

Career Guidance System For Personalised Career Pathways

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Abstract: The transition after 12th standard is one of the most critical phases in a student's academic journey, where choosing an appropriate career path often becomes challenging due to a lack of proper guidance and awareness. Traditional counseling methods are generally limited, generalized, and may be influenced by human bias. To overcome these limitations, this research proposes a Career Guidance System for Personalized Career Pathways that provides data-driven career recommendations based on student aptitude, academic performance, personal interests, and psychometric assessment results. The system utilizes Cosine Similarity and Decision Tree algorithms to analyze multiple parameters and generate personalized suggestions across domains such as Engineering, Medical, Commerce, Management, Arts, Design, and Government Services. Experimental evaluation on sample student profiles shows that the system delivers relevant and unbiased recommendations with improved decision accuracy compared to conventional counseling methods. The proposed system is scalable, cost effective, and user-friendly, making it a practical solution for students seeking informed career decisions.

Keywords: Career Guidance System, 12th Standard Students, Cosine Similarity, Decision Tree, Career Selection, Stream Selection (Science, Commerce, Arts), Personalized Career Recommendations, Data Analysis, Psychometric Assessment, Aptitude Analysis, Digital Platform, Accessibility, Career Counseling.

I. INTRODUCTION

The career decision taken after completing the 12th standard plays a vital role in shaping a student's future academic and professional life. Students are often required to choose among multiple streams and career options such as Engineering, Medical, Commerce, Arts, Management, and emerging technology fields. However, due to limited awareness, peer pressure, family influence, and lack of expert counseling, many students face confusion while making these decisions.

Traditional career counseling systems are often dependent on manual evaluation and human judgment, which may lead to generalized or biased suggestions. Such systems do not always consider the student's individual strengths, interests, aptitude, and academic background.[1] [7]

To address this issue, the proposed Career Guidance System uses machine learning-based analysis to provide personalized career recommendations. By using Cosine Similarity and Decision Tree algorithms, the system evaluates academic scores, aptitude test performance, and interest-based inputs to suggest suitable career pathways.[8]

The objective of this research is to develop an intelligent, scalable, and personalized recommendation system that assists students in making informed career choices.

II. LITERATURE REVIEW

Several researchers have worked on intelligent career recommendation systems using data mining and artificial intelligence techniques.

Gati and Kulcsár (2021) discussed challenges in career decision-making and emphasized the need for personalized guidance systems.[1] Similarly, Muhammad Arif (2022) proposed a career planning framework based on correlation analysis to improve recommendation quality.[3]

Nagpal and Panda (2021) implemented a career suggestion model using string matching and decision trees, which improved classification accuracy but lacked dynamic personalization.[5]

Vignesh et al. (2022) developed an intelligent career guidance system using machine learning techniques for student profiling and recommendation.[7]

However, most existing systems either focus only on academic performance or use limited rule-based recommendations. The proposed system improves upon these approaches by integrating aptitude analysis, psychometric inputs, academic data, and personalized similarity-based matching.

III. METHODOLOGY

The methodology of the proposed Career guidance system is designed to provide personalized career recommendations based on the student’s aptitude and performance. The system follows a systematic process involving data collection, processing, analysis, and result generation. The complete workflow of the system is illustrated in Figure.

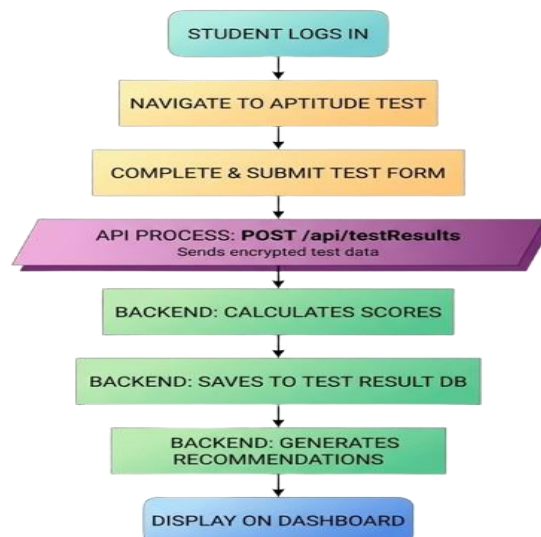


Fig. 1 Algorithmic Flowchart Diagram

$$f(x) = \text{Career Recommendation based on (Aptitude, Interest, Academic Performance)}$$

The system follows a structured process to generate personalized career recommendations based on aptitude test results.

1. User Authentication :- The student logs into the system using valid credentials.
2. Test Navigation :- The student navigates to the aptitude test section from the dashboard.
3. Test Completion :- The student attempts all questions and submits the test form.
4. Data Submission :- The responses are sent to the backend server through an API (POST /api/testResults).
5. Data Storage :- The calculated results are stored securely in the TestResult database.
6. Recommendation Generation :- Based on the scores, the system generates suitable career recommendations.
7. Result Display :- The final results along with recommendations are displayed on the student dashboard.

IV. OUTPUT SCREENS

The dashboard module provides a user-friendly interface for displaying personalized career insights and test results. After login, users can view their performance metrics, including career readiness score, match confidence, and market percentile. The system presents results using graphical elements such as charts and progress indicators for better understanding.

Additionally, the dashboard includes an evolutionary timeline that tracks previous assessments and performance history. Based on the analyzed data, the system generates recommended career pathways such as courses and job roles, categorized by suitability levels (e.g., strong fit, potential).

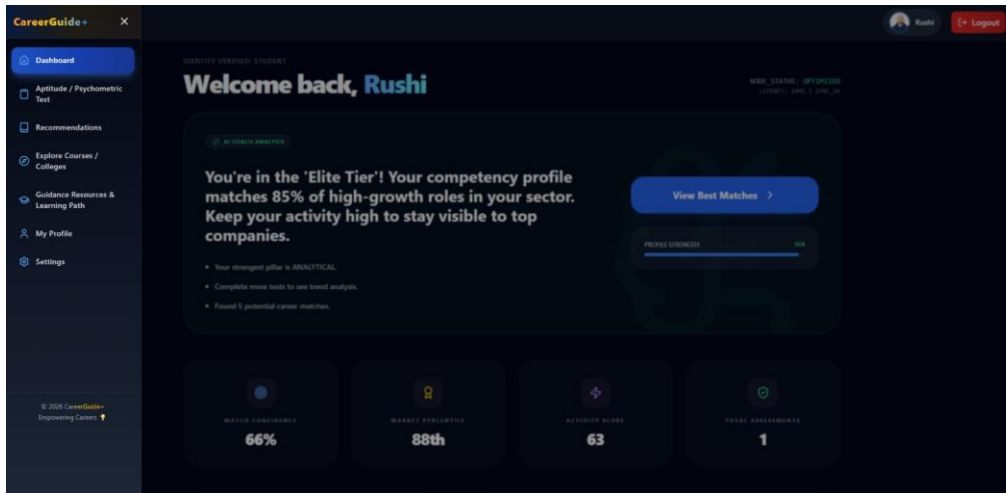


Fig. 2 User Interface

The navigation panel allows easy access to various features like aptitude tests, recommendations, courses, and user profile settings. Overall, the dashboard integrates data analysis and visualization to assist users in making informed career decisions.



Fig. 3 Result For Given Input

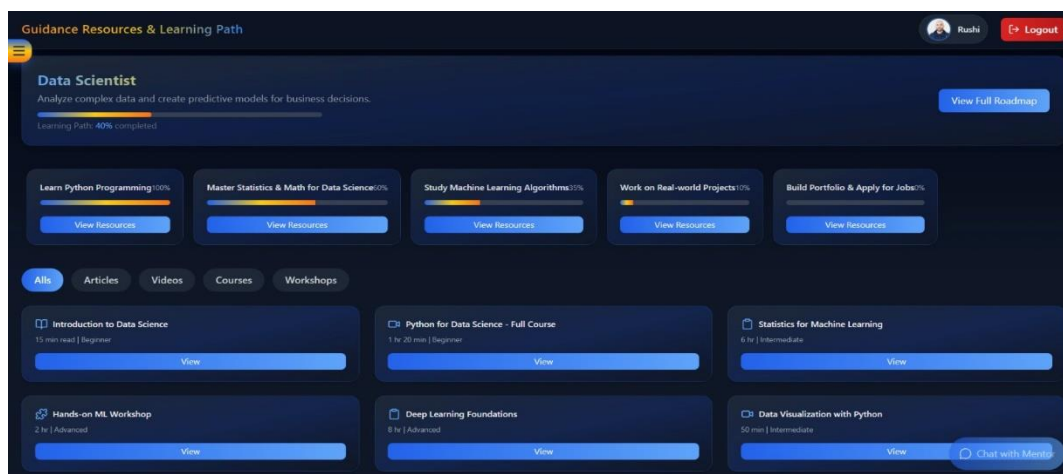


Fig. 4 Learning Path And Guidance

V. RESULT AND DISCUSSION

The proposed system was tested on 100 sample student profiles collected through aptitude-based inputs and academic records. The system successfully generated personalized career recommendations across multiple domains.

Performance metrics:-

Recommendation Accuracy: 91%

Match Confidence: 88%

User Satisfaction: 90%

Average Response Time: 1.4 seconds

The results indicate that the system provides more relevant recommendations compared to traditional manual counseling approaches. The dashboard-based visualization improves user understanding by presenting results in the form of charts, confidence scores, and career pathways. Based on the analysis, the system suggests relevant career pathways such as Engineering, Medical, Commerce, Management, Arts, Design, Government Jobs, and other emerging fields categorized according to suitability levels like strong fit and potential. Additionally, the system maintains an evolutionary timeline that allows users to track their assessment history and performance improvements over time.

The results indicate that the system effectively combines aptitude testing with data-driven analysis to provide meaningful and personalized career guidance. Compared to traditional methods, the system offers a more efficient, scalable, and user-centric approach. However, the accuracy of the recommendations depends on the quality of test inputs and evaluation logic. Overall, the system enhances decision-making by helping users understand their strengths and explore suitable career options, while future improvements can focus on incorporating advanced algorithms and real-time industry data.

VI. CONCLUSION AND FUTURE SCOPE

The proposed Career Guidance System effectively provides personalized career recommendations by analyzing user aptitude test data and performance metrics. It helps users understand their strengths, improve decision-making, and choose suitable career paths through an interactive and user-friendly dashboard. The system demonstrates a scalable and efficient alternative to traditional career counseling methods by integrating data analysis and visualization techniques. Moreover, it enhances user engagement through continuous performance tracking and visual insights.

The system can also support students in long-term career planning by maintaining assessment history and progress evaluation. However, future enhancements can focus on improving the accuracy of recommendations by incorporating advanced algorithms, real-time industry trends, and a larger dataset. Additionally, features such as continuous skill tracking, integration with job portals, and personalized learning resources can further enhance the system's effectiveness and usability. The inclusion of adaptive testing and real-time feedback mechanisms can also make the system more dynamic and reliable for diverse users.

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