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AI-Based Career Guidance System for Students

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Abstract: *Choosing an appropriate career path is a critical decision for students, yet many face difficulties due to lack of awareness and proper guidance. Traditional career counseling systems are often time-consuming, subjective, and unable to consider multiple influencing factors such as personality, aptitude, and interests. This paper presents an AI-Based Career Guidance System designed to provide personalized and data-driven career recommendations. The proposed system integrates academic performance, hobbies, skills, and psychometric analysis using the Holland RIASEC model along with aptitude testing. A Random Forest machine learning algorithm is employed to predict suitable career paths based on student data. The system is implemented using Python, Flask, MySQL, and machine learning libraries, providing an interactive web-based platform. Experimental results demonstrate that the system achieves an accuracy of approximately 85–90%, indicating its effectiveness in mapping student profiles to relevant career domains.*

Keywords: Artificial Intelligence, Career Guidance, Machine Learning, Random Forest, RIASEC, Aptitude Testing

I. INTRODUCTION

Career selection plays a vital role in shaping an individual's future, yet many students struggle to make informed decisions due to limited access to proper guidance. Traditional career counseling methods rely heavily on manual interaction, which may introduce bias, inconsistency, and lack of scalability. Additionally, such systems often fail to consider multiple dimensions such as interests, aptitude, and personality traits simultaneously.

With the advancement of Artificial Intelligence (AI) and Machine Learning (ML), it is possible to develop intelligent systems that provide personalized career recommendations. The proposed system leverages AI techniques to analyze student data and generate accurate predictions regarding suitable career paths.

The system integrates academic performance, psychometric evaluation, and aptitude testing to ensure a comprehensive analysis of student capabilities. This approach helps students align their interests and strengths with appropriate career options, thereby reducing uncertainty and improving decision-making.

II. LITERATURE SURVEY

Several research works have explored the application of AI and machine learning in career guidance systems. Devanshu (2023) proposed an AI-based web counseling platform that enhances decision-making by analyzing academic and personal data. Bankins (2024) highlighted the role of AI in career development and emphasized ethical considerations in automated systems.

Zaman (2024) demonstrated the effectiveness of combining big data analytics and AI for generating personalized career pathways. Nadeem (2023) developed a web-based counseling system integrating surveys and aptitude tests to provide individualized recommendations.

Paritosh et al. (2024) introduced a machine learning-based career prediction system that improved accuracy in recommending career paths. However, most existing systems lack adaptability, personalization, and real-time analysis capabilities.

The proposed system addresses these limitations by integrating machine learning, psychometric analysis, and dynamic data processing to deliver accurate and personalized career guidance.

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III. EXISTING SYSTEM

Existing career guidance systems primarily rely on rule-based logic, questionnaire-based assessments, and static information portals. These systems provide limited personalization and often depend on predefined rules to generate career suggestions.

Such approaches suffer from several limitations, including lack of adaptability, outdated career information, and inability to process large-scale data. Additionally, these systems do not learn from user interactions, resulting in less accurate and generic recommendations.

Therefore, there is a need for an intelligent system that can analyze multiple factors dynamically and provide personalized career guidance.

IV. PROPOSED SYSTEM

The proposed AI-Based Career Guidance System introduces a smart and interactive platform for personalized career recommendation. It combines psychometric analysis, aptitude testing, and machine learning to evaluate students comprehensively.

The system collects student data such as academic performance, hobbies, interests, and skills. It then performs psychological assessment using the Holland RIASEC model and evaluates aptitude through logical and analytical tests.

A Random Forest classifier is used to analyze the collected data and predict suitable career paths. The system generates personalized recommendations along with confidence levels, ensuring reliable guidance.

V. SYSTEM ARCHITECTURE

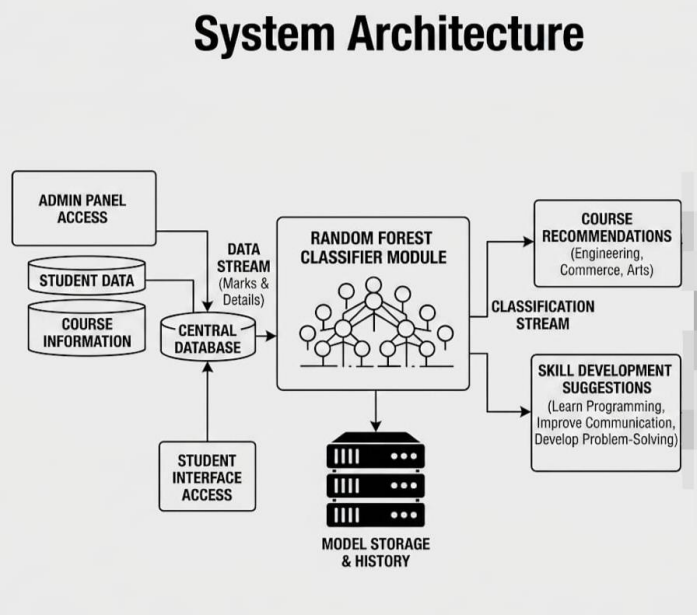

Fig 1. System Architecture

The system architecture consists of multiple modules that work together to provide accurate career recommendations.

The first module is the data collection module, which gathers student information including academic records, interests, and skills. The second module is the assessment module, which conducts psychometric and aptitude tests.

The processing module analyzes the collected data and extracts relevant features for prediction. The machine learning module uses a Random Forest algorithm to classify student profiles into suitable career domains. Finally, the recommendation module generates personalized career suggestions and displays them through a user-friendly interface.

The overall workflow follows a structured pipeline: input data → analysis → prediction → recommendation.

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VI. METHODOLOGY

A. Data Collection

The system collects multi-dimensional data including academic scores, interests, hobbies, and skills through a web-based interface.

B. Psychometric Analysis

The Holland RIASEC model is used to classify students into six personality types: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. Each type corresponds to specific career clusters.

C. Aptitude Testing

Students are evaluated through logical and mathematical questions and categorized into low, moderate, and high aptitude levels.

D. Machine Learning Model

A Random Forest classifier is employed due to its robustness and high accuracy. The dataset is split into training and testing sets in an 80:20 ratio.

E. Prediction

The trained model predicts suitable career paths and generates recommendations based on student profiles.

VII. IMPLEMENTATION

The system is implemented as a web-based application using modern technologies. The frontend is developed using HTML, CSS, and Bootstrap to provide an interactive user interface. The backend is built using Python and Flask, enabling efficient data processing and system control.

MySQL is used as the database to store student information, assessment results, and career recommendations. Machine learning algorithms are implemented using Scikit-learn and TensorFlow libraries.

The system includes modules for student registration, assessment, prediction, and result visualization, ensuring a seamless user experience.

VIII. RESULTS AND DISCUSSION

The system was tested using sample student data to evaluate its performance. The results indicate that the system accurately classifies personality types and aptitude levels.

The Random Forest model achieved an overall accuracy of approximately 85–90%, demonstrating its effectiveness in predicting suitable career domains. Students with strong analytical skills were recommended careers such as software engineering and data science, while socially inclined students were guided toward teaching and counseling professions.

The system reduces manual effort, minimizes bias, and improves decision-making through data-driven analysis.

IX. ADVANTAGES

The proposed system offers several advantages, including personalized career recommendations, improved accuracy, scalability, and accessibility. It reduces dependence on manual counseling and provides data-driven insights for better decision-making.

X. CONCLUSION

This paper presented an AI-Based Career Guidance System that utilizes machine learning, psychometric analysis, and aptitude testing to provide personalized career recommendations. The system demonstrates high accuracy and effectiveness in guiding students toward suitable career paths.

The integration of AI significantly enhances the career guidance process by making it more reliable, scalable, and accessible.

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XI. FUTURE WORK

Future enhancements include integrating real-time job market data, incorporating deep learning models, developing mobile applications, and adding interactive and gamified assessment modules.

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