



Introduction

Career Recommendation System helps students and professionals choose the right career in a rapidly evolving job market. By analyzing user inputs—skills, interests, and academic background—it recommends suitable career paths using machine learning.

Built with **Flask (backend)**, **Streamlit (frontend)**, and **MySQL (database)**, it serves as a digital career guide, offering tailored career suggestions, step-by-step roadmaps, job market insights, and resume tips to support users in achieving their goals

Company Profile



Sumago Infotech Pvt. Ltd.
Strive With Technology...!

- **Organization Name:** Sumago Infotech Pvt. Ltd.
- **CEO:** Mr. Sudhir Gorade / Ms. Sonali Gorade
- **Location:** Nashik, Maharashtra, India
- **Services:** IT Solutions, Software Development, Consulting
- **Vision:** Empower businesses with modern technology solutions.

My Role

- **Analyzed User Input** (skills, interests, academic background) to identify patterns for career prediction.
- **Developed ML models** to recommend suitable career paths based on user profiles.
- **Performed Data Preprocessing** and feature engineering to clean and prepare data for model training.
- **Trained and Evaluated Models** like Logistic Regression, Decision Tree, and Random Forest to improve recommendation accuracy.
- **Integrated ML Models** with Flask APIs to serve real-time career suggestions to the frontend.
- **Handled Error Cases and Edge Inputs** to ensure robust prediction handling.
- **Tested and Validated Predictions** to ensure logical and relevant career outputs.

Problem Statement

- **Lack of Personalized Guidance:** Individuals struggle to find careers that suit their skills and interests.
- **Mismatch of Skills and Opportunities:** Many are unaware of careers that match their qualifications.
- **Need for Data-Driven Suggestions:** Traditional career counseling is not data-backed.
- **Limited Tailored Resources:** There is a lack of personalized career development tools.

Objectives

- Develop AI-driven career guidance tool.
- Use ML algorithms for career path matching.
- Provide personalized recommendations and roadmaps.
- Build an AI career guide.
- Recommend the career based on their skills and interests.
- Offer personalized career plans.

System Analysis

Stakeholder Analysis

- Students: Seek career guidance
- Career Counselors: Use system insights
- Institutions: Monitor student progress

Feasibility Study:

- Technical: Uses Python, ML, Flask, and API integration
- Economic: Low-cost deployment with open-source tools
- Operational: Easy to use, scalable for institutions

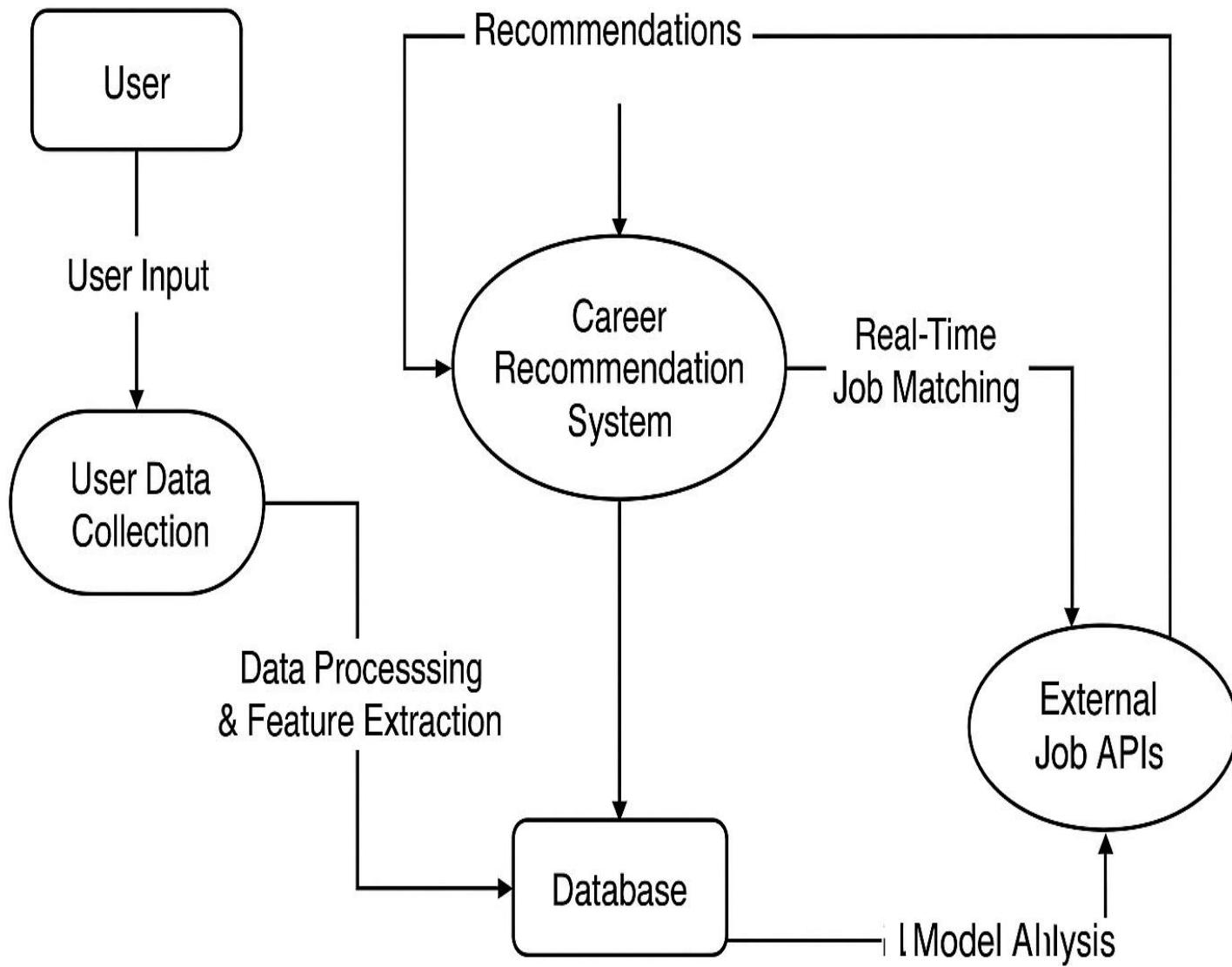
System Analysis

Requirements

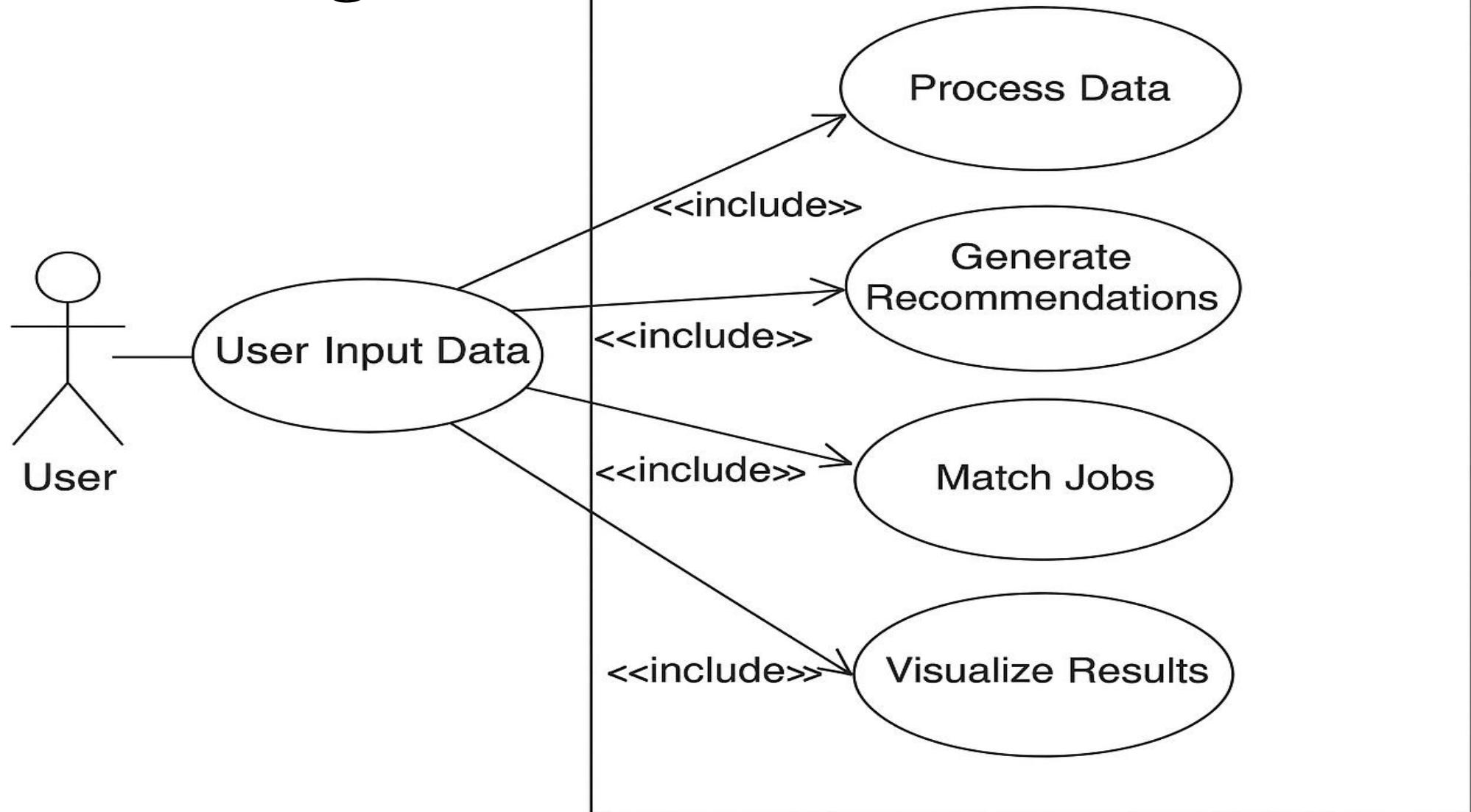
- Functional:
 - User input (skills, education, preferences)
 - Career prediction & job matching
- Non-functional:
 - Fast response time, high accuracy
 - User-friendly interface

System Design :

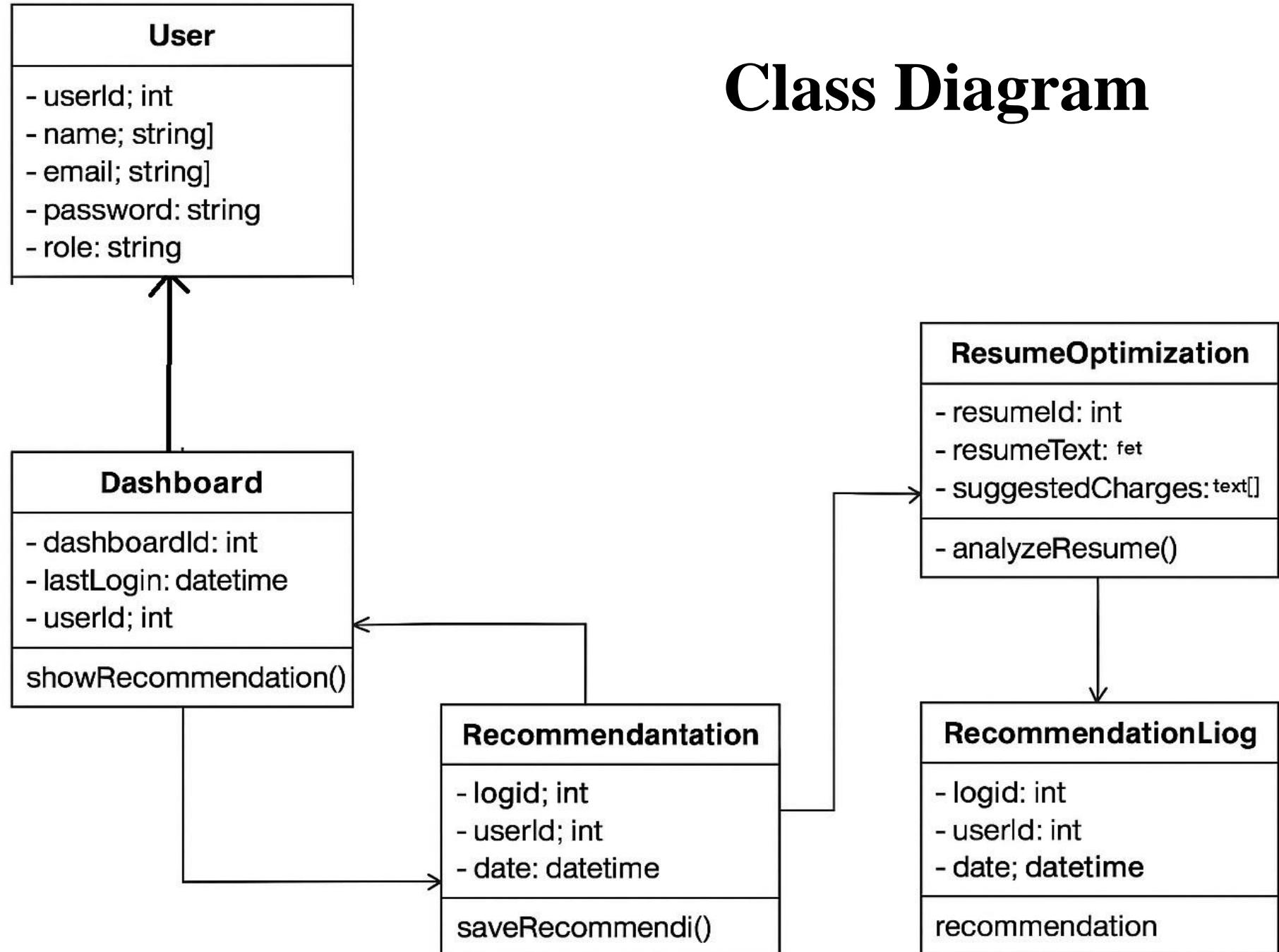
DFD Diagram (Data Flow Diagram)



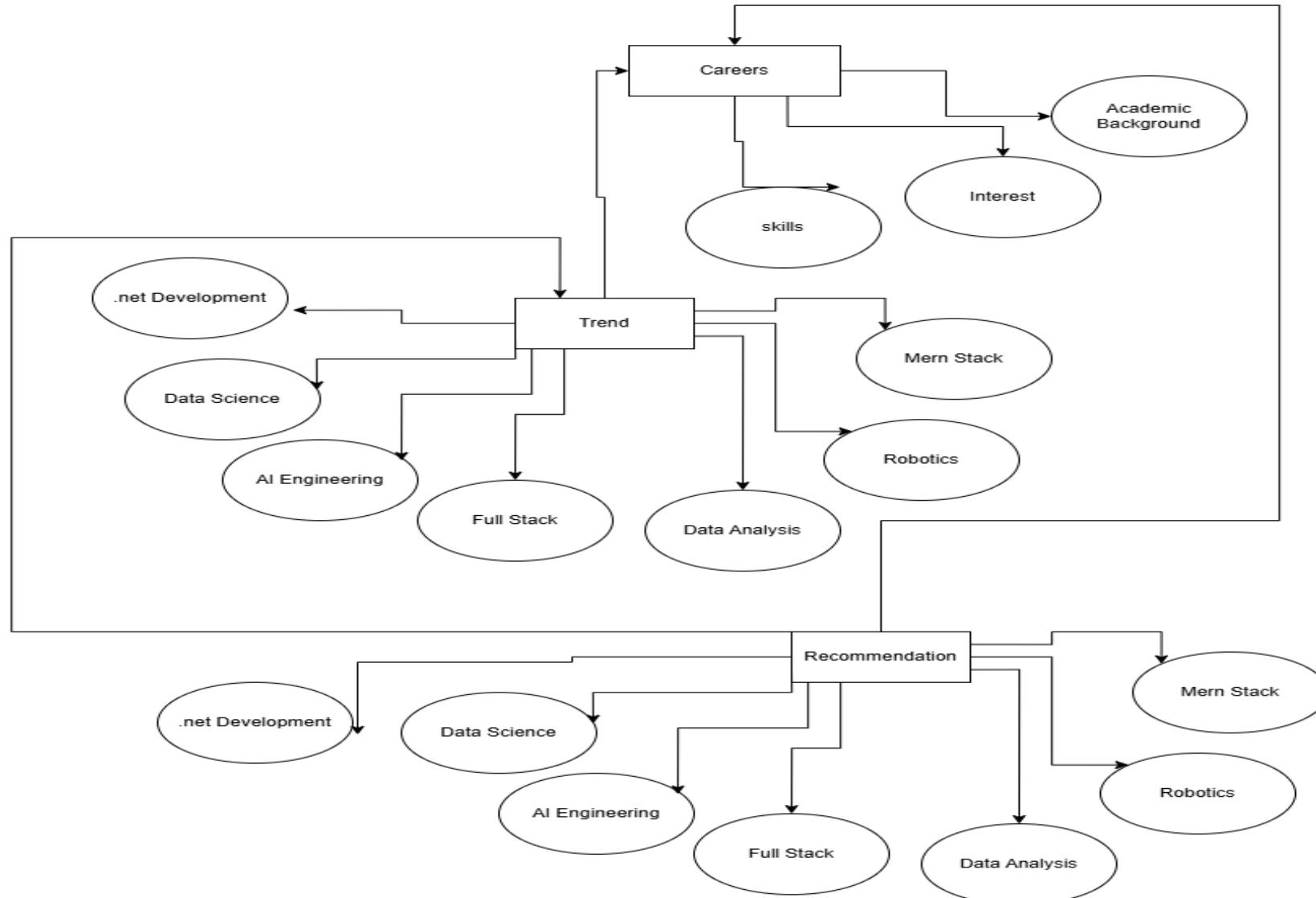
Use Case Diagram



Class Diagram



ER Diagram (Entity-Relationship Diagram)



Tools and Technologies Used

Category	Tools/Technologies
Programming Languages	Python
ML Libraries	Scikit-learn, Pandas, NumPy
Data Visualization	Matplotlib, Seaborn
Backend Framework	Flask, Flask-CORS
Frontend Framework	Streamlit
Dataset	Kaggle Datasets (Career-related datasets)
Development Tools	Jupyter Notebooks, VS Code/PyCharm

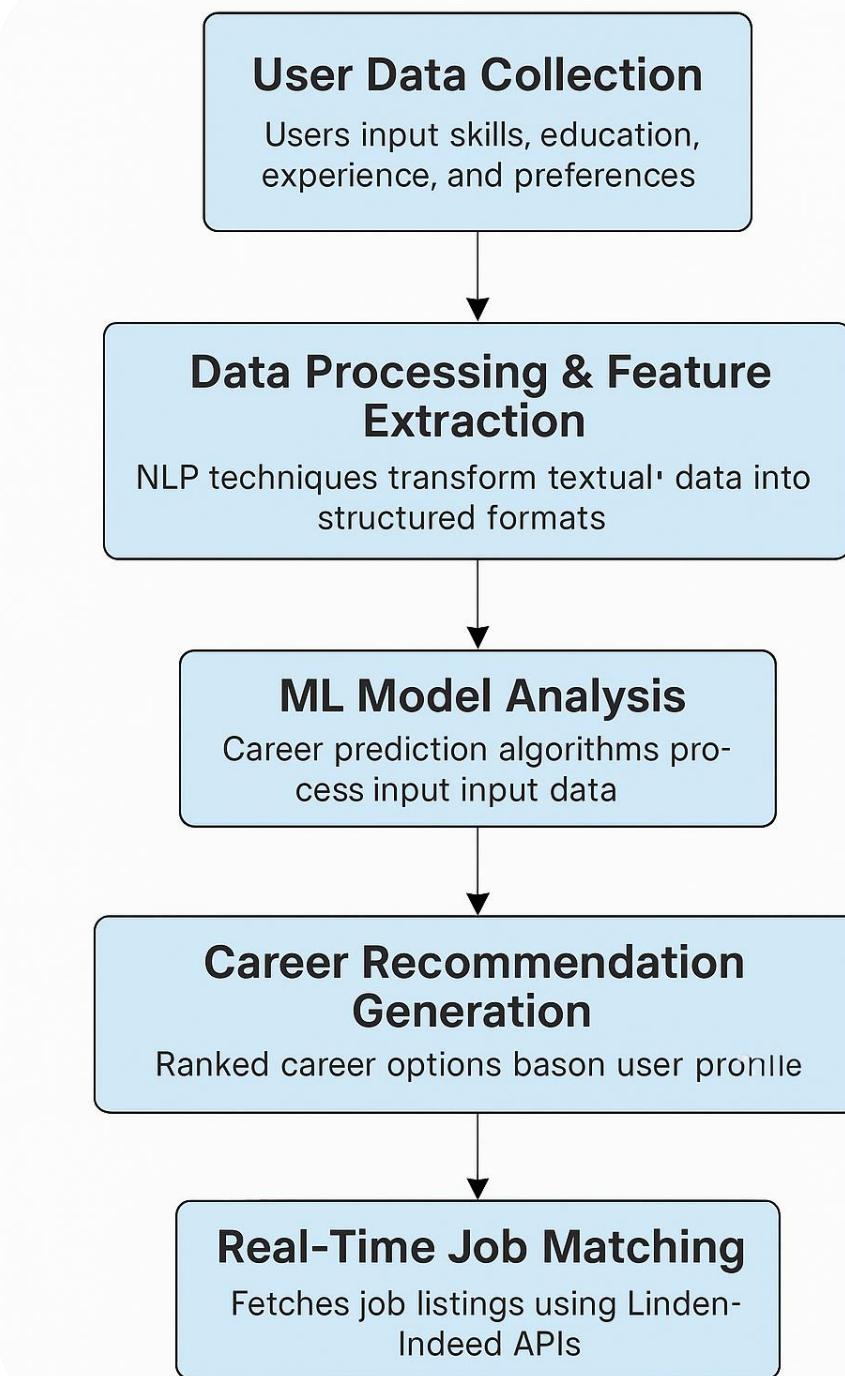
AI/ML Implementation

- **Dataset Collection:** Student profiles, skills, and career data (via Kaggle, etc.)
- **Preprocessing & Feature Engineering:** TF-IDF, data cleaning
- **Algorithms Used:** Decision Tree, Random Forest, KNN, NLP (for text-based input)
- **Model Evaluation Metrics:** Accuracy, Precision, Recall
- **Result Interpretation:** Matches user profile to best-fit career options

Sample Data set

Skills	Interests	Academic Background	Target Career
Programming, SQL	Technology	Computer Science	Data Analyst
Writing, Editing	Literature	English	Content Writer
Java, React	Development	Computer Science	Software Developer
Python, ML	AI	Data Science	Machine Learning Eng

System Workflow



User Data Collection

- **Primary Source:** Kaggle datasets
- Used for collecting real-world career, job, and skill-related data
- Ensures diverse and rich training data for the ML model

Users input their:

- Skills (e.g., Python, Communication)
- Education (e.g., Master's, Bachelor's, and Ph.D.)
- Experience (e.g., 2 years as Data Analyst)
- Preferences (e.g., work location, interest area)

Data Processing & Feature Extraction

NLP Techniques:

- Tokenization, Stop word Removal, TF-IDF, Word2Vec

Feature Engineering:

- Converts text input into structured format

Purpose:

- Prepare data for machine learning model analysis

ML Model Analysis

ML Algorithms Used:

- Logistic Regression, KNN, SVM, Random Forest
- Analyzes structured data from user
- Learns patterns from training data to make predictions

Purpose:

Predict suitable career options based on user profile

Career Recommendation Generation

- ✓ Generates ranked list of career paths based on ML model prediction and user profile

Output Example:

- Data Scientist
- Software Developer
- UI/UX Designer
- Data Science

Purpose: Offer top career choices personalized for the user

Real-Time Job Matching

- Integrates with job APIs (LinkedIn, Indeed)
- Fetches live job listings based on recommended careers
- Data used for recommendations is sourced from structured CSV files
- Example dataset includes: job titles, required skills, salary, location

Purpose:

Help users directly apply for matching job opportunities

Test Cases

Test Case ID	Test Scenario	Test Steps	Expected Result	Actual Result	Status
TC_01	User Login	Enter valid email and password	User successfully logs in	As Expected	Pass
TC_02	User Login - Invalid Credentials	Enter invalid email or password	Error message displayed	As Expected	Pass
TC_03	Register New User	Enter valid details and click register	User account created successfully	As Expected	Pass
TC_04	Submit Skills and Interests	Enter skills and interests and submit	System accepts input and stores data	As Expected	Pass
TC_05	Generate Career Recommendation	Click on 'Get Recommendation'	System displays career suggestions	As Expected	Pass
TC_06	Upload Resume	Upload a valid resume file	Resume uploaded successfully	As Expected	Pass
TC_07	Admin Login	Admin enters valid credentials	Admin dashboard opens	As Expected	Pass

SCREEN SHOTS

Home Page

The screenshot shows a web browser window with two tabs open, both titled "dashboard · Streamlit". The active tab displays the "CareerPath AI - Interactive Dashboard". The page has a clean, modern design with a light gray background. On the left side, there is a vertical navigation bar with a header "Navigation" and a "Go to" section containing five items: "Home" (selected), "Career Recommendations", "Job Market Trends", "Roadmap to Success", and "Resume Optimization". The main content area features a large, bold title "CareerPath AI – Interactive Dashboard" and a sub-section "Welcome to CareerPath AI!". Below this, a paragraph explains the purpose of the dashboard: "CareerPath AI is your personalized career navigator. It helps you:". A bulleted list follows, detailing the features: "Discover the best career paths based on your skills and interests.", "Explore job market trends and in-demand careers.", "Get a step-by-step roadmap to achieve your career goals.", and "Optimize your resume and LinkedIn profile.". At the bottom of the page, a footer states "Made with Streamlit". The browser's address bar shows "localhost:8501".

Sign in

127.0.0.1:5000

localhost:8501

Navigation

Go to

- Home
- Career Recommendations
- Job Market Trends
- Roadmap to Success
- Resume Optimization

CareerPath AI – Interactive Dashboard

Welcome to CareerPath AI!

CareerPath AI is your personalized career navigator. It helps you:

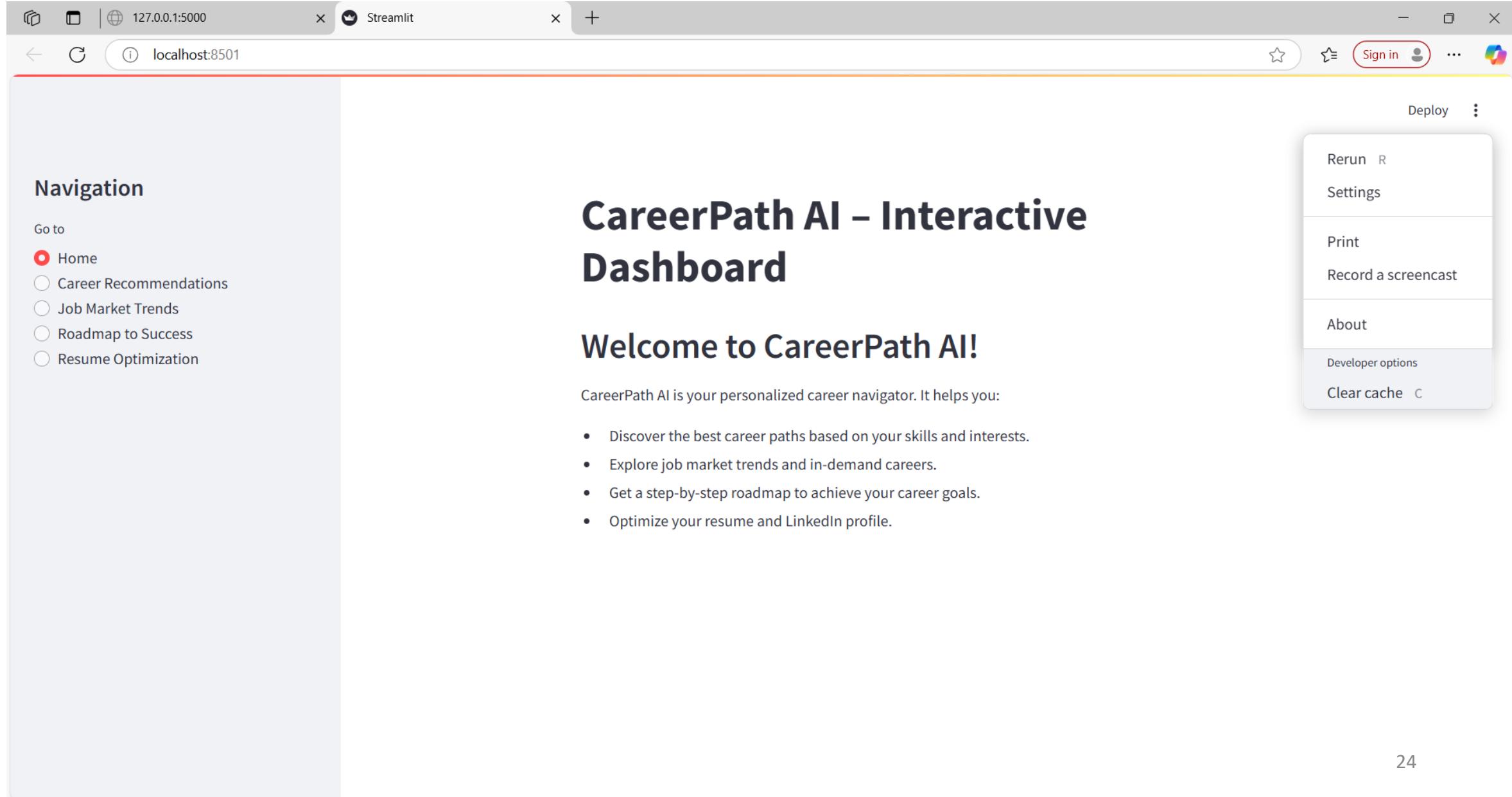
- Discover the best career paths based on your skills and interests.
- Explore job market trends and in-demand careers.
- Get a step-by-step roadmap to achieve your career goals.
- Optimize your resume and LinkedIn profile.

Made with Streamlit

Deploy

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setting Page



The screenshot shows a Streamlit application running at `127.0.0.1:5000` on a web browser. The title bar indicates the app is titled "Streamlit". The main content area features a large title "CareerPath AI – Interactive Dashboard" and a welcome message "Welcome to CareerPath AI!". Below the title, a list of bullet points describes the app's features. A navigation sidebar on the left lists "Home", "Career Recommendations", "Job Market Trends", "Roadmap to Success", and "Resume Optimization", with "Home" being the selected option. A sidebar menu on the right includes "Rerun R", "Settings", "Print", "Record a screencast", "About", "Developer options", and "Clear cache C". The bottom right corner shows the page number "24".

CareerPath AI – Interactive Dashboard

Welcome to CareerPath AI!

CareerPath AI is your personalized career navigator. It helps you:

- Discover the best career paths based on your skills and interests.
- Explore job market trends and in-demand careers.
- Get a step-by-step roadmap to achieve your career goals.
- Optimize your resume and LinkedIn profile.

Navigation

Go to

- Home
- Career Recommendations
- Job Market Trends
- Roadmap to Success
- Resume Optimization

Rerun R

Settings

Print

Record a screencast

About

Developer options

Clear cache C

Career Recommendation

The screenshot shows a web browser window with two tabs open, both titled "dashboard · Streamlit". The main content area displays the "CareerPath AI – Interactive Dashboard". On the left, there is a sidebar titled "Navigation" with a "Go to" section containing five options: "Home", "Career Recommendations" (which is selected, indicated by a red dot), "Job Market Trends", "Roadmap to Success", and "Resume Optimization". The main content area features a large title "CareerPath AI – Interactive Dashboard" and a section titled "Career Recommendations" with three input fields for "Skills", "Interests", and "Academic background", each followed by a large text input box. A "Get Recommendations" button is located at the bottom of these fields.

Sign in

localhost:8501

127.0.0.1:5000

Navigation

Go to

- Home
- Career Recommendations
- Job Market Trends
- Roadmap to Success
- Resume Optimization

CareerPath AI – Interactive Dashboard

Career Recommendations

Get personalized career suggestions based on your skills, interests, and academic background.

Enter your skills (e.g., Programming, Writing):

Enter your interests (e.g., Technology, Literature):

Enter your academic background (e.g., Master's, Phd, Bachelor's):

Get Recommendations

Deploy

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Career Recommendation output

The screenshot shows a Streamlit web application running on multiple browser tabs. The main content area displays a title 'Career Recommendations' and a subtitle 'Get personalized career suggestions based on your skills, interests, and academic background.' Below this, there are three input fields: 'Enter your skills (e.g., Programming, Writing)', containing 'python'; 'Enter your interests (e.g., Technology, Literature)', containing 'AI'; and 'Enter your academic background (e.g., Computer Science, English)', containing 'phd'. A red-bordered button labeled 'Get Recommendations' is positioned below these fields. A green box labeled 'Your Career Recommendations:' contains a bulleted list of five roles: 'Digital Marketer', 'Front-end Developer', 'Content Strategist', 'AI Specialist', and 'Data Analyst'.

Navigation

Go to

- Home
- Career Recommendations
- Job Market Trends
- Roadmap to Success
- Resume Optimization

Career Recommendations

Get personalized career suggestions based on your skills, interests, and academic background.

Enter your skills (e.g., Programming, Writing):

python

Enter your interests (e.g., Technology, Literature):

AI

Enter your academic background (e.g., Computer Science, English):

phd

Get Recommendations

Your Career Recommendations:

- Digital Marketer
- Front-end Developer
- Content Strategist
- AI Specialist
- Data Analyst

Deploy :

Job Market Trends

The screenshot shows a web browser window for the 'dashboard - Streamlit' application at 'localhost:8501'. The title bar includes a 'Sign in' button, a refresh icon, a search bar with '127.0.0.1:5000', and a tab labeled 'dashboard - Streamlit'. The main content area has a navigation sidebar on the left with a 'Navigation' heading and a 'Go to' list containing 'Home', 'Career Recommendations', 'Job Market Trends' (which is selected and highlighted in red), 'Roadmap to Success', and 'Resume Optimization'. The main content area features a large title 'CareerPath AI – Interactive Dashboard' and a section titled 'Job Market Trends' with the subtext 'Explore real-time job market trends and in-demand careers.' A 'View Trends' button is visible. The bottom of the page says 'Made with Streamlit'. The browser interface includes standard controls like back, forward, and search, along with a 'Deploy' button and a three-dot menu icon.

Navigation

Go to

- Home
- Career Recommendations
- Job Market Trends
- Roadmap to Success
- Resume Optimization

CareerPath AI – Interactive Dashboard

Job Market Trends

Explore real-time job market trends and in-demand careers.

View Trends

Made with Streamlit

Job Market Trends output

The screenshot shows a Streamlit application running at localhost:8501. The title bar indicates it's a Streamlit app. The main content area is titled "CareerPath AI – Interactive Dashboard" and features a "Job Market Trends" section. This section includes a "View Trends" button (which is highlighted with a red border) and a list of job trends. A sidebar on the left is titled "Navigation" and contains links to various features, with "Job Market Trends" being the active one.

CareerPath AI – Interactive Dashboard

Job Market Trends

Explore real-time job market trends and in-demand careers.

[View Trends](#)

Job Market Trends:

- **Job Title:** Machine Learning Engineer in office
- **Demand Level:** L
- **Salary Range:** 186597
- **Experience_Level:** MI
- **Job Title:** Statistician (Remote)
- **Demand Level:** M
- **Salary Range:** 110630
- **Experience_Level:** EX
- **Job Title:** Machine Learning Engineer
- **Demand Level:** L

Navigation

Go to

- [Home](#)
- [Career Recommendations](#)
- [Job Market Trends](#)
- [Roadmap to Success](#)
- [Resume Optimization](#)

Deploy :

Roadmap to Success

The screenshot shows a Streamlit dashboard titled "CareerPath AI – Interactive Dashboard". The main title "CareerPath AI – Interactive Dashboard" is displayed prominently at the top center. Below it, a large section titled "Roadmap to Success" is centered. A sub-section below "Roadmap to Success" reads "Get a step-by-step guide to achieve your career goals." There is an input field labeled "Enter your desired career (e.g., Software Engineer, Content Writer):" followed by a "Generate Roadmap" button. On the left side, there is a sidebar titled "Navigation" with a "Go to" section containing links for Home, Career Recommendations, Job Market Trends, Roadmap to Success (which is highlighted with a red dot), and Resume Optimization.

Sign in

localhost:8501

Navigation

Go to

- Home
- Career Recommendations
- Job Market Trends
- Roadmap to Success
- Resume Optimization

CareerPath AI – Interactive Dashboard

Roadmap to Success

Get a step-by-step guide to achieve your career goals.

Enter your desired career (e.g., Software Engineer, Content Writer):

Generate Roadmap

Made with Streamlit

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Roadmap to Success output

The screenshot shows a Streamlit application running at localhost:8501. The title bar indicates it's a Streamlit application. The main content area is titled "CareerPath AI – Interactive Dashboard". On the left, there's a "Navigation" sidebar with links to Home, Career Recommendations, Job Market Trends, Roadmap to Success (which is selected), and Resume Optimization. The main content area has a heading "Roadmap to Success" and a sub-section "Get a step-by-step guide to achieve your career goals.". A text input field contains "Data Science", and a button labeled "Generate Roadmap" is visible. Below, a green box displays the "Roadmap for Data Science:" which includes a bulleted list of steps:

- Enroll in a degree or diploma program related to Data Science
- Participate in hackathons or competitions for Data Science
- Apply for internships or entry-level jobs in Data Science
- Attend workshops or webinars on Data Science

At the top right of the dashboard, there are "Deploy" and three-dot menu icons. The top navigation bar also shows "Streamlit" and other browser controls.

Resume Optimization

The screenshot shows a web browser window with two tabs: "Sign in" and "dashboard · Streamlit". The main content area displays the "CareerPath AI – Interactive Dashboard" with a sidebar titled "Navigation". The sidebar includes links for Home, Career Recommendations, Job Market Trends, Roadmap to Success, and Resume Optimization, with "Resume Optimization" being the active link. The main content area features a large title "CareerPath AI – Interactive Dashboard" with a subtitle "Resume Optimization" and a sub-instruction "Optimize your resume using AI-powered suggestions." Below this is a text input field labeled "Paste your resume text here:" and a button labeled "Optimize Resume".

Sign in

localhost:8501

Navigation

Go to

- Home
- Career Recommendations
- Job Market Trends
- Roadmap to Success
- Resume Optimization

CareerPath AI – Interactive Dashboard

Resume Optimization

Optimize your resume using AI-powered suggestions.

Paste your resume text here:

Optimize Resume

Deploy

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Resume Optimization output

The screenshot shows a Streamlit application running at `127.0.0.1:5000` on a web browser. The title bar indicates the application is titled "Resume Optimization". The left sidebar is labeled "Navigation" and includes links for Home, Career Recommendations, Job Market Trends, Roadmap to Success, and Resume Optimization, with the latter being the active tab. The main content area has a heading "Resume Optimization" and a sub-instruction "Optimize your resume using AI-powered suggestions.". Below this is a text input field containing a resume snippet. A red box highlights the text: "My name is Jayashri Santosh Jadhav. I have completed my Master's degree in Computer Application, which provided me with a strong foundation in programming, Data Science, where I apply statistical analysis, machine learning algorithms, and data visualization techniques to extract insights and solve real-world problems." To the right of the text input is a "Press Ctrl+Enter to apply" button. Below the input field is an "Optimize Resume" button. A green box labeled "Optimized Resume:" contains the same text as the input field. At the bottom, there is additional descriptive text about the user's experience and goals.

Navigation

Go to

- Home
- Career Recommendations
- Job Market Trends
- Roadmap to Success
- Resume Optimization

Resume Optimization

Optimize your resume using AI-powered suggestions.

Paste your resume text here:

"My name is Jayashri Santosh Jadhav. I have completed my Master's degree in Computer Application, which provided me with a strong foundation in programming, Data Science, where I apply statistical analysis, machine learning algorithms, and data visualization techniques to extract insights and solve real-world problems."

Press Ctrl+Enter to apply

Optimize Resume

Optimized Resume:

"My name is Jayashri Santosh Jadhav. I have completed my Master's degree in Computer Application, which provided me with a strong foundation in programming, software development, and computer science principles. Currently, I am actively working in the field of Data Science, where I apply statistical analysis, machine learning algorithms, and data visualization techniques to extract insights and solve real-world problems.

I have hands-on experience in Python, SQL, Power BI, and various machine learning libraries like Pandas, NumPy, Scikit-learn, and Matplotlib. I have worked on end-to-end data science projects involving data cleaning, model building, evaluation, and deployment. My goal is to contribute to data-driven decision-making by developing intelligent systems that add value to organizations. I am passionate about continuous learning and always looking for opportunities to expand my skills and take on new challenges in the field of data science."

Deploy :

Conclusion

- This system uses machine learning to recommend personalized career paths based on students' skills and preferences, guiding them toward their ideal career choices.
- It helps students make informed decisions about their future, providing tailored career suggestions that can lead to better job satisfaction and career growth.

Future Enhancements

- User profile dashboard
- Resume parsing
- AI chatbot integration
- Live job feed integration
- Skill gap analysis
- Mobile app version
- Gamification features
- Feedback-based model improvement
- Multilingual support
- Course recommendations

(Coursera, Udemy)

References

- <https://dev.mysql.com/doc/>
- <https://flask.palletsprojects.com/>
- <https://docs.streamlit.io/>
- <https://www.kaggle.com>

THANK YOU