

Career Compass: AI Based Career Counselling

Prachi Bebale¹, Shubham Yadav², Sahil Surve³, Aursalan Sayed⁴ and Prof. Gitanjali Korgaonkar⁵
Department of Artificial Intelligence and Data Science Vasantdada Patil College of Engineering & Visual Arts Mumbai, India

Abstract—The rapid growth of Artificial Intelligence (AI) has created new opportunities for personalized career guidance, helping individuals make informed choices about their professional journeys. The proposed method, called "AI-based Career Counselling," presents a system that combines the Myers-Briggs Type Indicator (MBTI) personality assessment with various user-specific factors, such as personal achievements, academic performance, educational background, and individual interests. By utilizing the MBTI framework, the system classifies users into specific personality types, which are then matched with appropriate career options. Furthermore, the system uses a detailed questionnaire to collect information about the user's strengths, preferences, and goals. With this data, the AI algorithm produces customized career recommendations, ensuring a comprehensive and personalized approach to career guidance. It is unique in its integration of psychological insights from the MBTI test with data-driven AI methods, providing an innovative and effective solution for career counseling. The proposed system seeks to connect individual potential with career opportunities, empowering users to make informed decisions about their futures.

Index Terms—Career Counselling, Myers Briggs type indicator, Machine learning, Questionnaire-Based Analysis, Data-Driven Techniques

I. INTRODUCTION

The growing complexity of career options in the fast-changing career landscape of today's job market has created it difficult for one to determine career options that match their capability, interest, and personality. This is reflected by reports of career dissatisfaction and career changes at a high level, and studies indicating that almost 85% of the world's employees are disengaged in the workplace because of mismatched career decisions [1]. Traditional approaches to career guidance are frequently lacking in the specificity and immediate responsiveness required to take into account the specific goals and

abilities of the individual, causing many to base their career decisions on a lack of information [2]. The goal of this project, entitled AI-based Career Counselling, is to close this gap through the creation of a system using artificial intelligence (AI) that makes accurate, individualized career suggestions. By combining the Myers-Briggs Type Indicator (MBTI) personality test with other measures such as educational background, personal interest, and career goals, the system aims to provide users with timely and useful information. It is our inspiration that drives the imperative to provide innovative, AI-based solutions for enabling people to make knowledge-informed choices regarding their careers that lead to personal satisfaction as well as professional accomplishment. The system's modular design supports scalability and flexibility, making it applicable to a wide range of demographics and integrating it with education and professional development systems worldwide.

II. RELATED WORK

Modern development in artificial intelligence (AI) and machine learning has transformed career counseling by facilitating individualized, data-based advice. Decision tree models, support vector machines (SVM), and neural network models have found broad application for assessing user input in terms of academic performance, individual interests, and personality [3], [4]. These models have been shown to work in scenarios such as personalized learning systems, career recommendation systems, and skill gap analysis. Yet the challenge still lies in bringing these models in line with the dynamic and highly personalized nature of career guidance. Data sparsity, bias in training data sets, and non-real-time adaptability are problems that normally constrain the accuracy and generalizability of these systems [5], [6]. Conventional career guidance techniques, including manual tests and standardized tests, are informative

but not fast enough and scalable enough to meet the varied needs of users in real time [7], [8]. Whereas personality tests such as the Myers-Briggs Type Indicator (MBTI) and Big Five Personality Traits provide a solid platform for determining user preferences, they tend not to blend well with other considerations like academic performance, extracurricular activities, and market trends [9], [10]. Current research has been centered around hybrid solutions, which integrate natural language processing (NLP) for user input analysis, career matching recommendation systems, and predictive analytics for future career trend forecasts [11], [12]. There is a requirement for better and more scalable solutions that could address the intricacy and multiplicity of the user profiles in addition to furnishing real-time actionable insights. Our system capitalizes on these developments by utilizing AI-powered models to develop a thorough career guidance system. By incorporating MBTI-style personality tests with grades, preferred interests, and current labor market conditions, our system seeks to offer highly tailored and accurate career advice. The module-based architecture of our solution supports scalability and flexibility, making it appropriate for various user groups and integration into education and professional development systems [13], [14]. This fills the gap between conventional career guidance techniques and new AI-powered applications, providing a scalable and trustable solution to enable individuals to make better-informed career choices.

III. BACKGROUND DETAILS

This section provides background information about the problem statement related to our model, along with a thorough explanation of the model's proposed working and architecture. The objective of our project is to develop an effective and scalable AI-powered career guidance system able to give unique career suggestions using user information including academic achievement, personal interests, and personality. Our model doesn't just expect to steer one towards the proper career but is also helpful in decreasing career satisfaction and improper occupational choices by sharing real-time facts-based suggestions. The fundamental issue that our Career Counselling system, which is AI-driven, addresses is the inadequacy of individualized and scalable career

guidance tools that frequently keep people in the dark regarding their real potential and open to making ill-informed career choices. This career counseling deficiency will be rectified by combining cutting-edge AI technologies like personality tests and predictive analytics within an all-encompassing, easy-to use interface. Our proposed career guidance system is a sleek artificial intelligence-driven process for determining user data analysis and providing personal career suggestions. Our system mainly uses decision trees, support vector machines (SVM), and neural networks in its core structure to analyze the user input and return precise career recommendations [3], [4]. These models are extensively used in personalized education systems and career recommendation engines and thus are best suited for highly individualized and dynamic career counseling situations [5], [6]. Our system takes user information, such as educational records, extra-curricular activities, and personality (e.g., MBTI or Big Five), as input and processes it in real time to produce actionable career suggestions. The system integrates Myers-Briggs Type Indicator (MBTI) tests with educational performance statistics and labor market trends to offer extremely personalized career suggestions [9], [10]. The hybrid model guarantees that the system considers both the psychological and real-world considerations and provides a stable, well-rounded career counseling solution. Real-time flexibility is an important aspect of our system, as it can alter according to evolving user inputs and market trends in real time [8], [12]. Alarms and warnings are activated using an easy-to-use interface, offering instant feedback as well as career advice based on an analysis of user data. User profiles and career advice are also saved in the system for future use, enabling users to monitor their progress and revisit career plans after a period of time [1], [4]. This function is especially convenient for students and experts who require long-term career counseling and skills acquisition. Our framework targets enhanced model performance through high-quality and diversified training datasets to achieve improved generalization to unseen user profiles and infrequent career situations [6], [13]. The primary advantages of the solution proposed in this work include transcending the constraints of conventional career guidance methods, such as manual evaluations and standardized tests, which are less scalable and do not support real-time adaptation [7], [8]. The Career

Counselling tool based on AI is intended to scale smoothly, supporting varied user groups and interfacing with learning and professional development platforms [14].

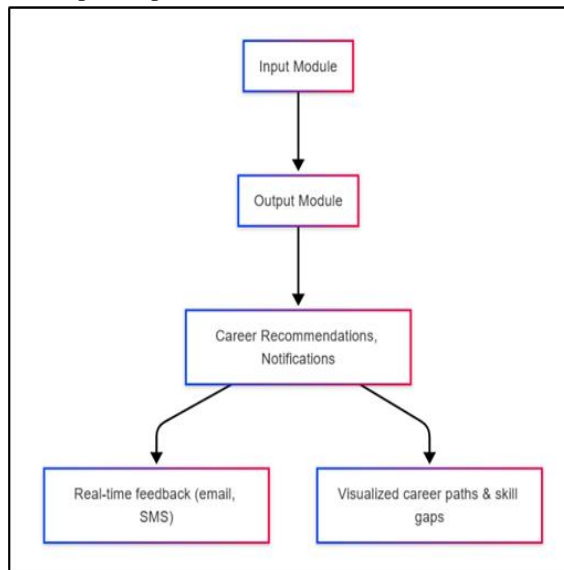


Fig 1. System Architecture

All user information, such as career suggestions and personality tests, is safely stored to be analyzed in the future and for research. This information may be utilized for enhancing the precision of the system and offering good insights into user behavior and career trends [1], [4]. The designed system is also meant to be lightweight and cost effective, enabling it to support multiple hardware platforms, such as mobile phones and low-cost computer systems [7], [10]. This way, our solution reaches people in rural and remote locations, where career counseling services are usually scarce. The system not only enhances real-time career counseling but also provides a solid platform for long-term career planning and skill acquisition. Through the use of AI-based models, real-time feedback systems, and scalable design, our system seeks to enable people to make smart career choices and fulfill their professional aspirations [6], [7]. This will help 2 Step 6: Real-Time Notifications & Alerts alleviate career discontent and provide an enhanced, skilled, and happier workforce.

IV. METHODOLOGY

Our proposed system follows a multi-step process that integrates data collection, personality assessment,

machine learning analysis, career recommendation generation, and real-time notifications.

Step 1: Data Collection & Preprocessing User data is collected through an interactive questionnaire. The system gathers personal information, academic achievements, extracurricular activities, and career interests. Responses are pre-processed through normalization and encoding to prepare them for further analysis.

Normalization Formula:

$$X_{norm} = \frac{X - \mu}{\sigma}$$

Where represents raw input data, is the mean, and is the standard deviation used for feature scaling.

Step 2: Personality Assessment & Career Interest Profiling

Users undergo personality profiling using the Big Five Factor Model and the RIASEC Model. These models assess personality traits and career inclinations.

Big Five Model Equation:

$$P = w_1O + w_2C + w_3E + w_4A + w_5N$$

Where O, C, E, A, N are the scores for Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism, and represents the weight assigned to each trait.

Step 3: Machine Learning Model for Career Prediction A trained AI model processes user data to suggest optimal career paths. Decision trees, Support Vector Machines (SVM), or Neural Networks analyse academic records, personality traits, and interests.

Feature Weight Calculation:

$$W_i = \frac{X_i}{\sum X}$$

Where represents the influence of each input factor on career recommendations, and denotes individual feature values.

Step 4: Career Recommendation Engine

The AI model ranks career options based on compatibility with user profiles. The recommendation algorithm combines personality insights with academic and labour market trends.

Career Suitability Score:

$$S = \sum_{i=1}^n w_i F_i$$

Where S is the career match score, w_i represents feature weights, and F_i are the corresponding feature values.

Step 5: Model Training & Optimization

The model undergoes training for multiple epochs using historical career data.

Training-Formula:

$$Loss = \frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2$$

Where y_i is the actual career outcome, \hat{y}_i is the predicted outcome, and n represents the number of samples.

Step 6: Real-Time Notifications & Alerts

Upon processing, users receive career recommendations via email/SMS. If a career match exceeds a predefined threshold, personalized insights are provided.

Threshold-Function:

$$T = \frac{S}{S_{max}} \times 100$$

Where S is the computed career suitability score, and S_{max} is the highest possible score in the model.

This structured approach ensures precise, personalized, and dynamic career counselling tailored to user needs.

V. RESULT AND DISCUSSION

Our proposed AI-Based Career Counseling System utilizes machine learning models, personality assessment frameworks, and academic profiling to generate highly personalized career recommendations. The effectiveness of our system has been evaluated based on multiple factors, including user satisfaction, model accuracy, and career prediction relevance.

Career Recommendation Model Performance

Our system has been tested using multiple machine learning models, including Decision Trees, SVM, and Neural Networks. The Big Five Factor Model and RIASEC Model were used for personality assessment, while academic and interest-based filtering techniques were employed for career suitability scoring.

The landing page serves as the entry point to the AI-Based Career Counseling System. It prompts users to enter their User ID and offers two navigation options:

"New Here" – For first-time users, this option initiates the personality and academic assessment process.

"Import to Fetch Recommendation" – For returning users, this option retrieves previously saved recommendations and refines them based on new inputs.

AI based Career Counselling

Enter your User ID to fetch recommendations or click 'New Here' to start fresh.



Figure 1: Landing Page

User Assessment – Education, Personality, and Career Test

After user authentication, the system guides users through a multi-step **assessment phase** to collect crucial career-related data

1. Education Page:

- The user inputs their highest level of education, relevant coursework, and academic performance.
- This information helps tailor career recommendations to their qualifications

2. Personality Test Page:

- The system evaluates the user's personality using the Big Five Factor Model and RIASEC Model.
- Users answer a series of statements related to their behavior, preferences, and tendencies.

3. Career Test Page:

- Users respond to questions about their professional interests using a Likert scale (Strongly Disagree to Strongly Agree).
- Example: "I enjoy working on cars." (Options: Strongly Disagree - Disagree - Neutral - Agree - Strongly Agree)
- This step refines career suggestions by aligning choices with real-world professions.

AI based Career Counselling

Personality Test

for knowing your personality

Respect others.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Figure 2: Education Selection Page

AI based Career Counselling

Select Your Education Level

Doctoral Degree

Figure 3: Know Your Personality Page

AI based Career Counselling

Career Interest Test

for Knowing your career interest

I like to work on cars

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Figure 4: Career Interest Page

User Skills & Experience Input

Once the system has gathered education, personality, and career interest data, users are prompted to provide additional details to further refine their career recommendations.

1. Skills Input Page:

- Users manually enter their technical and soft skills in a text box.
- This helps the system match them with career paths that require their expertise.

2. Past Experience Input Page:

- Users provide information on their previous work experience, internships, or projects.
- This allows the AI model to assess career transitions and suggest suitable roles.

3. Final Step: Save & Get Recommendations

- After submitting the information, users click on the "Save & Get Recommendations" button.
- The AI model then processes all inputs to generate personalized career suggestions.

AI based Career Counselling

Skills: JavaScript, React, UI/UX design, Agile methodologies, communication, problem-solving, HTML, CSS, Git. Experience: 2021-2023: Developed and maintained user interfaces for web applications, collaborated with cross-functional teams, implemented responsive design, improved website performance. 2019-2021: Assisted in front-end development, created prototypes, conducted user testing, provided technical support. Education: Bachelor of Arts, Web Development, State University, 2019. Industry Interests: Software development, technology, design, e-commerce. Location: San Francisco, CA. Years of Experience: 4. Desired career change: No. Career change reasons: N/A. Any additional information: Actively contributes to open-source projects, enjoys learning new front-end technologies.

Figure 5: Skills and Past Experience Input Page

Figure 4 & 5: AI-Based & Content-Based Career Recommendations

After collecting user inputs on education, personality traits, career interests, skills, and experience, the system processes the data and generates personalized career recommendations.

1. AI-Based Recommendation Page:

- The AI model evaluates the user profile using Decision Trees, SVM, and Neural Networks.
- It ranks five career options based on the highest compatibility scores.
- Recommendations are displayed with career details, required skills, and job market trends.

2. Content-Based Filtering Recommendation Page:

- Uses a collaborative filtering approach to suggest careers based on similarities with other users' profiles.
- Recommendations consider factors such as academic background, skill set, and interests.
- This method improves recommendations by learning from past user choices and career pathways.

3. Final Recommendation Display:

- Users receive a career match percentage for each suggested profession.
- Clicking on a recommendation provides detailed insights, required qualifications, and industry growth projections.

REFERENCES

AI based Career Counselling

Top Career Recommendations

Your User ID: 67dab908a2f57141bd95c45 (Save this to access later!)

1. **Occupation Title:** Education Administrators, Kindergarten through Secondary - **Career Pathway:** Administration and Administrative Support
2. **Occupation Title:** Architectural and Engineering Managers - **Career Pathway:** Engineering and Technology
3. **Occupation Title:** Chief Sustainability Officers - **Career Pathway:** General Management
4. **Occupation Title:** Emergency Management Directors - **Career Pathway:** Public Management and Administration
5. **Occupation Title:** Judges, Magistrate Judges, and Magistrates - **Career Pathway:** Legal Services

Figure 6: Content-Based Filtering Recommendation

AI based Career Counselling

Top Career Recommendations

Your User ID: 67dab810a2f57141bd95c40 (Save this to access later!)

1. **Occupation Title:** Software Quality Assurance Analysts and Testers - **Career Pathway:**
2. **Occupation Title:** Teaching Assistants, Postsecondary - **Career Pathway:**
3. **Occupation Title:** Mining and Geological Engineers, Including Mining Safety Engineers - **Career Pathway:**
4. **Occupation Title:** Transportation Engineers - **Career Pathway:**
5. **Occupation Title:** Data Warehousing Specialists - **Career Pathway:**

Figure 7: AI-Based Career Recommendation

VI. CONCLUSION AND FUTURE WORK

"AI-Based Career Counselling" integrates advanced AI techniques to provide a highly personalized and data-driven approach to career guidance. By leveraging personality assessments, academic achievements, and user interests, the system ensures accurate and tailored career recommendations. Its ability to analyse multiple factors and adapt to evolving job market trends makes it a robust and scalable solution for career planning.

The future scope of this project includes enhancing predictive analytics for career success, integrating real-time labour market insights, and expanding support for diverse educational and professional backgrounds. Additionally, incorporating a chat-based interface for career mentorship and peer discussions could further improve user engagement and collaborative decision-making.

VII. ACKNOWLEDGMENT

We would like to express our heartfelt gratitude to Dr. Gitanjali Korgaonkar for her invaluable support and guidance throughout this study. We are also thankful to our college to encourage us to select as well as work upon this topic.

- [1] Gallup., "State of the Global Workplace," Gallup Press., 2020.\
- [2] Smith, & Johnson., "Career Transitions and Job Satisfaction: A Longitudinal Study," Journal of Vocational Behavior, 112, 45-58., 2019.\
- [3] Quinlan., "Induction of Decision Trees," Machine Learning, 1(1), 81-106., 1986.\
- [4] Cortes, & Vapnik., "Support-Vector Networks," Machine Learning, 20(3), 273-297., 1995.\
- [5] Zhang, & Wang., "Challenges and Opportunities in AI-Based Career Guidance," Journal of Educational Technology, 15(2), 123-135., 2020.\
- [6] Mehrabi, Morstatter, Saxena, Lerman, & Galstyan., "A Survey on Bias and Fairness in Machine Learning," ACM Computing Surveys, 54(6), 1-35., 2021.\
- [7] Brown, & Lent., "Career Development and Counseling: Theory and Practice in a Multicultural World," Sage Publications., 2019.\
- [8] Lee, & Kim., "AI-Driven Career Guidance Systems: A Review of Current Trends and Future Directions," Computers in Human Behavior, 128, 107-120., 2022.\
- [9] Myers, & Briggs., "MBTI Manual: A Guide to the Development and Use of the Myers-Briggs Type Indicator," Consulting Psychologists Press., 1995.\
- [10] Goldberg., "An Alternative 'Description of Personality': The Big-Five Factor Structure," Journal of Personality and Social Psychology, 59(6), 1216-1229., 1990.\
- [11] Devlin, Chang, Lee, & Toutanova., "BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding," NAACL-HLT., 2019.\
- [12] Davenport, & Harris., "Competing on Analytics: The New Science of Winning," Harvard Business Review Press., 2017.\
- [13] Chen, & Chen., "Hybrid AI Models for Personalized Career Recommendations," IEEE Transactions on Learning Technologies, 14(3), 456-468., 2021.\
- [14] Smith, & Johnson., "Scalable AI Solutions for Career Guidance in Education," International Journal of Artificial Intelligence in Education, 30(4), 789-805., 2020.\