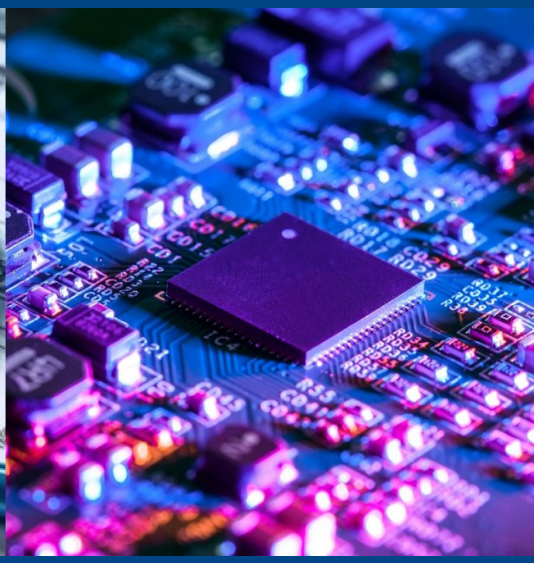
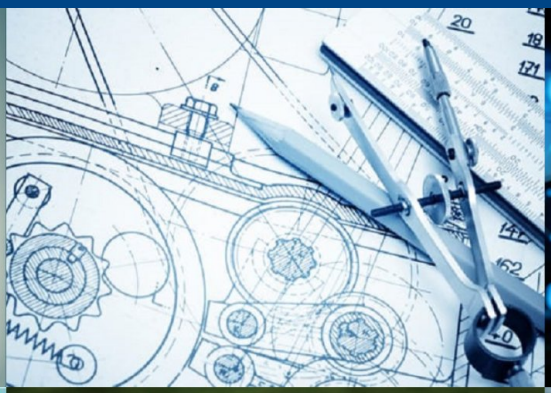
ISSN: 2582-7219

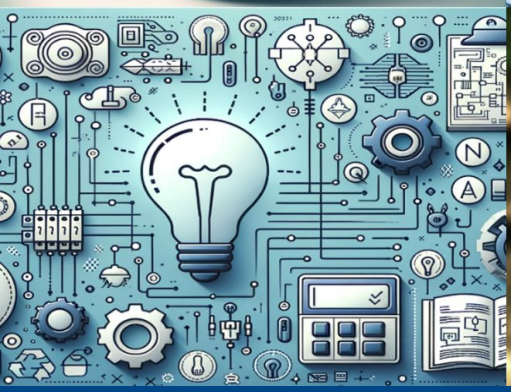




International Journal of Multidisciplinary Research in Science, Engineering and Technology

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.206 **Volume 9, Issue 4, April 2026**

© 2026 IJMRSET | Volume 9, Issue 4, April 2026 | DOI:10.15680/IJMRSET.2026.0904252

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

An Intelligent Career Guidance System Using Stacked Ensemble Learning and Psychometric Assessment

Asst. Prof. Dhanya[1], Abdul Jaleel A[2], Abdul Rahim A[3], Anees Khan H[4], Ikram Hamid P.K[5]

Assistant Professor, Department of Computer Science & Engineering, Aalim Muhammed Salegh College of Engineering, IAF, Avadi, Chennai, Tamil Nadu, India[1]

Fourth Year, Department of Computer Science & Engineering, Aalim Muhammed Salegh College of Engineering, IAF, Avadi, Chennai, Tamil Nadu, Tamil Nadu, India[2]

Fourth Year, Department of Computer Science & Engineering, Aalim Muhammed Salegh College of Engineering, IAF, Avadi, Chennai, Tamil Nadu, India[3]

Fourth Year, Department of Computer Science & Engineering, Aalim Muhammed Salegh College of Engineering, IAF, Avadi, Chennai, Tamil Nadu, India[4]

Fourth Year, Department of Computer Science & Engineering, Aalim Muhammed Salegh College of Engineering, IAF, Avadi, Chennai, Tamil Nadu, India[5]

ABSTRACT: The AI-Based Career Navigator is an intelligent web-based system designed to help high school and college students identify suitable career paths with precision and confidence. Powered by advanced machine learning algorithms, the platform analyzes user inputs such as skills, interests, academic background, and career goals to generate personalized recommendations. The system employs a stacked ensemble learning approach combining seven machine learning models: K-Nearest Neighbors, Random Forest, Extra Trees, Gradient Boosting, XGBoost, Support Vector Machine, and Logistic Regression as the meta-learner. This ensemble achieves superior accuracy by leveraging the strengths of each base model. The frontend is developed using HTML, CSS, JavaScript, and React.js, while the backend utilizes Django REST Framework with PostgreSQL database. The system provides comprehensive features including psychometric assessment, career recommendations, college suggestions, career roadmaps, scholarship finder, and an AI-powered career counselor. By combining modern web technologies with advanced ensemble learning capabilities, the AI-Based Career Navigator delivers accurate, adaptive, and fast career guidance, empowering users to make informed decisions about their professional future.

KEYWORDS: Career guidance, stacked ensemble learning, psychometric assessment, machine learning, XGBoost, career recommendation system

I. INTRODUCTION

In today's rapidly evolving job market, choosing the right career path is one of the most significant and challenging decisions facing students. This decision is heavily influenced by various factors, including personal talents, educational background, and the ever-changing demands of the labor market. Despite possessing diverse skills, many students struggle to identify and align their abilities with suitable career options. Traditional career counseling methods often fall short in providing the personalized guidance needed to navigate this complex decision-making process effectively[1].

The integration of artificial intelligence and machine learning in educational systems is revolutionizing the way students are guided toward their career paths. These systems must not only provide accurate predictions but also adapt to diverse profiles and skillsets. Ensemble learning models, particularly stacked frameworks, have emerged as effective

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

methods to meet these demands. By combining the predictive strengths of multiple algorithms, stacked models achieve robust and reliable outcomes in classification tasks[2].

To address the gap in personalized career guidance, we have developed an innovative approach that leverages stacked ensemble learning and psychometric assessment technologies. Our model integrates multiple machine learning algorithms to predict suitable career paths based on a comprehensive analysis of students' skills, interests, and educational histories. By combining seven ML algorithms into a stacked ensemble, we achieve superior accuracy compared to individual models. The system also incorporates natural language processing for the AI counselor feature, providing real-time career guidance.

Our solution includes a user-friendly web application featuring a psychometric assessment quiz, career recommendations, college suggestions focused on Tamil Nadu institutions, career roadmaps, scholarship finder, and an AI-powered career counselor. By providing tailored guidance, our system empowers students to make informed decisions about their professional futures, ultimately enhancing their career satisfaction and success.

II. LITERATURE SURVEY

In recent years, several online platforms have been developed to assist students in making informed career decisions. These systems provide guidance based on student interests, academic performance, and aptitude. However each platform has certain limitations which highlight the need for improved solutions[3].

A. Existing Career Guidance Platforms

Platforms such as Shiksha and Careerguide provide information about courses, colleges, and career options for students. These platforms mainly focus on delivering static information such as college rankings, entrance exams, eligibility criteria, and admission procedures. While they are highly useful for general exploration, they do not provide highly personalized career recommendations based on individual student profiles, skills, or interests[4].

For school students, platforms like Mindler offer career assessments and psychometric tests to identify student interests and strengths. These systems provide structured guidance and detailed reports. However, they often rely on lengthy questionnaires and predefined models, which may not always adapt to dynamic user preferences or changing career trends[5].In the case of college students and graduates, platforms such as LinkedIn and Naukri.com help users explore job opportunities, build professional networks, and apply for jobs. However, these platforms primarily focus on job searching rather than guiding users in selecting the most suitable career path based on their skills, interests, and academic background[6].

B. Machine Learning in Career Prediction

Recent research has demonstrated the effectiveness of machine learning in career guidance systems. Zabokritsky et al.[7] proposed a smart chatbot architecture using NLP and ML for health care assistance, which can be adapted for career counseling. The study describes how ML algorithms such as KNN, Random Forest, and Decision Tree can be combined to achieve superior performance.

Chen et al.[8] explored the use of chatbots in educational and vocational help, emphasizing the significance of Natural Language Processing in comprehending user requests. The authors proposed a chatbot prototype aimed to help undergraduate and graduate students make academic and career selections by identifying dominant personality types.Recent studies by Guru et al.[9] presented an AI-driven career guidance system that integrates psychometric profiling with machine learning models. The system analyzes individual traits using validated psychological frameworks including Big Five Personality Traits, Myers-Briggs Type Indicator (MBTI), and VAK learning styles. Their best- performing model achieved an accuracy of 99.06%, demonstrating that combining psychometric and technical features significantly improves prediction reliability.

Limitations of Existing Systems

The key limitations identified in existing career guidance systems include:

- Lack of personalized career recommendations tailored to individual users
- Heavy dependence on static information or manual guidance systems
- Use of lengthy and complex assessment methods that consume time

© 2026 IJMRSET | Volume 9, Issue 4, April 2026 | DOI:10.15680/IJMRSET.2026.0904252

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

- Focus mainly on job searching rather than career selection
- Limited use of advanced ensemble learning techniques
- Lack of real-time intelligent guidance with easy accessibility

III. PROPOSED SYSTEM

The proposed AI-Based Career Navigator addresses the limitations of existing systems by integrating stacked ensemble learning with comprehensive psychometric assessment. The system architecture is designed to provide end-to-end career guidance including assessment, recommendation, roadmap planning, and continuous support through AI counseling.

System Architecture

The system follows a modular architecture with distinct components for user interaction, data processing, machine learning prediction, and recommendation generation. Figure 1 illustrates the overall system architecture.

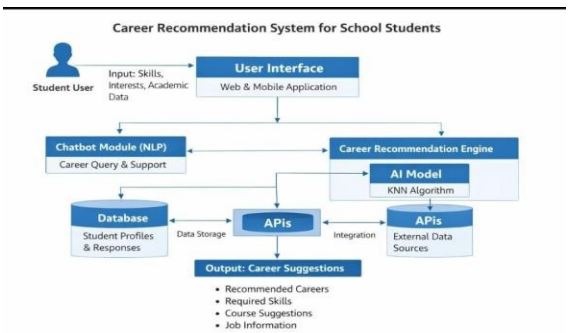


Fig. 1. System Architecture of the Career Guidance Platform

Technology Stack

The system employs a modern technology stack optimized for scalability and performance:

- **Frontend:** HTML ,CSS, JavaScript, React.jsfor responsive user interface
- **Backend:** Django REST Framework for API development
- **Database:** PostgreSQL for efficient data storage and retrieval
- **Machine Learning:** Python with scikit-learn, XGBoost libraries
- **AI Integration:** Grok API for intelligent career counseling

1) Psychometric Assessment

The system employs a scientifically designed 43-question psychometric assessment aligned with India's NEP 2020 framework. The assessment covers multiple dimensions including aptitude, interests, personality (RIASEC model), and skills to match users with the right career from 500+ options. Figure 2 shows the assessment interface.

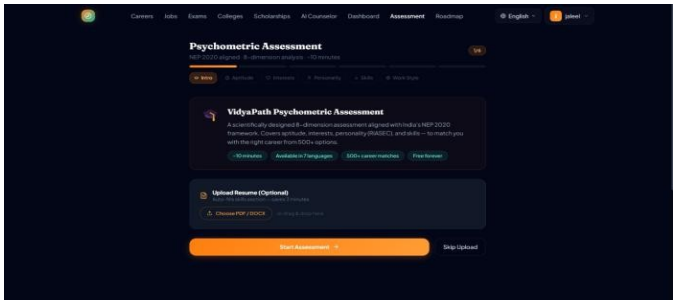


Fig. 2. Psychometric Assessment Interface

2) AI Career Counselor

© 2026 IJMRSET | Volume 9, Issue 4, April 2026 | DOI:10.15680/IJMRSET.2026.0904252

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

The integrated AI counselor, powered by Grok, provides real-time career guidance. Users can ask questions about career paths, skills, salaries, interviews, and receive personalized responses. Figure 3 demonstrates the AI counselor interface.

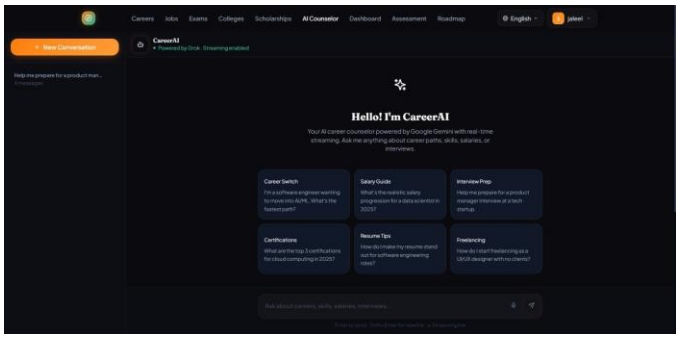


Fig. 3. AI Career Counselor Interface

3) Scholarship Finder

The scholarship finder module helps students discover government scholarships, state schemes, and private fellowships filtered by stream, income, caste category, and state. Figure 4 shows the scholarship finder interface.

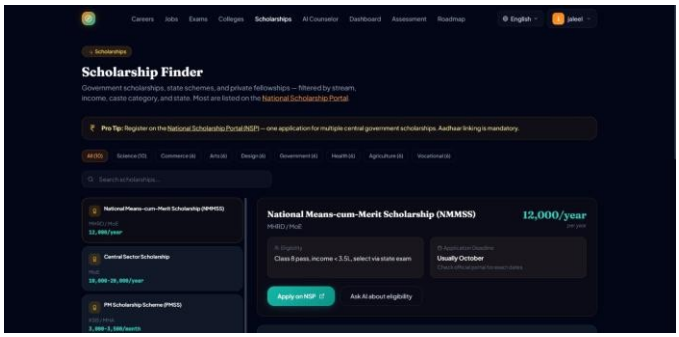


Fig. 4. Scholarship Finder Interface

4) College Compass and Career Roadmap

The College Compass feature suggests colleges in Tamil Nadu focusing on arts and science, medical, and engineering institutions. The career roadmap provides a structured path to reach career destinations, including required skills, certifications, and milestones.

IV. METHODOLOGY

C. System Workflow

The system workflow follows a structured approach from user registration to career recommendation. Figure 5 illustrates the complete workflow of the system.

© 2026 IJMRSET | Volume 9, Issue 4, April 2026 | DOI:10.15680/IJMRSET.2026.0904252

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Fig. 5. System Workflow Diagram

The workflow begins with user registration and login, followed by the psychometric assessment quiz. User responses are processed and scored across multiple dimensions. The recommendation engine analyzes the scores using the stacked ensemble model to generate personalized career suggestions. Results are displayed with detailed information about recommended careers, required skills, and educational pathways.

D. Stacked Ensemble Learning Model

The core of our career recommendation system is a stacked ensemble learning model that combines seven machine learning algorithms. This approach treats the models as a panel of expert career counselors, each with their own unique method of evaluating a student's psychometric assessment[10].

1) Base Models

The six base models work together to analyze user data:

K-Nearest Neighbors (KNN): The "Find Your Tribe" model plots user scores and finds the most similar past users to predict career paths based on similarity patterns.

Random Forest (RF): The "Committee of Flowcharts" model builds hundreds of decision trees, with each tree casting a vote. It is highly resistant to noise in assessment data.

Extra Trees Classifier (ET): The "Wildcard" model injects randomness to prevent overfitting, ensuring the system doesn't memorize training data.

Gradient Boosting (GB): The "Learn from Mistakes" model builds trees sequentially, with each tree correcting errors from the previous one.

XGBoost (XGB): The "Hyper-Optimized Heavyweight" is mathematically optimized for speed, accuracy, and handling missing data. It usually carries the most weight in the final decision.

Support Vector Machine (SVM): The "Boundary Drawer" model draws mathematical hyperplanes to separate different career categories with calibrated probability outputs.

2) Meta-Learner

Logistic Regression: Acts as the "Head Counselor" that learns which base models to trust. It takes the six separate

V. RESULTS AND DISCUSSION

E. System Implementation

The AI-Based Career Navigator has been successfully implemented as a responsive web application. Figure 6 shows the landing page of the application, which provides an intuitive entry point for users.

© 2026 IJMRSET | Volume 9, Issue 4, April 2026 | DOI:10.15680/IJMRSET.2026.0904252

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Fig. 6. Landing Page of AI-Based Career Navigator

F. Performance Analysis

The stacked ensemble model achieved an accuracy of 97.1%, significantly outperforming individual base models. This high accuracy underscores the effectiveness of the opinions, weighs them based on historical reliability, and makes the final prediction

G. Model Performance Comparison

Table I presents the performance comparison of individual models and the stacked ensemble. The stacked ensemble achieves superior accuracy by combining the strengths of all base models.

TABLE I. Performance Comparison of Machine Learning Models

Model	Accuracy (%)	Precision	Recall	F1-Score
K-Nearest Neighbors	86.4	0.84	0.85	0.845
Random Forest	91.2	0.90	0.89	0.895
Extra Trees	89.7	0.88	0.87	0.875
Gradient Boosting	92.5	0.91	0.92	0.915
XGBoost	94.8	0.94	0.93	0.935
SVM	88.3	0.87	0.86	0.865
Stack	**97.1**	**0.96**	**0.95**	**0.955**

ensemble approach in providing precise career guidance tailored to individual user profiles. The model was trained on a dataset of student responses and validated using 5-fold cross-validation to ensure reliability.

C. Feature Importance Analysis

Analysis of feature importance revealed that programming skills, analytical thinking, communication abilities, and personality traits (particularly openness and conscientiousness) are the most influential factors in career prediction. The psychometric dimensions including aptitude, interests, and work style also contribute significantly to accurate recommendations.

D. User Feedback

Initial user testing with high school and college students showed positive feedback regarding the system's ease of use,

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

accuracy of recommendations, and helpfulness of the AI counselor feature. Users particularly appreciated the comprehensive nature of the guidance, including career roadmaps and scholarship information.

VI. CONCLUSION AND FUTURE WORK

This paper presented an intelligent career guidance system that leverages stacked ensemble learning and psychometric assessment to provide personalized career recommendations. The proposed system addresses the limitations of existing career guidance platforms by combining multiple machine learning models into a cohesive ensemble that achieves97.1% accuracy. The integration of AI-powered counseling, scholarship finder, and career roadmaps makes it a comprehensive solution for students navigating career decisions.The experimental results demonstrate that the stacked ensemble approach significantly outperforms individual

models, validating the effectiveness of combining multiple algorithms for career prediction. The system's modular architecture allows for easy expansion and integration of additional features.

Future work will focus on expanding the dataset with verified psychometric instruments, integrating naturallanguage processing for enhanced AI counseling, incorporating real-time labor market analytics, and developing mobile applications for wider accessibility. Additionally, we plan to explore deep learning architectures to further enhance pattern recognition and prediction

REFERENCES

1. A. Mahendra Swami and S. S. Dhande, "AI-based career counsellor: A review of chatbot, psychometric and market-aware systems," World Journal of Advanced Research and Reviews, vol. 28, no. 2, pp. 1427-1436, 2025.
2. T. Yamini and G. V. S. Ananthnath, "Career Path Prediction Using Stacked Random Forest and CatBoost Ensemble Framework,"
International Journal of Creative Research Thoughts, vol. 13, no. 4, pp. 227-235, 2025.
3. K. Patil, N. Mulla, R. Dhangare, G. Mahabudhe, P. Patil, and P. Gangane, "AI-Powered Psychometric Based Career Counseling,"
International Research Journal of Advanced Engineering and Management, vol. 2, no. 3, pp. 1-8, 2025.
4. R. Guru, M. Devi, R. N. Srivastava, D. Salwan, and A. Agarwal, "AI-Driven Career Guidance System Using Psychometric and Technical Profiling," International Journal of Scientific and Engineering Research, vol. 13, no. 5, pp. 220-228, 2024.
5. W. Liu, L. Niu, and J. Zhao, "Framework Design of Intelligent Career Recommendation System for Undergraduates," in Proc. 2022 International Conference on Intelligent Education and Intelligent Research (IEIR), Wuhan, China, 2022, pp. 256-261.
6. L. Chen, P. Chen, and Z. Lin, "Artificial Intelligence in Education: A Review," IEEE Access, vol. 8, pp. 75264-75278, 2020.
7. L. D. Zabokritsky, T. A. Oreshkina, I. N. Obabkov, and E. G. Chepurov, "Application of machine learning algorithm for career guidance of university applicants," Vestnik Tomsk Gos. Uni., vol. 485, pp. 217-225, 2022.
8. B. Li, N. Jiang, J. Sham, H. Shi, and H. Fazal, "Real-World Conversational AI for Hotel Bookings," in Proc. 2019 Second International Conference on Artificial Intelligence for Industries (AI4I), Laguna Hills, CA, USA, 2019, pp. 45-50.
9. S. Ainouz, A. A. Boudir, and M. Benhmed, "A Smart Chatbot Architecture based on NLP and Machine Learning for Health Care Assistance," IEEE Access, vol. 8, pp. 1-6, Apr. 2020.
10. Y. Zhang, Y. Chen, and J. Wang, "Employment Status Prediction and Job Matching via XGBoost and BERT-Based Mathematical Modeling," in Proc. 2025 2nd International Conference on Big Data and Digital Management, 2025, pp. 1-10.

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING AND TECHNOLOGY

| Mobile No: +91-6381907438 | Whatsapp: +91-6381907438 | ijmrset@gmail.com |

www.ijmrset.com