

AI BASED CAREER GUIDANCE SYSTEM USING ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

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ABSTRACT

The AI-Based Career Guidance System is an intelligent platform that bridges the gap between academic learning and industry requirements. It uses Machine Learning (ML) and Natural Language Processing (NLP) to analyze a user's academic performance, skills,

Unlike traditional career guidance systems, this project includes a recommendation engine that identifies skill gaps and suggests relevant learning resources.

In today's rapidly evolving job market, traditional methods are often outdated, subjective, and lack real-time insights.

This system provides a data-driven, personalized solution for career prediction and skill development, helping students and professionals make informed career decisions.

KEYWORDS and psychometric traits to recor

- Artificial Intelligence (AI)
- Machine Learning (ML)
- Career Prediction
- Natural Language Processing (NLP)
- Recommendation System

1. INTRODUCTION

The AI-Based Career Guidance System is designed to help students and job seekers choose the right career path using modern technology.

In today's fast-changing world, selecting a suitable career has become difficult due to the wide range of options and lack of proper guidance.

This system uses Artificial Intelligence (AI) and Machine Learning (ML) to analyze a user's academic performance, skills, and interests. It also applies Natural Language Processing (NLP) to extract information from resumes. Based on this data, the system predicts the most suitable career options.

Unlike traditional career counseling methods, this system provides personalized recommendations and identifies skill gaps, helping users understand what they need to improve. It also suggests learning resources to achieve their career goals.

Overall, the system aims to make career decision-making easier, smarter, and more accurate through a data-driven approach.

2. EXISTING SYSTEM

The existing career guidance system mainly relies on traditional methods such as standardized tests, personality

assessment, and manual counseling by experts. These approaches provide basic guidance but are often time-consuming, require significant resources, and are not easily accessible to all students.

One of the major drawbacks is the lack of personalization. These systems usually offer general career recommendations that may not align with an individual's interests, skills, or evolving goals. Additionally, they do not consider current job market trends, which can lead to poor career choices.

Furthermore, accessibility and scalability remain key challenges. Many students, especially in rural areas, do not have access to professional career counselors.

Even when available, it is difficult to provide personalized guidance to a large number of students, making the system less effective.

3. PROPOSED SYSTEM

To overcome the limitations of traditional career guidance methods, the proposed system introduces an AI-Based Career Guidance System that provides personalized career recommendations using Machine Learning. It collects user inputs such as interests, skills, education, and personality traits.

The system analyzes this data and predicts suitable career paths with high accuracy. It also includes features like resume analysis, chatbot support, and career roadmap generation.

Additionally, it provides information about required skills, job trends, and salary details, helping students make informed career decisions. Thus, the proposed system offers a smart, efficient, and scalable solution for modern career guidance.

4. LITERATURE REVIEW

Introduction to Literature Review:

The literature survey is a critical phase of the project that involves the study of existing methodologies, research papers, and industrial standards in the field of Career Guidance and Artificial Intelligence. The objective is to identify the strengths and weaknesses of current systems and to find a "research gap" that our proposed AI-based system will fill.

Review of Existing Methodologies:

Paper1:"A Machine Learning

Approach to Career Prediction" (2022)

- **Authors:** R. Kumar et al.
- **Key Findings:** This research focused on using supervised learning to predict job roles for engineering students. The researchers used a dataset of 5,000 students and tested multiple algorithms, including Support Vector Machines (SVM) and Decision Trees
- **Observations:** The study concluded that while SVM provided a high accuracy of 82%, it was computationally expensive when the number of features increased.
- **Gap Identified:** The system did not include a "Learning Roadmap"—it only predicted the job role but did not tell the student how to reach it.

Paper 2: "NLP-Based Resume Parsing for Automated Recruitment" (2023)

- **Authors:** S. Gupta and J. Miller
- **Key Findings:** This paper explored the use of Named Entity Recognition (NER) to extract skills from resumes. By using the SpaCy library, the authors were able to identify "entities" like Python, Java, and SQL from unstructured PDF text.
- **Observations:** The research proved that automated parsing is 70% faster than manual entry and reduces errors by 40%.
- **Gap Identified:** The paper focused only on the recruiter's side (hiring) and did not use the extracted skills to guide the

5. METHODOLOGY

The proposed AI-Based Career Guidance System follows a systematic approach to provide accurate and personalized career recommendations.

1. Data Collection

The system collects user inputs such as education, skills, interests, personality traits,

and experience through a user interface. Additionally, resumes can be uploaded for extracting detailed information automatically.

2. Data Preprocessing

The collected data is processed by: Converting categories to numerical values
Handling missing values
Normalizing data for better model performance

3. Resume Parsing (NLP)

Using Natural Language Processing (NLP) techniques, the system extracts important details like skills, certifications, and projects from resumes. This reduces manual effort and improves accuracy.

4. Model Training

A Machine Learning model (Random Forest Classifier) is trained using a dataset of career profiles. The dataset is divided into training and testing sets to improve prediction accuracy.

5. Career Prediction

The trained model analyzes user inputs and predicts suitable career options. Multiple decision trees generate predictions. Final output is based on majority voting. Confidence score is calculated.

6. Skill Gap Analysis

The system compares user skills with industry requirements to identify missing skills and areas for improvement.

7. Recommendation & Roadmap Generation

Based on the analysis, the system: • Suggests the best career path

- Provides a step-by-step learning roadmap
- Recommends courses and resources to achieve the goal
- student's career growth.

8. Result Display

Finally, the system displays: • Predicted career options • Confidence scores • Required skills and roadmap through an interactive web interface.

6. SYSTEM ARCHITECTURE

The AI-Based Career Guidance System follows a multi-tier architecture consisting of three main layers:

1. Presentation Layer (User Interface)

This is the front-end of the system where users interact.

- User registration and login • education

- Resume upload

- Display of career results and roadmap

2. Application Layer (Processing / Logic Layer)

This is the core layer where all processing happens.

- Resume Parser Module

Uses NLP to extract skills from resumes

- Machine Learning

Uses Random Forest algorithm to predict career

- Recommendation Engine

Suggests career paths and learning roadmap

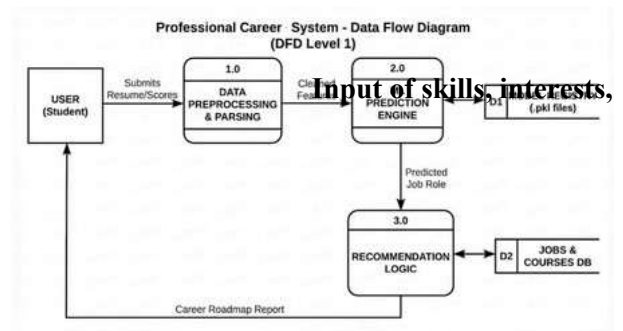
- Chatbot Module

Provides user support and answers queries

3. Data Layer (Storage Layer)

This layer stores all system data.

- User details and profiles • Career datasets
- Skills and job roles
- Course and learning resources



7. ALGORITHM USED

Algorithm Used: Random Forest Classifier

Random Forest Algorithm is a supervised machine learning algorithm used for classification tasks. It works by creating multiple decision trees and combining their results to improve accuracy and reduce overfitting.

working of algorithm

1. Data Connection:

User inputs: interests, skills, education, personality, experience

2. Data Processing:

- Convert categorical data into numerical form
- Handle missing values
- Normalize data if required

3. Model Training:

- Dataset is split into training & testing data
- Multiple decision trees are created using random subsets

4. Prediction Process :

- Each decision tree gives a career prediction
- Final output is based on majority voting

5. Output Generation: :

- Best career option is predicted
- Confidence score is calculated

8. IMPLEMENTATION

The system is implemented using modern technologies for efficient performance and accurate career prediction.

- **Frontend (Flask / Streamlit):**

Provides an interactive user interface with components for user registration, login, data input, resume upload, and result display.

- **Backend (Python):**

Handles application logic, data processing, and integration of machine learning models. It manages API requests, authentication, and system operations.

- **Machine Learning Model (Random Forest):**

Used for predicting suitable career paths based on user inputs such as skills, interests, and education. The model is trained using a dataset and provides predictions with confidence scores.

- **Resume Analyzer (NLP):**

Extracts important information like skills, certifications, and experience from uploaded resumes using Natural Language Processing techniques.

- **Database (CSV / SQLite / JSON):** Stores user data, career datasets, prediction results, and course details in a structured format.

- **API Integration:**

REST APIs are used for communication between frontend and backend for prediction, resume analysis, and chatbot responses.

- **Security Features:**

1. User authentication (login/signup)
2. Secure data handling
3. Session management

9. RESULT AND DISCUSSION

The implementation of the AI-Based Career Guidance System shows significant improvement over traditional career guidance methods. The system successfully analyzes user inputs such as skills, interests, education, and resume data to provide accurate and personalized career recommendations.

The use of the Random Forest

Machine Learning algorithm enables the system to predict suitable career paths with high accuracy and generate confidence scores. Compared to manual counseling methods, the system provides faster and more consistent results.

The integration of Natural Language Processing (NLP) for resume analysis improves the quality of predictions by extracting relevant skills and experience automatically. This reduces manual effort and minimizes errors in data entry.

The system also performs skill gap analysis, helping users understand the difference between their current skills and industry requirements. Based on this, it generates a clear and structured career roadmap, guiding users step-by-step towards their desired career.

Additional features such as chatbot support, data visualization, and user-friendly interface enhance the overall user experience. The system is capable of handling multiple users efficiently, making it scalable and accessible.

Overall, the AI-Based Career

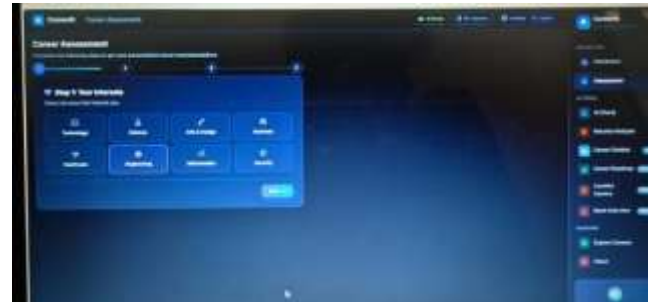
Guidance System proves to be a reliable, efficient, and intelligent solution for career decision-making, providing accurate guidance and improving user confidence in choosing the right career path.

10. OUTPUT SCREENSHOTS

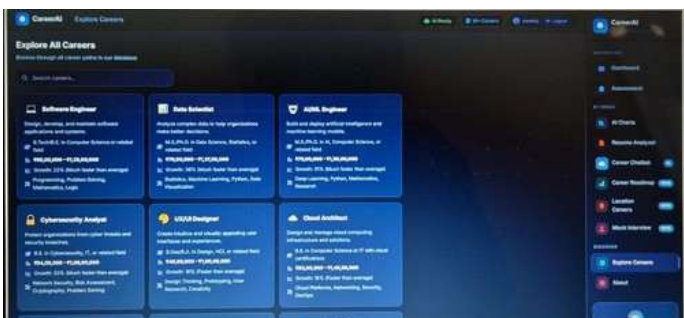
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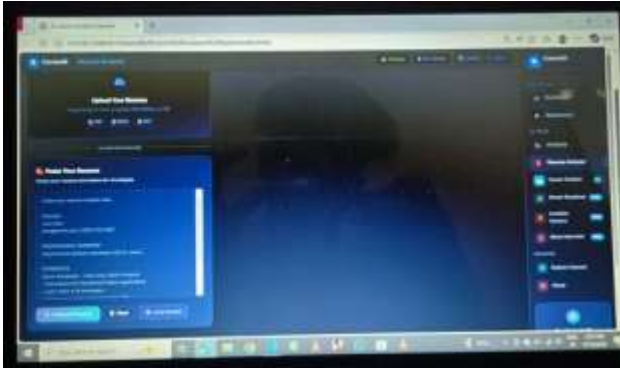
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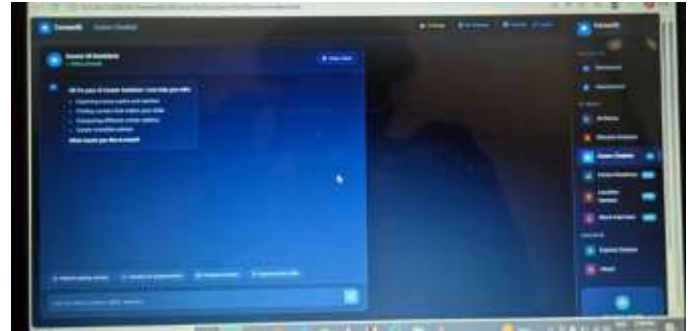
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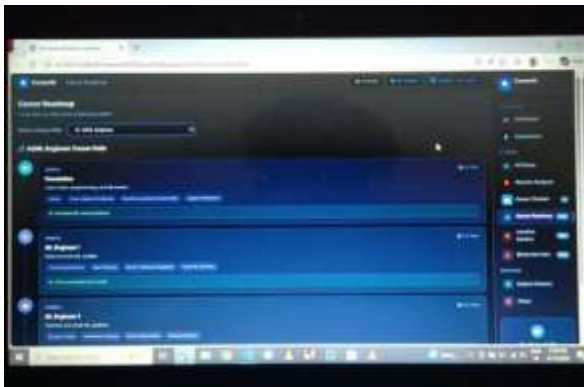
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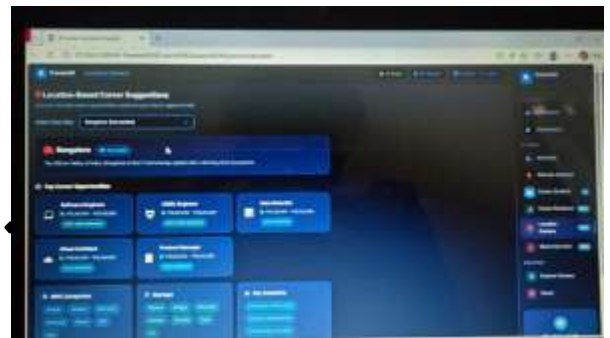
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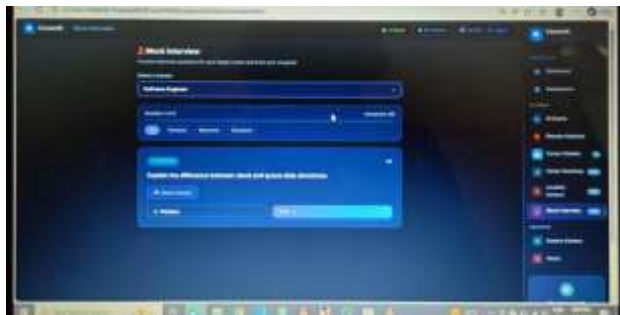
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11. CONCLUSION

The AI-Based Career Guidance System uses Machine Learning and NLP to provide accurate and personalized career recommendations based on user skills, interests, and education.

It helps users identify suitable career paths, analyze skill gaps, and offers a clear roadmap for improvement. The system is efficient, user-friendly, and reduces dependence on traditional counseling methods, making career decision-making faster, smarter, and more reliable.

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