objective research of pulse diagnosis, the pulse diagnosis instrument is the key. Although Sensor technology and analysis algorithms are constantly updated and iterated. but There are still Certain questions: (1) Multi-probe and array sensor technology is not yet fully Mature (2) The pulse information currently collected cannot fully reflect the The four elements of the image cannot accurately reflect the clinical thinking of Chinese medicine pulse diagnosis. Therefore, currently only suitable Used for Assistant Doctor born Diagnosis Break and cannot alone stand Identify sick (3) Current pulse diagnosis AI Auxiliary diagnosis is mainly limited to pulse Graph signal analysis algorithms, As traditional ML Algorithms: SVM, k- NN, DT, BP Neural network, etc.. In short, pulse diagnosis instruments are currently used For scientific research and prevention of diseases, Limited clinical use. The reason is this These devices do not exceed the doctor's perception and diagnostic capabilities. Sensor The sensitivity and stability of the collected signal affect its accuracy and repeatability There are restrictions.

2.3 Olfactory diagnosis and voice and odor information

Traditional Chinese medicine's olfactory diagnosis involves listening to sounds and smelling odors. As Suwen The "Great Treatise on the Correspondence of Yin and Yang " says: Examine the clear and turbid to know the parts, observe the breathing and listen to the sound " The sound can tell the pain ", The Difficult Classic also has " " Those who know by hearing are called saints " etc., indicating the importance of auscultation in identifying diseases, distinguishing syndromes and judging prognosis. Whether it is acoustic diagnosis or olfactory diagnosis,

it is still at the level of subjective judgment and qualitative analysis by doctors. Disaster by Heavy complex Test certificate, And lack Lack of Certainly quantity of Diagnosis Broken mark Gao Yetao et al. The 25-tone analyzer opens the door to traditional Chinese medicine The research on objectification and standardization of voice diagnosis is currently used AI Assisted auscultation of ML The algorithm mainly includes SVM, K-NN, decision tree, independent component Analysis and neural networks, etc. at present, The objective method of acoustic diagnosis consists of three steps: Composition:(1) Collect the patient 's stable Vowel data, or reading and corresponding to the five internal organs sound theory Angle Gong Shang Yu " Chinese characters, explore the characteristics of phonetic correspondence, or combine Non-speech indicators such as coughing, breathing, crying, groaning, etc. Characteristic parameters of sound. (2) Audio data processing, including signal Noise reduction, clutter filtering, transformation and feature extraction, such as approximate entropy, sample Entropy and wavelet packet transform are used to extract parameter features. (3) Parameter feature To input data for ML Algorithm training. For example, Chen Chunfeng et al. DL knowledge Although audio is still in its infancy, But it has shown a high recognition Accuracy, such as CNN Data enhancement technology can identify real and fake evidence with high accuracy Pass 95%, Original Because CNN In the analysis of acoustic signal time domain It also has a global receptive field based on the local waveform. Listen with clinicians The nature of the diagnostic process is similar.

2.4 Consultation and text messages

since Yes language Word Department natural language processing, NLP) It can extract professional terms, disease relationships, Time series and events, etc. DL and voice tools composition AI The core of the consultation system, like 2018 The first World Federation of Chinese Medicine The doctor-patient relationship published at the TCM Big Data Development Forum AI Dialogue system, The system builds a TCM knowledge base based on cloud computing and big data. It integrates medical consultation information collection, symptom reasoning and auxiliary diagnosis. Question and Answer Department System question answering sys tem,QA) Yes Natural Language Processing A traditional task to realize intelligent consultation, Its based on DL Extract text The semantic features of this information, And use decision tree and other models to identify the answer Among them, the use of DL Algorithm builds language model to extract text After the features are obtained, they are often tested on general data sets. like Dong proposed multi-column CNN Can be derived from response path, context, answer type, etc. The distribution representation between questions and answers is learned in three aspects. Diagnostic field, Due to the lack of large annotated clinical datasets, as well as NLP It still fails to solve the professional terms in text information, the temporal relationship between multiple diseases, multi-domain knowledge reasoning, and unstructured data recognition. As well as the complexity of ancient Chinese medical texts such as polysemy, ambiguity, and homophony There are still many difficulties such as grammar recognition. Currently, there is no system that can answer natural language questions and give answers to dialectical treatment. With annotations The dataset also involves the privacy of patient visit information. Because of these challenges At present, the research on intelligent Chinese medicine consultation is still in the exploratory stage. because Therefore, the subsequent research focuses on intelligent medical consultation and TCM text information recognition. To solve this problem, a standardized information collection process should be established based on clinical application Create annotated scenes of data set, Pampari wait use i2b2 database for NLP Existing clinical data on the task Explanation: Using an end-to-end model with an attention layer, Generated 100 Ten thousand Question format and 40 A large dataset of millions of question - answer pairs. Secondly, it is recommended to develop and improve the standardization and standardization of TCM terminology To assist context analysis, eliminate semantic differences, and provide support for feature extraction and intelligent Finally, choosing appropriate feature selection and dimensionality reduction methods can also help improve the effectiveness of the intelligent consultation model. like Wrapper and hybrid feature selection methods complement each other. Or combine the latest Modeling methods and specific text data to improve existing feature selection methods It may also become a new research direction.

3. Results and Discussion

Expert system by AI It is derived from the diagnosis and treatment of Chinese medicine experts. Based on knowledge and experience, integrated knowledge acquisition and language analysis technology, Through data collection, mining and logical reasoning, it simulates medical experts' diagnosis, The thinking process of syndrome differentiation and prescription can achieve accurate diagnosis and individual Clinical intelligent decision-making support such as chemical diagnosis and treatment plans. Guan Youbo Jiao Awarded 1978 The first to develop Guan Youbo's liver disease diagnosis program ", and then Professor Zhu Wenfeng's team in 1979 Developed the Medical digital identification Certificate Machine " and in 1985 It was upgraded to Department of Computer Science of Medical Syndrome Differentiation and Treatment These systems are developed based on the theory of traditional Chinese medicine and are used for subsequent This laid the foundation for the research and development

of expert systems in the field of traditional Chinese medicine. at present, expert The diagnosis and treatment mode of the system is mostly " four diagnostic information collection - experience extraction - clinical Clinical application verification - mechanism research - theoretical guidance of clinical practice ", through research Study the diagnosis characteristics of famous traditional Chinese medicine practitioners, After data structure transformation, it is summarized Database of diagnosis and treatment information of famous traditional Chinese medicine practitioners, Combining data mining methods such as Cluster analysis, association rules, etc. to realize the experience of famous old Chinese medicine practitioners and diagnosis However, the early expert system diagnosis and treatment procedures were only simple Simply simulate the diagnosis and treatment thinking of an expert in a certain disease field, When faced It is basically not applicable when it comes to different disease areas and different schools of thought. and At present, the expert system has expanded on the basis of objective collection of four diagnostic information. The dialectical thinking and direction, such as Yang Yali's attribute partial order structure Graph algorithm is the core, building The traditional Chinese medicine of " Syndrome - Syndrome Factor - Syndrome Name - Disease Name " Quantitative diagnostic model, and use it to design a special diagnosis model for common diseases in traditional Chinese medicine The system collects information from the four diagnoses and infers the syndrome set to confirm Determine the TCM disease name and syndrome diagnosis. Based on ensemble learning The algorithm constructs the clinical experience model of famous traditional Chinese medicine practitioners and analyzes international diseases Classification (ICD -10) Accurate diagnosis based on annotated clinical data In short, The application areas of expert systems should include It includes auxiliary diagnosis of diseases and syndromes, identification of health status in traditional Chinese medicine, and health management, based on abundant traditional Chinese medicine literature and clinical diagnosis and treatment data. Data-based Mining algorithms extract knowledge models related to disease diagnosis and syndrome classification Type or classification rules.

The rich ancient Chinese medical records, medical records and experience of famous doctors are A carrier of the thoughts and clinical experience of various schools of TCM; Modern research The accumulated research on the pharmacological mechanisms of monomers, Chinese medicines, and compound prescriptions has also built a huge standard modern Chinese medicine pharmacology database. Collecting this data and information Extracting features is an important way to realize the modernization of TCM diagnosis. To achieve this path, we use data mining technology to analyze ancient Chinese medical books, literature and The experience of famous old Chinese medicine practitioners is collated. From the complicated medical records and famous old Mining drug prescriptions and compatibility rules from traditional Chinese medicine experience, use ML Calculate The method of using these standardized data to diagnose TCM diseases and syndromes is the idea of building a TCM clinical disease diagnosis and treatment decision support system. The commonly used data mining techniques in research are cluster analysis, association rules,, decision tree, scale -free network rough set theory, etc., in revealing the potential relationship between complex symptom and sign information and syndrome type, treatment principle and method, prescription and medicine The system has advantages. In the study of the law of "symptom - syndrome - prescription ", Soup Erqun et al. used a method based on data mining Intelligent analysis of medical prescriptions System Treatise on Febrile Diseases, 112 The rules for using the main, secondary, auxiliary and guiding drugs in the first prescription The laws of qi, taste, and meridians are quantitatively ranked. Summarize the syndrome differentiation prescription The law of classical prescriptions Certificate " and " The relationship between the main symptoms and the Used to reason about uncertain and incomplete knowledge systems, With some diseases The principle of syndrome diagnosis is similar. For example, Qin Zhongguang first used rough sets to classify Diagnosis of rheumatic disease symptoms, Yan Junfeng et al. also used rough set Combined with syndrome differentiation and applied to inference rules and symptom differentiation Professor Liu Baoyan and Zhou Xuezhong's team used the correlation The intelligent decision-making of clinical diagnosis and treatment is studied by using methods such as rules, cluster analysis and case reasoning, and the famous elderly are realized for diabetes, stroke and coronary heart disease. Multidimensional Analysis of Clinical Experience He Ju et al. used complex The network model mines the medication rules of famous traditional Chinese medicine practitioners in treating lung cancer. Festival A weighted network is constructed based on point association and attribute similarity to mine The results show that the weighted complex network can accurately mine the core drugs Sexually similar high-frequency and low-frequency drug communities, Clinical drug regulations for lung cancer The team led by Professor Zhou Changle of Xiamen University and others have Using rough set and soft computing theory to construct eight-category syndrome differentiation and viscera syndrome differentiation Model system to explore the development path of logical differentiation of TCM syndromes. Data mining is also a reflection of ML Important branches of application, Zhang Congzheng and Zhu Danxi is the "Attack the faction " and " The " Yin-nourishing School " represents doctors, two The medications used by the patients were significantly different. Wang Ruixiang used naive Bayes and SVM algorithm Perform pattern recognition and analyze the prescription data sets of two doctors to distinguish The prescription has better effects. It can be used as a comparison of the

thoughts of different schools of medicine. Intelligent paradigm of thinking and medication characteristics, Personalized medication from various schools Find common rules in. In short, Symptom - Syndrome - Prescription - Medicine " For the rules The TCM data mining method based on the law is an intelligent disease and syndrome differentiation, Medical Clinical The intelligent diagnosis and treatment decision-making system provides algorithm support.

4. Conclusion

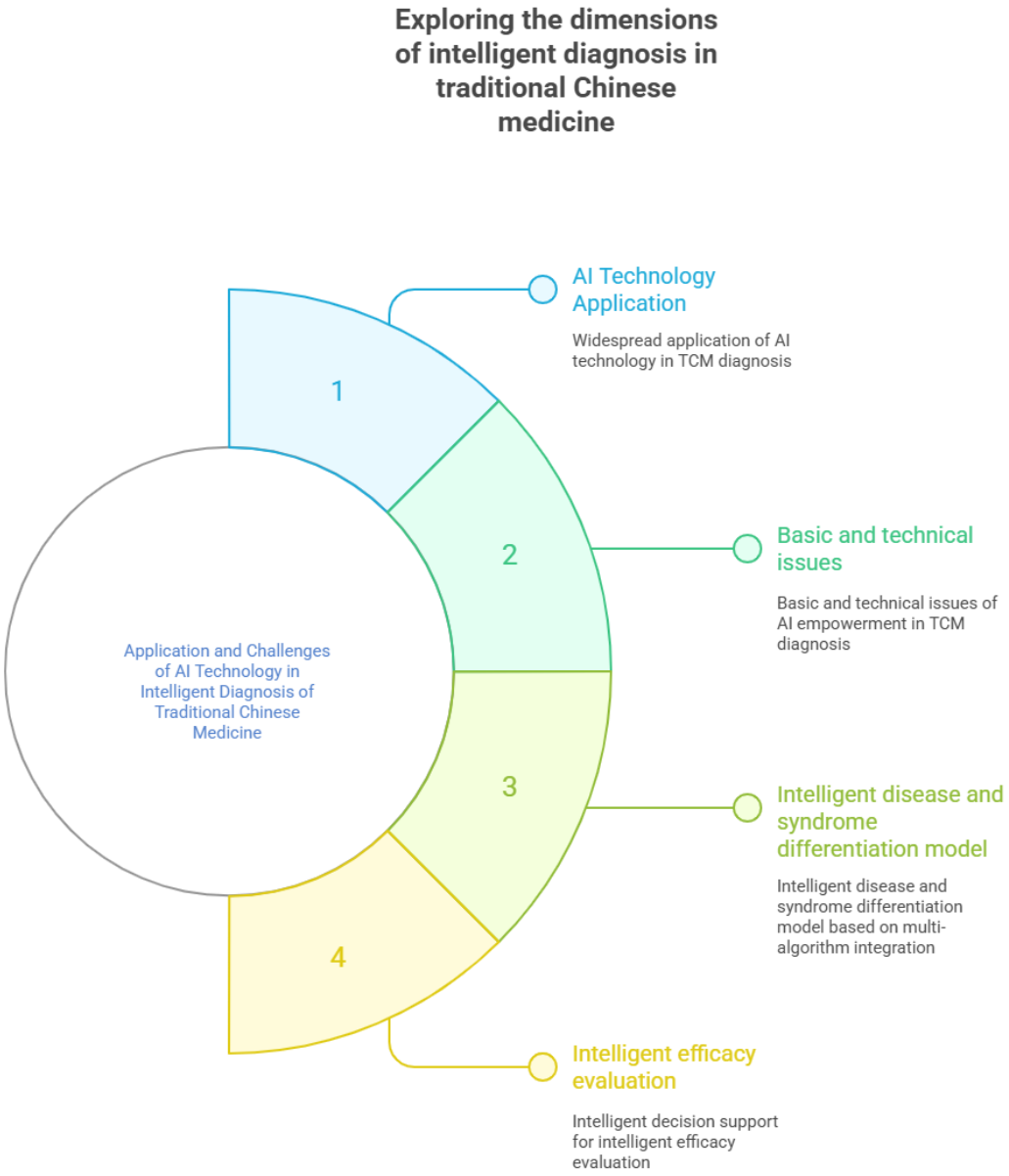

Figure 2: Exploring the dimensions of intelligent diagnosis in traditional Chinese medicine

With the application of information technologies such as AI and big data in the intelligentization of traditional Chinese medicine and the emergence of new auxiliary diagnosis and treatment models, this study explored the application of AI technology, especially traditional ML and DL in intelligent diagnosis such as the four diagnoses of traditional Chinese medicine, multi-source and multi-modal information processing, and intelligent disease differentiation and syndrome differentiation, which can provide support for the auxiliary treatment of intelligent decision support systems. However, it is still necessary to pay attention to the basic and technical issues in the process of AI empowering traditional Chinese medicine diagnosis, such as basic work and problems such as the four-diagnosis collection standards and large-scale annotated data sets; technical problems such as the intelligent disease differentiation and syndrome differentiation model integrated with multiple algorithms and the intelligent efficacy evaluation for intelligent decision-making and treatment support are still in the initial stage, and all

advanced technologies and appropriate methods should be adopted to explore and develop. In short, Solving the technology of intelligent diagnosis in traditional Chinese medicine Difficulty: Building a TCM intelligent diagnosis model and corresponding intelligent treatment efficacy The evaluation model is to help the objectification process of traditional Chinese medicine and create a new era The only way to build an AI- based traditional Chinese medicine medical system.

Data Availability

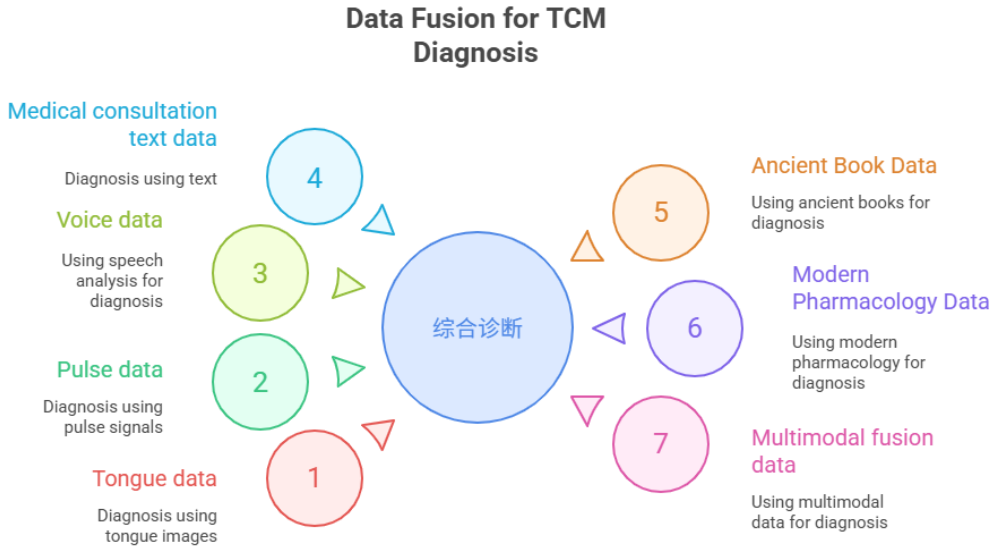

Figure 3

Table 1: Classification by data source

According to type	Specific source	illustrate
Tongue image data	Hospital clinical collection + public data set	For example, Zhang et al. used standardized tongue images to establish a diabetes model
Pulse signal data	Pulse diagnosis instrument (PDA-1, etc.) + clinical collection	Luo et al. used PDA-1 to collect pulse data from healthy subjects and patients with hypertension.
Voice data	The hospital collects voices of patients with lung diseases	Chen Chunfeng et al. collected vowel/cough sounds from 342 patients with lung diseases
Medical consultation text data	TCM Questionnaire + Electronic Medical Record	For example, Liu Guoping et al. established a questionnaire on heart disease
Ancient books and medical records	"Treatise on Febrile Diseases" and "Golden Chamber" + Experience of Famous Traditional Chinese Medicine Practitioners	Tang Erqun et al. discovered the medication rules of 112 classical prescriptions
Modern Pharmacology Data	Traditional Chinese Medicine Pharmacology Database + Literature	Used to build a "symptom-syndrome-prescription-drug" association model
Multimodal fusion data	Four-diagnosis combined diagnosis and treatment instrument collection	For example, the multi-source data collection platform of Niu Xin/Wang Yiqin team

References

[1] Chen, T., & Niu, X. Y., et al. (2018). Application of traditional Chinese medicine four-diagnostic auxiliary apparatus in evaluation of health status and clinical treatment. Journal of Traditional Chinese Medicine, 38(3), 447–451.

[2] Chen, C., Wang, Y., Xu, J., et al. (2022). Speech signals of 342 patients with lung diseases: Acquisition and characterization. Shanghai Pharmaceuticals, 43(14), 21–25.

[3] Gao, Z., Xu, H., Shi, D., et al. (2007). TCM syndrome differentiation of acute myocardial infarction: Clustering study. Chinese Journal of Emergency Medicine, 16(4), 432–434.

[4]

[5] He, J., Dai, C., Hu, C., et al. (2019). Weighted network of traditional Chinese medicine based on attribute similarity: Network construction and community division method. World Science and Technology - Modernization of Traditional Chinese Medicine, 21(12), 2746–2752.

[6] Liu, B., Zhou, X., & Li, P., et al. (2007). Integration of individual diagnosis and treatment, clinical research information platform. Chinese Digital Medicine, 2(6), 31–36.

[7] Liu, G., Wang, Y., Dong, Y., et al. (2009). Development and evaluation of the medical psychological questionnaire. Journal of Integrative Medicine, 7(1), 20–24.
[8] Liu, L., & Das, S. K. (2025). Evaluation of the anti-obesity potential of ginseng flower bud extract. International Journal of Environmental Sciences, 11(4s), 318–333.
[9] Liu, L., Das, S. K., & Jin, Z. (2024). Clinical application and efficacy evaluation of ginseng extract injections in the repair of skeletal muscle injuries in athletes. Journal of Theory and Practice in Engineering and Technology, 1(3), 9–13.
[10] Shi, M. (2007). An approach to syndrome differentiation in traditional Chinese medicine based on neural network. In Proceedings of the Third International Conference on Natural Computation (ICNC 2007) (pp. 376–380). IEEE.
[11] Shi, M., & Zhou, C. (2006). A classification rule extraction algorithm based on rough set theory. Computer Engineering and Applications, 42(9), 150–153.
[12] Tang, E., Ren, T., Chen, M., et al. (2012). Research on prescription and syndrome knowledge mining based on data mining method in Treatise on Febrile Diseases. Chinese Journal of Traditional Chinese Medicine Information, 19(4), 31–34.
[13] Wang, Y. (2019). Research on the development of traditional Chinese medicine diagnosis technology and the fusion of four diagnostic information. Shanghai Journal of Chinese Medicine University, 33(1), 1–7.
[14] Wu, R., Liu, X., Wang, J., et al. (2007). Coronary heart disease diagnosis and treatment by famous traditional Chinese medicine practitioners based on association rules: Drug law research. Chinese Journal of Traditional Chinese Medicine, 32(17), 1786–1788.
[15] Yan, S., Liu, L., & Huang, Y. (2024). Research on the role and construction strategies of physical education associations in higher vocational colleges in promoting vocational skill development. Journal of Social Science Humanities and Literature, 7(6), 93 – 97.
[16] Yan, S., Liu, L., & Ubaldo, C. (2024, November). Artificial intelligence in UFC outcome prediction and fighter strategies optimization. In Proceedings of the 2024 9th International Conference on Intelligent Information Processing (pp. 96–100).
[17] Yan, S., & Liu, L. (2024, September). Optimizing fighter strategies and predicting outcomes in Bellator MMA using artificial intelligence. In 2024 4th International Conference on Electronic Information Engineering and Computer Science (EIECS) (pp. 901–905). IEEE.
[18] Yang, L., Zhou, X., Bi, L., et al. (2014). Medical clinical diagnosis and treatment decision support system. World Science and Technology - Modernization of Traditional Chinese Medicine, 16(3), 474–480.
[19] Zhang, J., Xu, J., Hu, X., et al. (2017). Diagnostic method of diabetes based on support vector machine and tongue images. BioMed Research International, 2017, Article ID 7961494.
[20] Luo, Z. Y., Cui, J., Hu, X. J., et al. (2018). A study of machine-learning classifiers for hypertension based on radial pulse wave. BioMed Research International, 2018, Article ID 2964816.