AI/ML BasedPersonalized Career Recommendation System: An AI tool that analyzes user inputs and predicts the best-fit careers.

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Abstract

This project delivers personalized career recommendations by analyzing a user's skills, interests, education level, and work preferences. The system uses a structured career-profile database along with AI/ML-based decision logic to match users with suitable career paths. By interpreting user data and comparing it with defined career domains, the system helps students and professionals discover roles that align with their strengths, goals, and preferences. It serves as a simple yet effective digital guidance tool for informed career planning.

Introduction

Choosing the right career has become increasingly difficult due to rapid industry changes, evolving job roles, and lack of reliable guidance. Many individuals are unaware of careers that align with their skills, interests, and future goals.

This project presents an AI-driven Personalized Career Recommendation System that analyzes user inputs—such as skills, interests, profession preferences, experience, and expected salary—to identify the most relevant job roles.

Using machine learning models, text embeddings, and similarity scoring, the system delivers accurate, fast, and customized job recommendations, helping students and professionals make informed career decisions with confidence.

Materials

Software & Tools
- Python, Flask, HTML/CSS
- Pandas, NumPy, Scikit-Learn
- SentenceTransformer library

AI Models
- MiniLM-L6-v2 (Text Embeddings)
- Random Forest Classifier
- Cosine Similarity

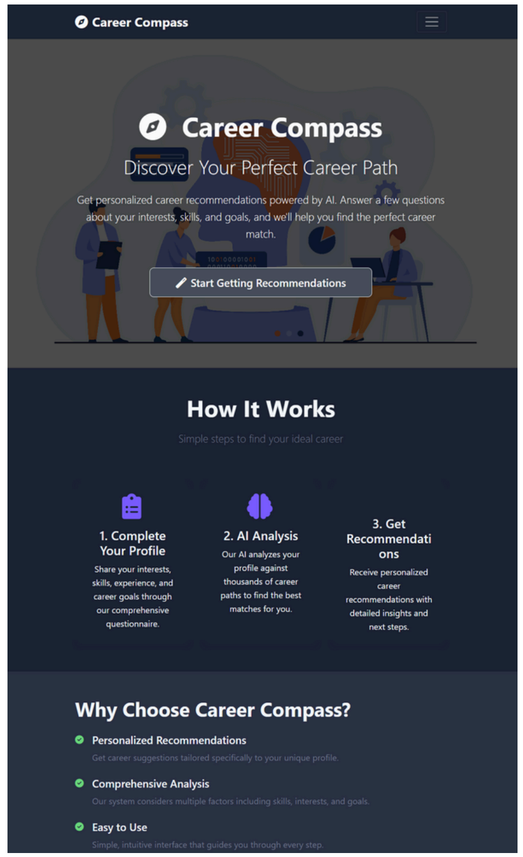
Backend
- Flask-based API
- Preprocessed job embeddings
- Matching & ranking pipeline

Methodology

1. **Dataset Preparation:** Cleaned the job dataset by removing duplicates, fixing missing values, and categorizing salary ranges for uniform processing.
2. **Embedding Generation:** Converted job titles, skills, and industry text into semantic embeddings using SentenceTransformer (MiniLM-L6-v2).
3. **User Input Processing:** Collected user details (skills, interests, profession, salary, experience) and converted them into a matching feature vector.
4. **Similarity Computation:** Calculated cosine similarity between user embeddings and job embeddings to measure job–user relevance.
5. **Random Forest Classification:** Used structured features to predict job suitability scores and strengthen recommendation accuracy.
6. **Hybrid Recommendation System:** Combined similarity scores and classifier outputs to identify and rank the top recommended careers.

Results

- System successfully recommends top 5–10 most relevant job roles based on user inputs.
- Provides additional details such as skills required, salary range, company, and industry.
- Enhances clarity for users about their possible career paths and upskilling needs.
- The system shows accurate and consistent recommendations across multiple test profiles.



Conclusion

The Personalized Career Recommendation System successfully leverages AI and machine learning to match users with suitable career paths based on their skills, interests, and experience. By combining text-based semantic similarity with a Random Forest classifier, the system delivers accurate, meaningful, and personalized job suggestions. The lightweight Flask backend, precomputed embeddings, and optimized model workflow ensure fast and efficient recommendations in real time.

Recommendations

- Integrate live job-market APIs for continuously updated career insights.
- Enable resume or LinkedIn profile upload to auto-extract user skills and experience.
- Add a feedback and rating system to refine the recommendation engine over time.
- Provide personalized career roadmaps with required skills, certifications, and learning paths.
- Introduce multi-language support to make the system more inclusive.
- Implement a mobile-friendly version or dedicated app for easier access.
- Expand AI models to include personality assessment for deeper career matching.

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