Interest-Based Career Domain Recommender Using Personality Profiling

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Abstract: *This work presents an Interest-Based Career Domain Recommender System that helps students choose suitable career paths through personality and interest analysis. The system uses the Big Five Personality Traits (OCEAN) alongwith dynamic questionnaire to provide personalized career suggestions. A rule-based and AI-supported recommendation engine matches student traits with relevant career domains. The system also offers career road maps, curated resources, and chatbot support to guide students further. With an adaptive feedback mechanism, recommendations improve over time. Overall, the system aims to reduce career confusion, improve decision-making, and provide a scalable solution for educational institutions.*

Keywords: *Career recommendation, OCEAN personality model, interest profiling, AI-driven guidance, adaptive learning, student decision-making, personalized career pathways.*

I.INTRODUCTION

Career selection plays a crucial role in shaping a student's academic growth, professional development, and overall future success. However, many students struggle to choose an appropriate career path due to limited awareness, lack of personalized guidance, and insufficient understanding of their own strengths and interests. With rapid advancements in technology, intelligent decision-support systems have become essential in assisting students to make informed choices. In recent years, psychological assessment models and AI-driven tools have gained prominence for providing personalized recommendations that go beyond traditional counselling methods. The proposed system leverages the Big Five Personality Traits (OCEAN) combined with interest-based profiling to deliver career suggestions that align with a student's personality, preferences, and skills. The system incorporates a dynamic questionnaire, an AI-assisted recommendation engine, and rule-based mapping that connects psychological traits to relevant career domains. By integrating detailed roadmaps, curated learning resources, and real-time chatbot support, the platform enhances the quality of guidance and enables students to explore their chosen domains more effectively. Existing career counselling methods often rely on manual assessments, one-size-fits-all recommendations, and limited data-driven insights. These approaches may lead to confusion, wrong career choices, or academic dissatisfaction. The proposed intelligent system addresses these limitations by offering a more structured, personalized, and scalable solution capable of serving large student populations across institutions. Moreover, the system supports continuous refinement through an adaptive feedback mechanism, improving recommendation accuracy over time. Its accessibility and ease of use make it suitable for academic institutions, training centers, and individual learners. By combining psychological profiling, AI-driven analytics, and interactive guidance, this platform aims to reduce career mismatches, enhance decision-making, and empower students to discover career paths that truly align with their potential. with minimal knowledge to develop robots for protective purposes.

II. SYSTEM METHODOLOGY

1.Data Collection: Students begin by completing a dynamic questionnaire designed to capture their interests and measure their Big Five Personality Traits (OCEAN).

2.Personality and Interest Analysis: The system processes the responses to evaluate personality scores and identify key interest areas.

3.Rule-Based Mapping: A predefined mapping model links personality traits and interests to suitable career domains. This ensures an initial accurate match.

4.AI-Driven Recommendation: An AI-assisted Module refines the mapping by analyzing patterns and enhancing the refines the mapping by analyzing patterns and enhancing the accuracy of the suggested career domains.

5.Career Recommendation Generation: The system provides students with the most relevant career paths, along with detailed roadmaps and curated learning resources.

6.Chatbot Support: An integrated chatbot assists users by answering queries and offering additional guidance throughout the process

7.Feedback Refinement: User feedback is collected to improve the system's future recommendations, making the model more adaptive and reliable.

III. LITERATURE REVIEW

S. Dhelim et al. (2021), in "A Survey on Personality-Aware Recommendation Systems", present a detailed review of how personality traits enhance the accuracy of recommendation systems. The authors explain how models based on the Big Five Personality Traits (OCEAN) significantly improve user–system interaction by generating more personalized outputs. Their work highlights the importance of psychological profiling in building adaptive and user-centric recommendation platforms.

M. Qamhieh et al. (2020), in "Personalized Career-Path Recommender System", propose a data-driven system that helps individuals select suitable career paths using machine learning methods. The system analyzes user interests, skills, and personality-related factors to generate career suggestions. The authors demonstrate that integrating personality assessments greatly improves the reliability of career recommendations, particularly for students facing uncertainty in academic decision-making.

P. Rani and M. Gupta (2019), in their study "Personality-Based Career Suggestion Model", present a model that maps personality traits to career categories using rule-based logic. Their results show that using psychological frameworks like OCEAN leads to more meaningful and accurate career predictions. The study emphasizes the need for structured personality evaluation when building recommendation systems for career planning.

K. Manjula and R. Banupriya (2022), in their work "Deep Learning for Career Domain Prediction", discuss the use of deep learning techniques to identify career domains based on user responses and behavioral patterns. The authors highlight how neural networks can detect complex patterns in personality and interest data, improving the precision of recommendations. They also outline challenges such as limited training data and varying psychological factors among users.

Collectively, the existing literature shows that integrating personality traits, interest profiling, and machine learning leads to more effective and personalized career guidance systems. However, many models lack dynamic questionnaires, adaptive feedback mechanisms, or real-time support features. The proposed system addresses these gaps by combining OCEAN-based profiling, rule-based domain mapping, AI-driven refinement, detailed career roadmaps, and chatbot assistance.

IV. SYSTEM ARCHITECTURE

The system architecture of the proposed Interest-Based Career Domain Recommender Using Personality Profiling is designed to provide a seamless flow from data collection to personalized career recommendations, supported by intelligent analytics and continuous feedback refinement. The architecture is composed of several interconnected modules that work together to assess user personality traits, profile individual interests, map them to suitable career domains, and deliver structured learning pathways. Each component functions in a modular and scalable manner, ensuring efficiency, adaptability, and ease of future system upgrades.

A. User Interface (UI) Layer

The UI serves as the primary interaction point for students. It consists of intuitive screens for registration, login, questionnaire navigation, and visualization of recommended career paths. The questionnaire uses dynamic content rendering, meaning questions adapt based on user responses. The clean dashboard displays recommended domains, personality scores, interest mapping results, and roadmap suggestions. This layer communicates with backend modules through secure API requests.

B. Personality Profiling Module (OCEAN Model Processing)

This module processes user responses to psychological questions aligned with the Big Five Personality Traits (OCEAN):
Openness – creativity, curiosity
Conscientiousness – discipline, organization
Extraversion – sociability, communication
Agreeableness – cooperation, empathy
Neuroticism – emotional stability

The system assigns numerical scores to each trait using weighted scoring functions. These scores form the core psychological profile for career domain prediction. The module ensures accuracy by applying normalization, threshold mapping, and trait balancing to avoid biased outputs.

C. Interest Profiling Module

Alongside personality profiling, students answer interest-based questions that help identify their preferences in domains such as:
Technology
Business and Management

Arts and Creativity
Research and Analysis
Communication and Media
Public Service and Education

The module uses an interest vector, which quantifies student inclination toward these areas. The output of this module is combined with the personality profile to improve recommendation accuracy.

D. Rule-Based Mapping Engine

This component forms the core logic of the system. It maps personality traits and interest vectors to relevant career domains using predefined rules derived from psychological research and industry datasets.

Examples:

High Openness + strong creative interests → UI/UX Designer, Content Creator
High Conscientiousness + analytical interests → Data Analyst, Software Developer
High Extraversion + communication interests → HR Specialist, Marketing Executive

The mapping rules are stored in a modular rule repository, allowing easy updates without modifying the entire system.

E. AI-Driven Recommendation Engine

While the initial mapping uses rule-based logic, the system architecture includes machine learning models (future scope) such as:

K-Nearest Neighbors (KNN)
Logistic Regression
Decision Trees

These models analyze historical user patterns, feedback, and trait–career relationships to refine predictions. Over time, the AI component identifies deeper correlations between profiles and career outcomes, improving accuracy with each iteration.

F. Career Roadmap Resource Module

Once a career domain is selected, this module generates:
Step-by-step learning pathways
Required technical skills
Recommended soft skills
Online course links
Project ideas
Internship and placement suggestions

Each domain contains a predefined roadmap with scalable difficulty levels: Beginner → Intermediate → Advanced, enabling students to understand how to progress effectively.

G. Chatbot Support Module

The integrated chatbot enhances accessibility by answering questions related to:
Career domains
Required skills
Roadmap clarification
Course suggestions
System navigation
Using a lightweight NLP model, the chatbot guides students in real time, acting like a digital counsellor.

H. Feedback and Adaptive Learning Module

Feedback is collected from users regarding:
Accuracy of recommendations
Relevance of domain suggestions
Quality of learning resources
Clarity of roadmaps

This data is sent to a continuous improvement pipeline, which updates mapping rules and enhances future recommendations. Over time, the system becomes more personalized and accurate.

V. DISCUSSIONS

The development of the Interest-Based Career Domain Recommender System demonstrates the potential of integrating psychological profiling with modern recommendation technologies to support student career planning. The system bridges the gap between traditional counselling methods and technology-driven guidance by providing personalized, data-informed recommendations.

Through the combination of the OCEAN model and interest mapping, the system captures both behavioural

tendencies and domain preferences, leading to more reliable outcomes. Initial user responses indicate that students find the recommendations intuitive and aligned with their personal expectations, suggesting the viability of such systems in educational environments.

However, the effectiveness of the system remains influenced by the quality of user inputs and the depth of available datasets, highlighting the need for ongoing refinement and large-scale validation.

VI. SYSTEM IMPLEMENTATION

The implementation of the proposed career recommendation system was carried out using a modular, layered design to ensure smooth functionality and future scalability. The frontend interface was designed to be clean, responsive, and easy to navigate, presenting personality and interest questionnaires interactively along with dashboards showing recommended career paths.

On the backend, personality scores are computed using the Big Five (OCEAN) model through a weighted-response mechanism. Interest profiling is processed in parallel, and both outputs feed into the rule-based mapping engine. The system stores curated career roadmaps dynamically displayed when recommendations are made. A lightweight NLP-based chatbot supports student queries. All components are hosted on a cloud environment, enabling concurrent multi-user access.

VII. EXPERIMENTAL EVALUATION

An initial pilot evaluation was conducted with undergraduate learners. Participants completed personality and interest assessments, after which the system generated personalized career suggestions. Students provided feedback on recommendation accuracy, system usability, and roadmap clarity.

The responses were encouraging. Many students felt the recommendations closely matched their interests and strengths, while others discovered new career options. Roadmap visualizations were particularly appreciated for providing clear next steps.

VIII. FINDINGS AND OBSERVATION

Students were receptive to personality-based career guidance, appreciating that recommendations were not solely marks-based. Structured career roadmaps were viewed as the most valuable feature. Testing revealed that while rule-based systems offer consistency, machine learning can capture deeper personality–career relationships. Overall, the system shows strong promise as a personalized career exploration tool.

IX. FUTURE SCOPE

Future enhancements include integrating advanced machine learning models, academic performance data, skill assessments, and real-time labour market trends. Expanding chatbot intelligence, multilingual support, mobile applications, and institutional dashboards can further strengthen system impact.

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