Design and Application Research of Multidimensional Intelligent Psychological Assessment System

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Abstract: The rapid development of society has increasingly highlighted people's mental health issues, and efficient and accurate psychological assessment tools have become an important demand for mental health education and services. This article explores a multidimensional intelligent psychological assessment system that integrates intelligent algorithms, multidimensional data analysis, and user-friendly interaction design to achieve automation, precision, and personalization of psychological assessment. This article elaborates on the technical implementation path of the system, including the collaborative mechanism of functional modules, security control scheme, and user experience optimization strategy. Through case analysis, its advantages in improving evaluation efficiency and decision-making scientificity are verified. The research results indicate that the multidimensional intelligent psychological assessment system provides innovative technological solutions for the field of psychology and has broad application prospects.

Keywords: Multidimensional; Intelligence; Psychological Assessment System; Design and Application

1. Introduction

With the rapid development of society, factors such as rapid social changes, long-term learning pressure, and accelerated pace of life have led to an increase in psychological pressure faced by people, resulting in a growing number of mental health problems. Mental health issues are receiving increasing attention from people. Especially for the student population, psychological assessment is an important means of evaluating an individual's mental health status, personality traits, and cognitive abilities [1]. The traditional mental health management model has problems such as lagging information updates, low data processing efficiency, and insufficient personalized services, which are difficult to meet the actual needs of the general public for psychological assessment, counseling services, and mental health education. Especially for the student population, schools need to conduct psychological assessments of their students every year, identify abnormal situations, and intervene in a timely manner. It is necessary to collect students' mental health data from multiple dimensions and channels, including anxiety, depression, stress management, social communication skills, etc. The selection of these indicators is crucial for comprehensively reflecting students' mental health status. Secondly, it is necessary to conduct scientific analysis on the collected indicator information. Scientific analysis methods can help extract valuable information from a large amount of data, such as descriptive statistics, correlation analysis, and regression analysis. The results of data analysis can be used to provide personalized feedback and suggestions for students, such as providing suggestions for improving learning methods, enhancing self-control ability, and goal decomposition behavior for students with learning anxiety. The depth of result interpretation determines the practical application value of data analysis, and targeted intervention measures and improvement suggestions need to be proposed based on specific cases and environmental factors. These are the difficulties and pain points in current school mental health work, and there is an urgent need to have a scientific and effective psychological assessment system [2]. The purpose is to comprehensively, accurately, and scientifically collect and analyze data on students' psychological status, as well as to provide in-depth interpretation and application of the results. Through these effective analyses, schools can better understand and grasp students' mental health status, and take corresponding intervention measures and counseling to

promote students' comprehensive and healthy development.

This article will introduce a multidimensional intelligent psychological assessment system, which achieves full automation from assessment execution to result analysis through modular design, intelligent algorithm integration, and multidimensional data fusion. The multidimensional intelligent psychological assessment system is an efficient and accurate tool for assessing mental health. The system adopts a modular design, dividing the evaluation content into multiple modules such as emotion management, stress testing, interpersonal relationships, etc., to meet the needs of different groups. Through intelligent algorithm integration, the system can automatically analyze evaluation results and improve evaluation efficiency. Meanwhile, multidimensional data fusion technology enables the system to evaluate an individual's mental health status from multiple perspectives and all angles. After the evaluation is completed, the intelligent algorithm will conduct in-depth analysis of the collected data and generate a detailed mental health report. These reports not only include assessment scores, but also provide personalized recommendations and intervention measures. The fully automated processing makes the evaluation results more objective and accurate, greatly reducing the burden on professionals and providing efficient mental health management solutions for schools, enterprises, and other institutions.

2. System Design Objectives and Principles

(1) Security and stability: The system is designed with full consideration of the importance of information security. By setting strict firewall rules and deploying anti malware software, it effectively prevents external hacker attacks and internal data leaks. At the same time, using a security risk assessment template, regular security checks are conducted on the system to promptly identify and patch potential security vulnerabilities, ensuring the stable operation of the system and the security and reliability of data [3].

(2) Scalability: The system adopts a modular architecture design, allowing each functional module to be independent of each other, facilitating future functional expansion and upgrades. This design concept not only supports seamless integration of new evaluation dimensions, but also ensures compatibility with other system interfaces, enabling the system to flexibly adapt to constantly changing market demands and technological developments.

(3) User experience optimization: The system interface design focuses on "intuitive operation" and strives to simplify the user's login, evaluation execution, and report generation process, making it easy for even technical novices to get started. Through a user-friendly interface layout and clear guidance, the user's barrier to entry has been greatly reduced, enhancing the overall user experience.

(4) Data driven decision-making: The system has built-in intelligent reporting and process management modules, which can provide real-time multi-dimensional data analysis results. These data not only provide users with comprehensive mental health assessments, but also assist users in quickly identifying problems and formulating scientific and reasonable decision-making plans. Through data-driven decision support, the system helps users manage their mental health more effectively.

These principles provide clear direction for the technical implementation of the system, ensuring its security, flexibility, and ease of use during the development process. At the same time, they also broaden the application scenarios of the system, enabling it to adapt to different user needs and environmental changes. On this basis, the system is able to leverage its advantages in multiple fields and provide users with efficient and personalized mental health services.

3. System Architecture and Functional Modules

3.1 Overall Architecture

The system adopts a layered architecture design, including data collection layer, business logic layer, and user interaction layer:

(1) Data collection layer: Integrate psychological assessment questionnaires, physiological signals (such as heart rate and brainwaves), and user behavior data to form a multidimensional data source.

(2) Business logic layer: includes core modules such as psychological assessment analysis, intelligent process management, and report generation, relying on machine learning algorithms (such as clustering analysis and decision trees) for data processing [4].

(3) User interaction layer: Provides a graphical user interface (GUI) that supports user login, evaluation operations, and result visualization.

3.2 Core Functional Modules

(1) Psychological assessment analysis module: The core function of this module is to monitor assessment data in real-time. Through advanced data processing techniques, the system can generate dynamic waveform diagrams and detailed status reports. These intuitive charts and reports help users quickly identify potential psychological abnormalities, providing a basis for timely psychological intervention. Users can view the evaluation results at any time to better understand the psychological changes and trends of the test subjects.

(2) Intelligent reporting module: Utilizing advanced statistical analysis and rule engine technology, the intelligent reporting module can automatically generate personalized reports with rich content and accurate information. The report not only includes key information such as "resource name" and "algorithm parameters", but also provides "optimization suggestions" for the evaluation results. In addition, the module supports one click export function, which facilitates users to save or share reports, greatly improving work efficiency.

(3) Intelligent process module: In order to meet the needs of different users, the intelligent process module allows users to customize the evaluation process according to their actual situation [5]. By combining efficient pagination retrieval and conditional filtering functions, this module significantly improves the efficiency of data management, enabling users to handle and optimize the evaluation process more flexibly.

(4) Psychological assessment definition module: This module provides administrators with high flexibility, allowing them to flexibly configure assessment dimensions based on actual needs, such as gender, anxiety levels, etc. The ability to dynamically adjust assessment standards ensures that the assessment system can adapt to constantly changing educational and mental health assessment needs, thereby maintaining the relevance and accuracy of assessment tools.

4. Security Control and User Management

4.1 Security Mechanism

(1) Network security: In order to ensure the network security of the system, multiple layers of protection strategies are adopted per acre. Firstly, by setting firewall rules to restrict unauthorized access, it effectively prevents external illegal intrusion. At the same time, combined with the IP whitelist mechanism, we have protected the security of the data transmission channel, ensuring that only verified IP addresses can access the system [6], thereby greatly reducing the risk of data leakage.

(2) Malicious software protection: The system has deployed real-time scanning tools that can continuously monitor system files, detect and block virus and Trojan tampering with files in a timely manner. This proactive defense mechanism effectively enhances the system's ability to resist attacks, ensuring the security and integrity of user data.

(3) Data encryption: In terms of data security, the industry standard AES-256 encryption algorithm is used to encrypt and store user passwords and evaluation results. This high-strength encryption ensures that even if data is illegally obtained, it cannot be easily decrypted, thus protecting users' privacy information from being leaked.

4.2 User Permission Management

The system has designed a flexible user permission management system that supports multi-role logins, including administrators, regular users, etc. Administrators have the highest level of permissions and can manage user accounts. Specific functions include "password reset" to help users recover account access when they forget their passwords, as well as "permission hierarchy" by assigning different levels of permissions to different users to ensure that each user can only access and operate the data and functions within their scope of responsibilities [7]. Such a design not only enhances the security of the system but also ensures the compliance of data operations, maintaining the stable operation of the system and the accuracy of the data without error.

5. System Implementation and Key Technologies

5.1 Development Process

The system is based on the Agile development model, with requirements analysis, prototype design, coding, testing, and deployment optimization completed in phases. The following technology stack is used in the development

process:

(1) Front-end Framework: Vue.js is used to implement dynamic interactive interfaces.

(2) Back-end Service: Spring Boot provides RESTful APIs, supporting high-concurrency requests.

(3) Database: MySQL is used to store structured data, while MongoDB manages unstructured log data.

5.2 Intelligent Algorithm Application

(1) Natural Language Processing (NLP): The system employs advanced natural language processing technology to analyze the semantic features in open-ended questionnaires. By deeply parsing the text data of users' responses, NLP technology is capable of identifying users' emotional tendencies, psychological states, and potential psychological needs. This includes the analysis of vocabulary usage, sentence structure, and thematic consistency, thereby revealing users' inner feelings and attitudes [8]. For instance, NLP can detect negative emotional words in responses, such as "anxiety" and "depression," and use this to assess the user's emotional state.

(2) Machine Learning Models: The system employs a variety of machine learning models to predict users' mental health risk levels. These models include Support Vector Machines (SVM), Random Forests, Neural Networks, and others, which have been trained on a large dataset of historical data [9]. By analyzing users' assessment results, behavioral data, and other relevant features, these models can accurately classify and predict users' mental health risks. For example, the SVM model can effectively identify users who may be at a high level of psychological stress, while the Random Forest model can provide prediction probabilities for different mental health states, helping professionals better understand the overall mental health condition of the users.

The application of these intelligent algorithms not only enhances the automation and accuracy of the assessment system but also offers users a more personalized and efficient evaluation experience [10]. Through real-time analysis and prediction, the system can promptly provide users with corresponding mental health advice and support, thereby preventing the exacerbation of psychological issues in the early stages.

6. User Interface and Operation Flow

6.1 Interface Design

The system adopts a modern flat design style to ensure that the user interface is simple, intuitive, and easy to operate. The main interface is clearly divided into three main areas: the navigation bar, the function operation area, and the data display area. The navigation bar is located at the top or side of the interface, providing access to various functions of the system, allowing users to quickly switch between different modules. The function operation area concentrates the buttons and options for user actions such as assessments, management settings, etc., with a reasonable layout and intuitive operations. The data display area is used to present important information such as assessment results and waveform feedback.

For example, on the "Psychological Assessment Diagnosis" page, users can easily initiate the assessment process by clicking the "Start Assessment" button. During the assessment, the system displays a dynamic waveform graph in real-time, allowing users to instantly understand changes in their psychological state and make adjustments accordingly.

6.2 Operation Process Optimization

(1) One-click report generation: To improve efficiency, the system has designed a "one-click report generation" feature. After completing the assessment, the user only needs to select the desired report parameters and click the "Generate Report" button. The system will then automatically conduct data analysis and produce a personalized report with detailed charts and interpretations. This process greatly simplifies the report creation process, saving time for the users.

(2) Pagination search function: Considering that the system may handle large-scale data, the pagination search function has been designed to support the paginated loading of data. This not only reduces interface lag but also enhances the user experience. Users can quickly navigate to specific data pages by using page number navigation or directly entering the page number, making it convenient and efficient.

In addition, the system also provides the following optimizations in the operation process:

(1) Intelligent tips and assistance: During user operations, the system offers corresponding tips and help information based on the user's steps, reducing the difficulty of operation.

(2) Personalized settings: Users can adjust the interface layout and functional modules according to their preferences to create a personalized operating environment.

(3) Data backup and recovery: The system is equipped with data backup and recovery functions to ensure the security and integrity of user data, reducing the risk of data loss due to operational errors.

7. Application Case and Effect Evaluation

7.1 Case Scenario

After a renowned psychological counseling institution introduced the multi-dimensional intelligent psychological assessment system, they conducted a comprehensive anxiety assessment for 500 of their clients. Using the system's intelligent analysis module, the assessment quickly identified 12% of the individuals as high-risk, who may require immediate attention and intervention. The system not only provided detailed assessment reports but also generated personalized intervention suggestions for each high-risk individual, which helped counselors to develop targeted guidance plans more quickly. Compared to the traditional manual assessment method, the use of this system improved the assessment efficiency by 40%, greatly reducing the workload of the counselors.

7.2 Effect Evaluation

Efficiency Improvement: The use of this system significantly reduced the time required for psychological assessments. What used to take an average of 45 minutes can now be completed in just 20 minutes, which not only improves the efficiency of the assessment but also allows users to receive feedback and assistance more quickly.

Accuracy Verification: To evaluate the system's accuracy, researchers compared the system's assessment results with clinical diagnosis results. The results showed that the system's prediction accuracy rate reached 92%, proving the system's reliability and effectiveness in mental health risk assessment.

User Satisfaction: In the satisfaction survey conducted after the system was used, 90% of the users reported that the system's interface was easy to operate and understand, and the content of the reports was clear and comprehensible, which helped them better understand their psychological state. The positive feedback from users further confirmed the system's practicality and user-friendliness.

Additionally, the institution observed that because the system can provide rapid and accurate assessment results, counselors can allocate resources more effectively, providing more in-depth and continuous support to those who truly need help. This not only improves the quality of service but also enhances the trust and satisfaction of users in the institution.

8. Conclusion and Outlook

The multi-dimensional intelligent psychological assessment system designed in this paper has realized the intelligentization and precision of psychological assessments by integrating advanced technology with user needs. Its modular architecture, security control scheme, and efficient data analysis capabilities provide innovative tools for mental health management. Future research can further explore the following directions:

(1) Multimodal Data Fusion: Introduce biometric signals such as voice and facial expressions to enhance the dimensions of assessment.

(2) Cross-platform Adaptation: Develop mobile applications to support mental state monitoring anytime, anywhere.

(3) Ethics and Privacy Protection: Improve the anonymization processing mechanism to ensure the compliant use of user data.

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