CareerPilot AI: Intelligent Career Prediction and Personalized Learning Recommendation System Using Machine Learning and Generative AI

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Abstract
This paper presents CareerPilot AI, an intelligent career prediction and recommendation platform developed using Machine Learning, Natural Language Processing, Streamlit, and Generative AI technologies. The system analyzes user skills, resume information, and career interests to predict suitable career paths and recommend personalized learning resources. The project integrates machine learning models with the Gemini AI API to provide interactive guidance and recommendations. The proposed system improves decision-making for students and professionals by reducing confusion in career selection and enhancing skill-based recommendations.

Keywords
Machine Learning, Career Prediction, Artificial Intelligence, Streamlit, Resume Analysis, NLP, Recommendation System, Generative AI.

1. Introduction

Career selection is one of the most important decisions in a student's life. Traditional career counseling methods are often time-consuming and lack personalization. CareerPilot AI addresses this issue by providing intelligent predictions and personalized recommendations using Machine Learning and Generative AI. The system accepts user inputs such as skills, interests, and resumes, processes them using ML models, and generates suitable career recommendations along with learning roadmaps.

2. Objectives

• To develop an intelligent career prediction system.
• To recommend career paths based on user skills.
• To integrate AI-powered guidance using Gemini API.
• To provide personalized learning recommendations.
• To create an interactive web-based platform using Streamlit.

3. Literature Survey

Several existing systems focus on career counseling using surveys and manual analysis. Recent advancements in Machine Learning and NLP have enabled automated career recommendation systems. Research papers on AI-based recommendation systems show that predictive analytics improves accuracy and personalization. However, many systems lack interactive AI support and resume analysis capabilities. CareerPilot AI combines ML prediction, resume skill extraction, and Generative AI assistance into a unified platform.

4. System Methodology

The proposed methodology includes user authentication, resume analysis, skill extraction, machine learning prediction, and AI-powered recommendation generation. The system uses Streamlit as the front-end interface, SQLite for user data storage, and machine learning algorithms for career prediction. Gemini AI API is integrated for generating career guidance and roadmap recommendations.

5. Technologies Used

- Python
- Streamlit
- Scikit-Learn
- SQLite Database
- Gemini AI API
- Pandas and NumPy
- Plotly Visualization

6. Experimental Results

The implemented system successfully predicts suitable career domains based on user profiles and resumes. Testing was performed on multiple sample datasets. The system achieved high prediction accuracy and generated personalized recommendations effectively. The integration of Generative AI improved the interaction quality and user experience.

7. Conclusion

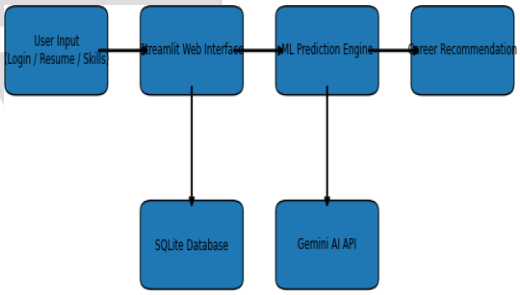
CareerPilot AI provides an efficient and intelligent solution for career prediction and recommendation. The integration of Machine Learning and Generative AI enables personalized suggestions and roadmap generation. The project demonstrates the practical use of AI technologies in educational and professional guidance systems.

8. Future Scope

Future enhancements may include deep learning-based prediction models, multilingual support, real-time job market analysis, integration with LinkedIn APIs, and mobile application deployment.

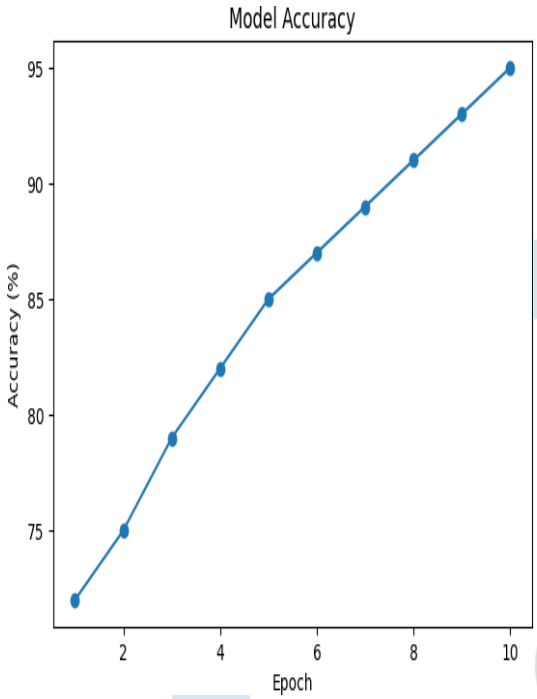
9. References

[1] Scikit-Learn Documentation.
[2] Streamlit Official Documentation.
[3] Research Papers on Career Recommendation Systems.
[4] Gemini AI API Documentation.
[5] Machine Learning using Python – Academic Resources.

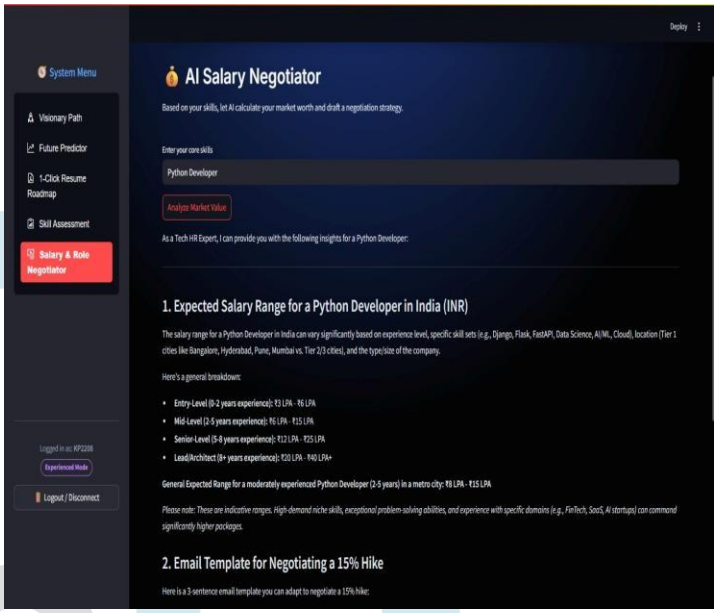


System Architecture Diagram

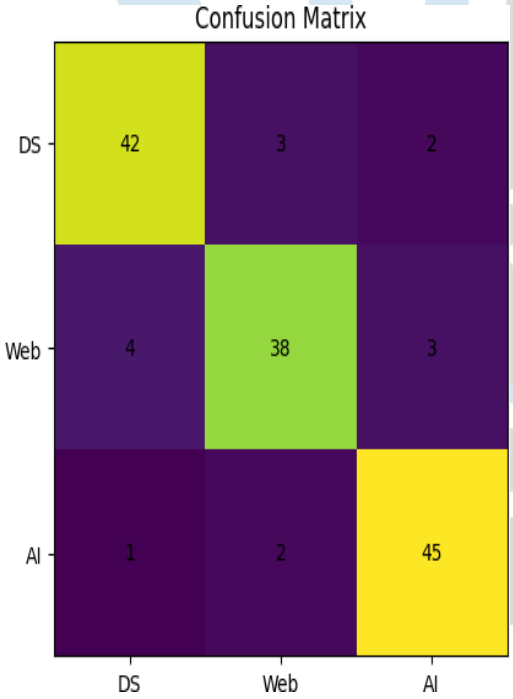
10. Project Output Screenshot



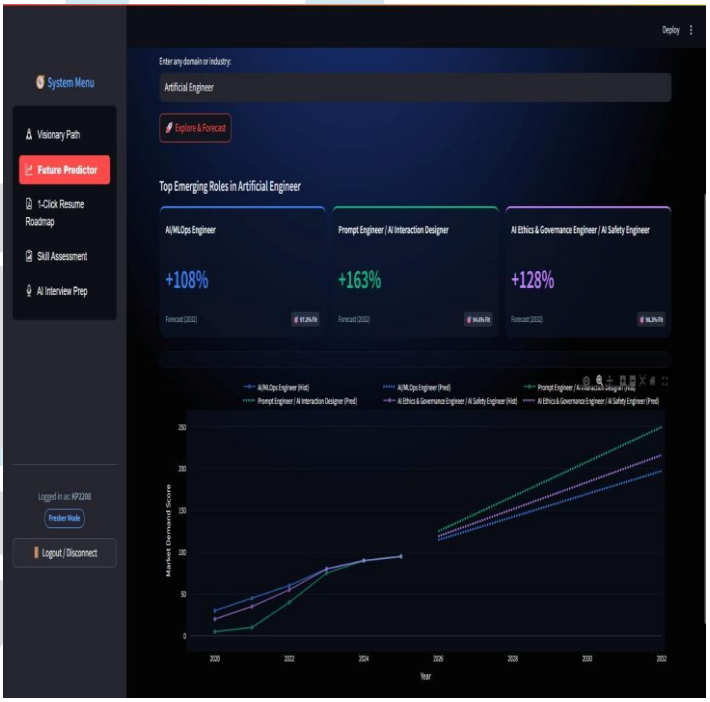
Accuracy Graph



CareerPilot AI User Interface



Confusion Matrix



Future Prediction