

Insight Navigator: AI Based Career Recommendation

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Abstract-Career recommendation at the secondary school level is crucial in guiding students towards informed academic and professional decisions. However, the absence of accurate recommendations and personalized counseling often leads to confusion and misaligned career choices. To overcome this challenge, this project proposes "Insight Navigator", an AI-based career recommendation system designed to assist secondary students in identifying suitable career paths early on. The system leverages machine learning algorithms to generate recommendations based on an interest-based test, aligning career options with students' preferences. Additionally, an aptitude test evaluates quantitative, logical, and verbal reasoning skills, with visual representation to enhance self-awareness. A psychometric test is also integrated to assess personality traits and match them with appropriate career domains. A chatbot provides instant support, while a feedback system collects user input to continuously improve system performance. By offering accessible, data-driven career guidance, Insight Navigator empowers students to make well-informed decisions for their future.

Keywords: AI-based career recommendation, aptitude analysis, interest test, machine learning, psychometric test

I. INTRODUCTION

Choosing a career path is a vital decision for secondary school students, yet many face confusion due to the lack of personalized guidance especially in under-resourced areas without trained counsellors. This often leads to uninformed choices based on external influences, resulting in poor academic and career alignment.

Insight Navigator addresses this challenge through an AI-powered career recommendation system. It offers personalized guidance using three key tests: an interest-based test to match preferences, an aptitude test with visual feedback, and a psychometric test to assess personality traits. The platform also includes a chatbot for instant support and a feedback system for continuous improvement.

By making career counselling accessible and data-driven, *Insight Navigator* empowers students to make informed, confident decisions about their futures.

II. RELATED WORK DONE

S. Gupta, R. Sharma, and S. Kumar explored the integration of machine learning and career guidance systems for high school students. Their research focused on personalized career recommendation systems that leverage data from academic performance and student interests, helping guide students toward suitable career paths early in their academic journey.

A. Patel and colleagues developed an AI-driven aptitude assessment tool designed to evaluate students' cognitive abilities in quantitative, logical, and verbal reasoning. The system utilized machine learning models to provide students with real-time feedback and recommendations, assisting them in identifying their strengths and areas for improvement.

P. R. Joshi and team created an online career counselling platform that used psychometric tests to match students with appropriate careers based on their personality traits. Their research showed how psychometric analysis can enhance career recommendations, though it lacked integration with aptitude and interest-based assessments, which is a key feature of the *Insight Navigator* system.

M. Verma and co-authors proposed an AI-based career prediction system incorporating student preferences and academic backgrounds. By using clustering techniques and machine learning algorithms, their system successfully grouped students into different career pathways. However, the system did not provide visual feedback on test results or combine multiple assessment types, unlike the *Insight Navigator* system.

N. Rao and team introduced a chatbot-powered career guidance tool, allowing students to interact with AI-based career advisors. While their system provided immediate career recommendations based on interests, it did not incorporate psychometric or aptitude testing to refine the suggestions, which *Insight Navigator* combines for a more comprehensive user experience.

L. Chen and colleagues developed a machine learning model for predicting students' future career

success based on early-stage academic performance and extracurricular involvement. Although their model was accurate in predicting academic pathways, it lacked interactive elements, such as the aptitude and psychometric test results visualized in Insight Navigator.

S. Mehta and team examined the integration of multiple data points, including academic records, aptitude, and psychometric assessments, in career guidance systems. Their research demonstrated the potential of combining different types of data to create more accurate and personalized career recommendations, a methodology incorporated in the Insight Navigator system.

III. METHODOLOGY

The methodology adopted for developing the Insight Navigator system follows a structured, user-centered workflow involving multiple modules integrated into a unified web platform. The major steps are outlined below:

1. User Registration and Login

The process begins with users (students) signing up on the web application by entering basic personal information. The admin also has login access to manage student data, view analytics, and generate reports.

2. Dashboard Access and Main Interface

Once logged in, the user is directed to the main interface, which offers access to core services such as career prediction, aptitude testing, psychometric evaluation, and interest-based analysis. This acts as a central hub for all user interactions.

3. Assessment Modules

The system includes three distinct tests:

Aptitude Test: Assesses logical, verbal, and quantitative reasoning.

Psychometric Test: Evaluates personality traits and behavioral patterns.

Interest-Based Test: Captures areas of academic or professional interest.

Each test module records responses and stores the data in a centralized database.

4. AI-Based Career Prediction

Once the tests are completed, the data is processed using a machine learning model (Random Forest Classifier). The system generates the top five career options best suited to the user's profile. Each suggestion includes career insights, required skills, and education paths.

5. Result Visualization

Results from each test are visually represented using bar charts and pie charts to make performance metrics easy to understand. These results are displayed on the user dashboard for review and self-assessment.

6. Chatbot and Support Services

A built-in chatbot provides interactive support and clarifies doubts related to career paths or assessments. A support bot is also available for guiding users through the process.

7. Feedback System

Users can submit feedback after exploring their career recommendations. This feedback is stored in the database and analyzed by the admin to enhance system features and user experience.

8. Admin Panel and Monitoring

Admins have access to a control panel where they can monitor all users, view detailed feedback, download reports, and track progress through student analytics.

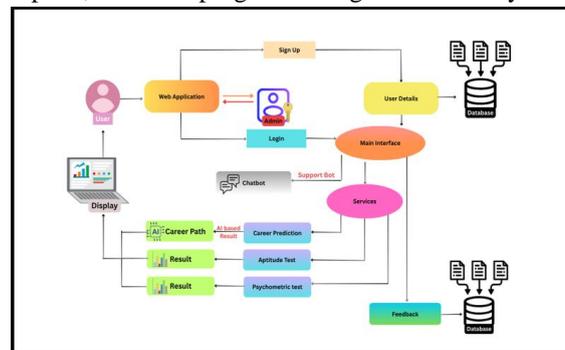


Fig. System Architecture

IV. PROPOSED SOLUTION

The proposed system, titled Insight Navigator, is an AI-based career guidance and counseling platform designed to assist secondary school students in identifying suitable career paths based on their aptitude, interests, and personality traits. The solution aims to bridge the gap in early career awareness by providing personalized recommendations through a structured and interactive web-based application.

The system integrates three core psychometric assessments:

Aptitude Test: Evaluates logical, verbal, and quantitative reasoning abilities.

Interest-Based Test: Identifies areas of professional interest and preference.

Psychometric Test: Assesses personality traits to align career options with behavioral tendencies.

Once the user completes these assessments, the responses are processed through a machine learning model (Random Forest Classifier), which predicts the top five most relevant career options. These recommendations are supported by detailed career descriptions, required skills, and suggested educational paths.

In addition to career prediction, the platform includes:

A visual results dashboard that presents user performance through interactive graphs and charts.

An integrated chatbot for real-time support and queries.

A feedback system allowing students to share their experiences and suggestions.

An admin panel for teachers and counselors to monitor student responses, generate reports, and offer additional support.

The solution is built using a hybrid architecture:

Frontend: HTML, CSS, JavaScript for an interactive interface.

Backend: PHP for user management and Flask (Python) for test processing and prediction.

ML Libraries: scikit-learn, Pandas, NumPy, Matplotlib for model training and data visualization. By offering a centralized platform for self-assessment and personalized career recommendations, Insight Navigator aims to empower students to make informed career choices at an early stage, fostering long-term academic and professional success.

V. RESULT

The developed web-based Career Guidance System for secondary students includes interest-based,

aptitude, and psychometric tests. Using Flask and machine learning, it provides real-time career predictions. The aptitude section visualizes strengths with bar and pie charts, and the psychometric test offers personality insights. A chatbot assists users, and feedback is collected for improvements. An admin panel enables teachers to review student data and download reports.



Fig: Services Page

The Services Page of Insight Navigator offers career guidance through three main services: Career Prediction, Aptitude Test, and Psychometric Test. It features a navigation bar with links to key sections and a welcome message. Each service is represented by a clickable card, and a chatbot provides interactive support at the bottom-right. The page serves as a central hub for students to access career tools easily.



Fig: AI-Based Career Recommendation Test

The AI-Based Career Recommendation Test interface collects user input on interests and skills, offering multilingual support (English, Marathi, Hindi). Users rate themselves on a 1-5 scale across various areas, such as problem-solving, medical interests, finance, and coding. The clean, user-friendly design ensures easy navigation. The collected data is processed by an AI model to provide personalized career recommendations.

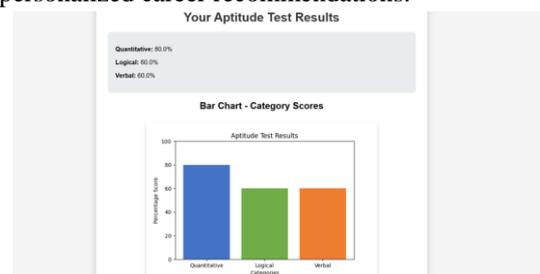


Fig: Aptitude test

The aptitude test results show scores of 80% in Quantitative, and 60% in Logical and Verbal reasoning. These results highlight strong numerical skills and moderate abilities in analytical and language areas. The data is presented both textually and in a bar chart for clarity and comparison, aiding career and education decisions.

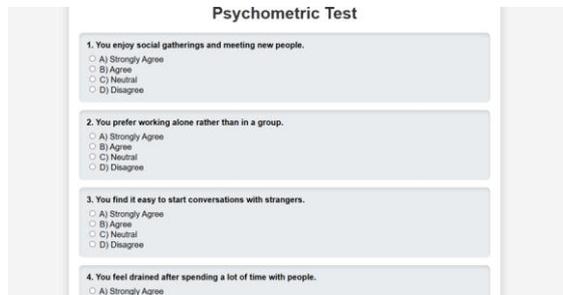


Fig: Psychometric Test

The psychometric test interface features multiple-choice questions with a Likert scale (Strongly Agree to Strongly Disagree) to assess personality traits like extroversion, emotional regulation, and cognitive preferences. It helps in personality profiling, team dynamics, and career or therapeutic planning.

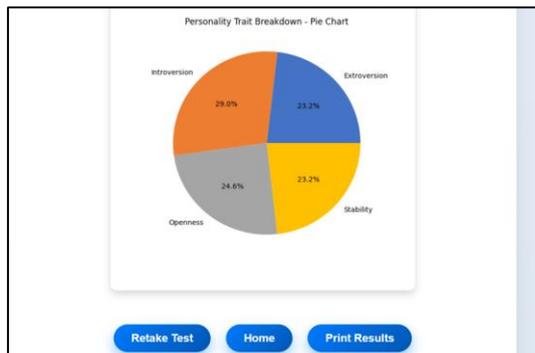


Fig: Personality Trait Distribution in Percentage (Pie Chart Format)

The pie chart shows personality trait percentages: Introversion (29.0%) is most dominant, followed by Openness (24.6%), and Extroversion and Stability (23.2% each). It visually represents the individual's psychological profile based on a personality test.

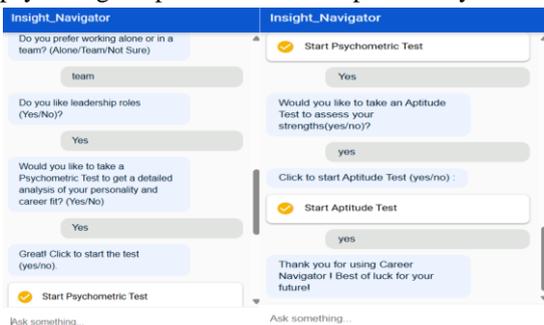


Fig: Chatbot-Driven Psychometric and Aptitude Test Initiation in Career Guidance System

The Insight Navigator chatbot interacts with users by asking about preferences like teamwork and leadership. Based on responses, it suggests the Psychometric Test for personality insights and the Aptitude Test for cognitive strengths. Its adaptive flow offers a personalized career guidance experience.

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