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

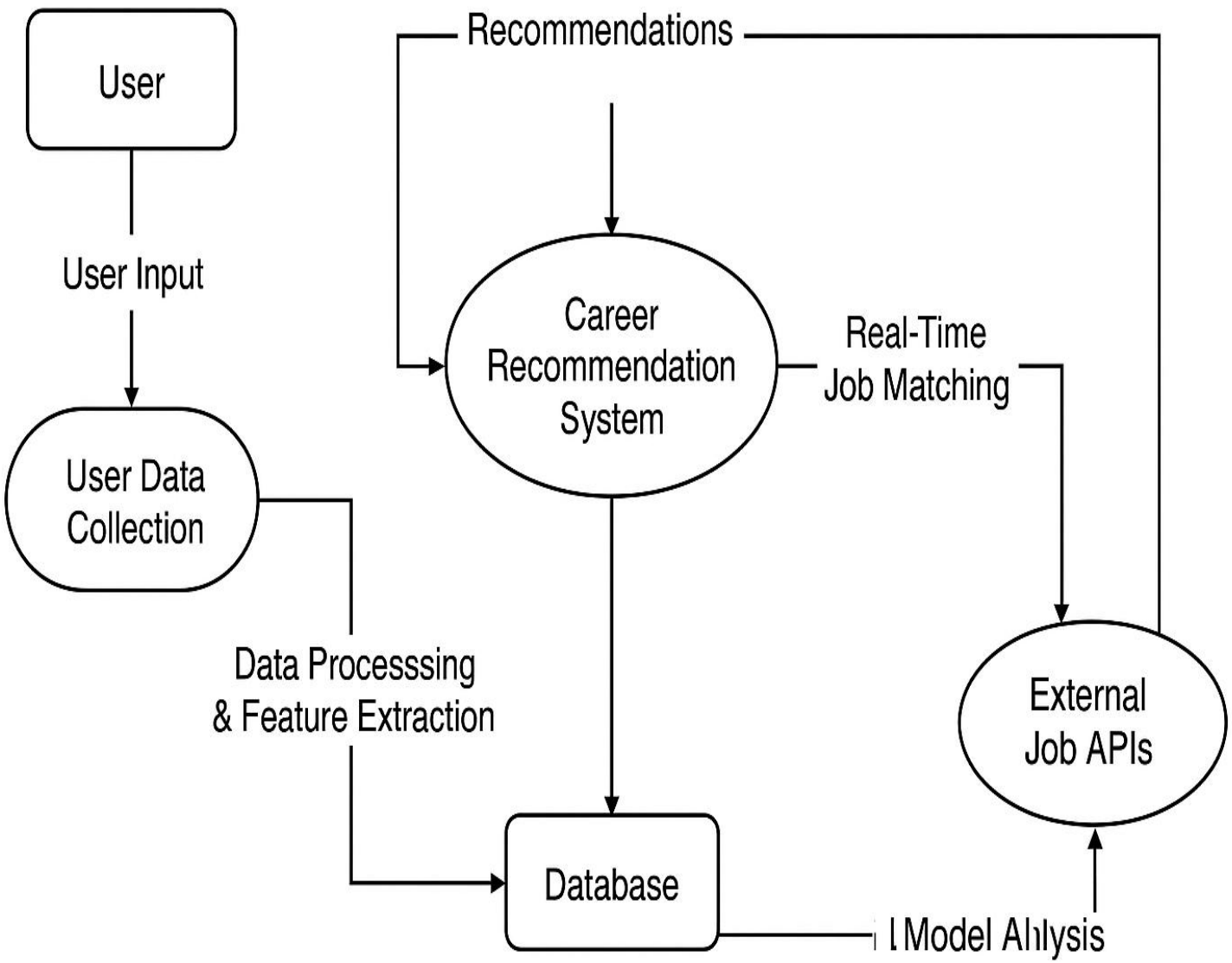
System Analysis

Requirements

- Functional:
  - User input (skills, education, preferences)
  - Career prediction & job matching

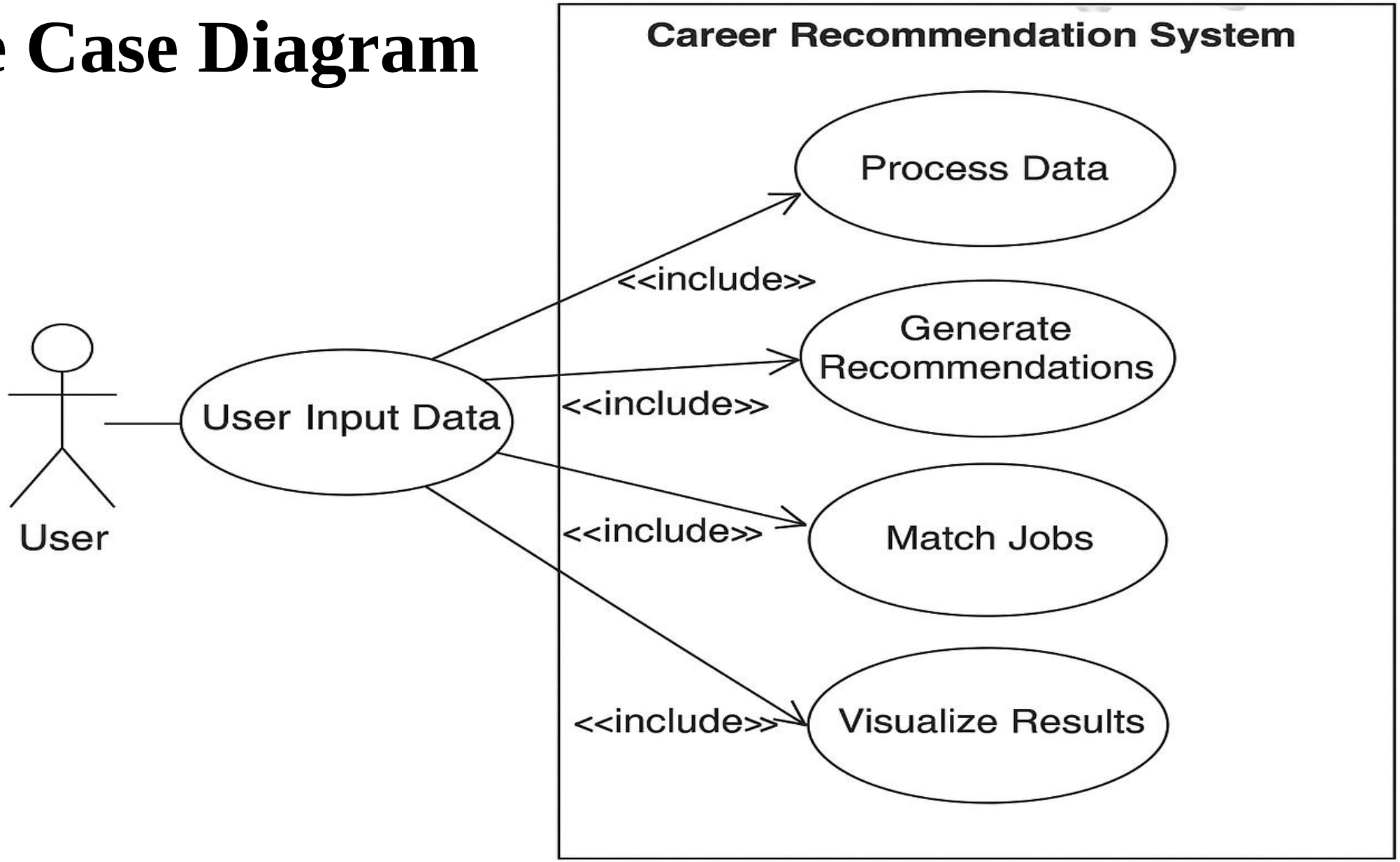
- Non-functional:
  - Fast response time, high accuracy
  - User-friendly interface

System Design :

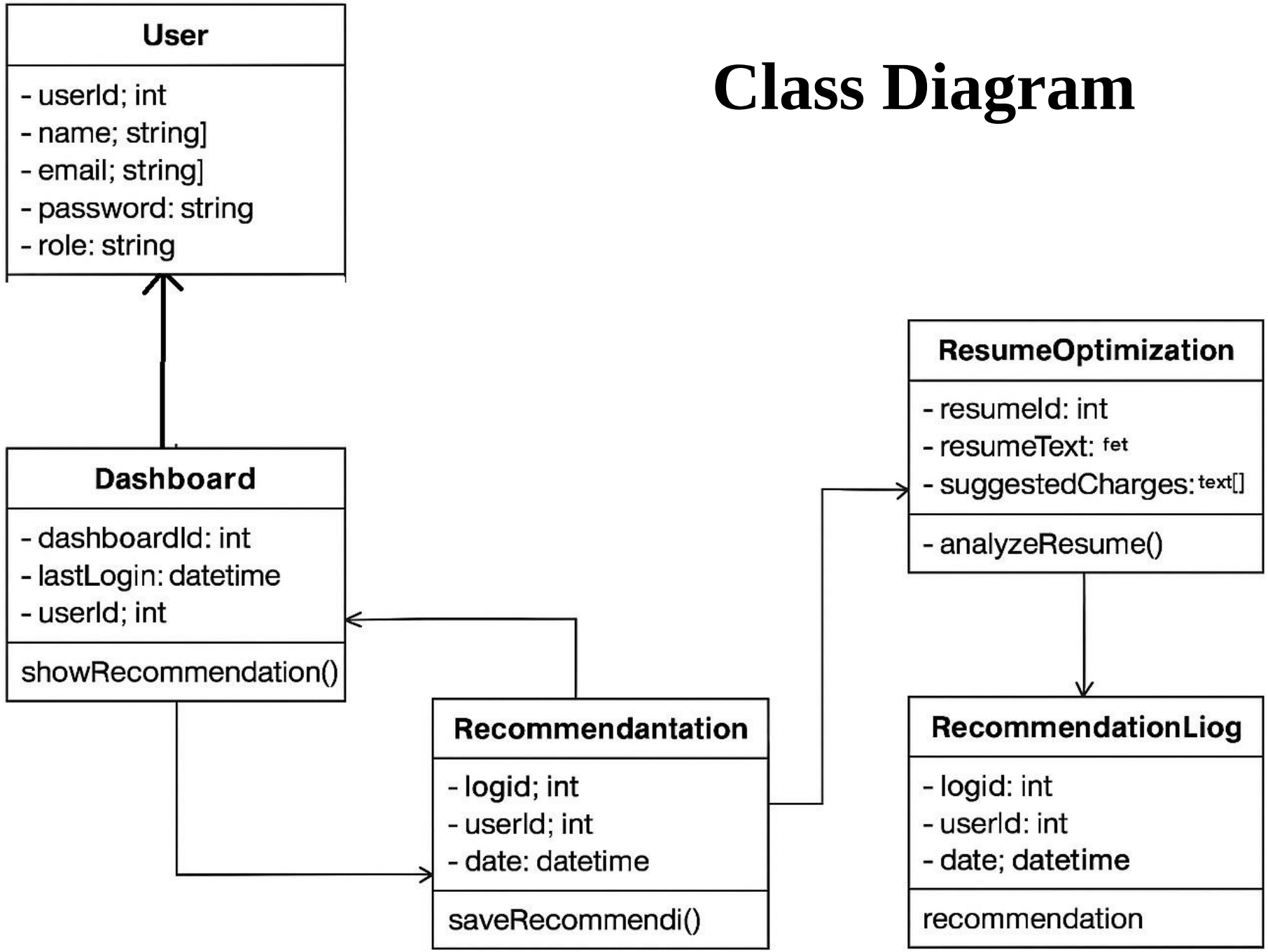


DFD Diagram (Data Flow Diagram)

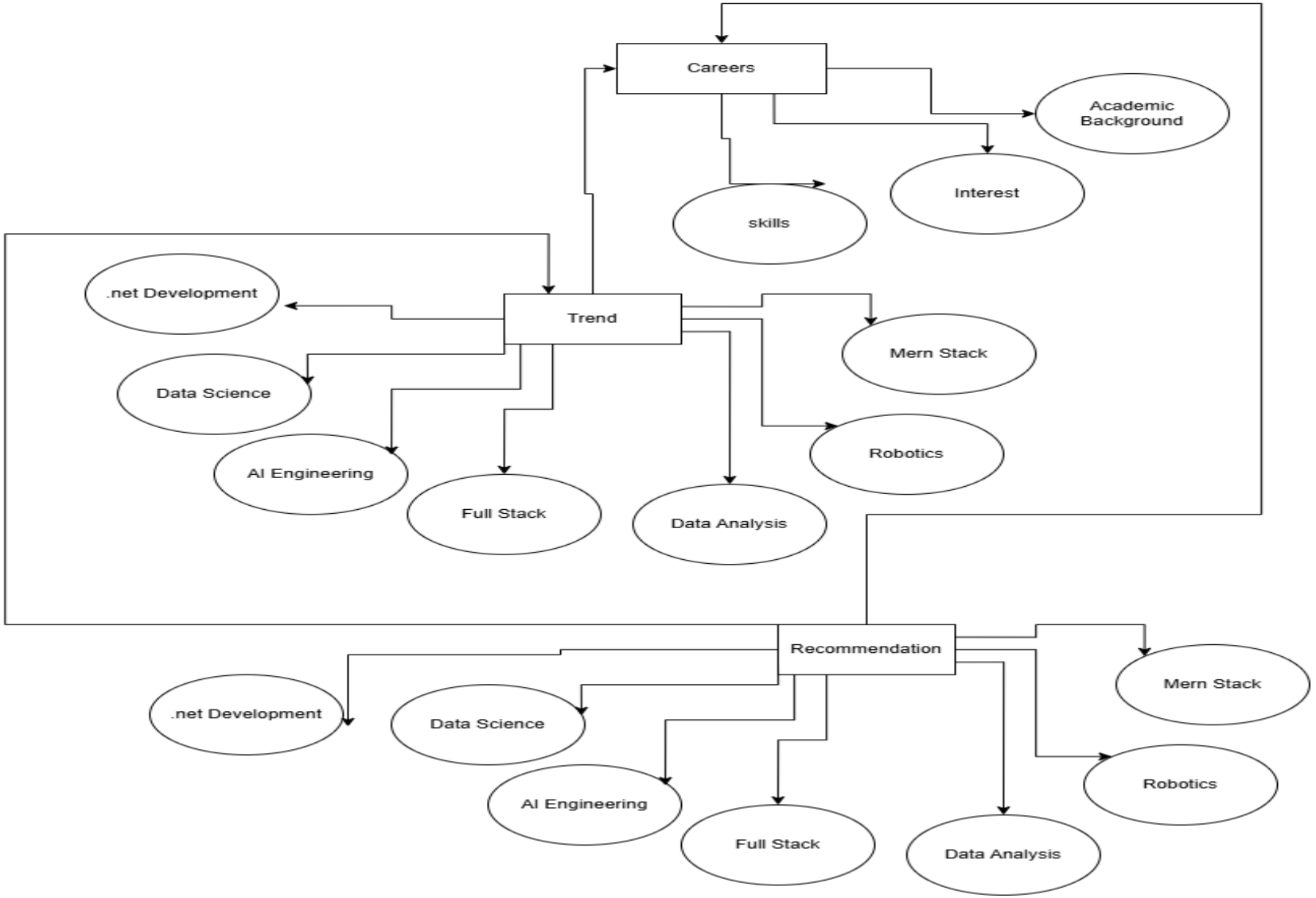
Use Case Diagram



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

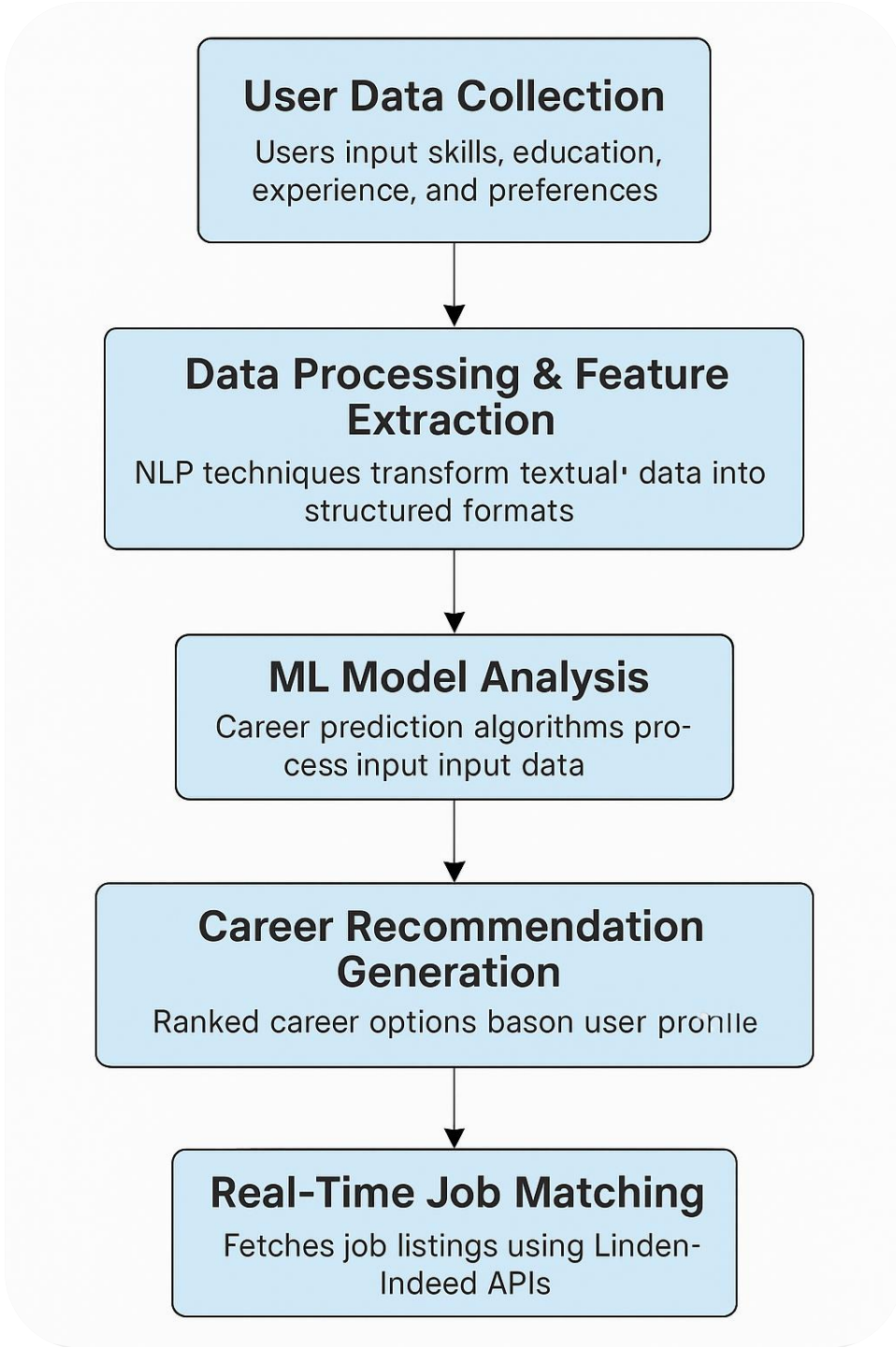
AI/ML Implementation

- **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:

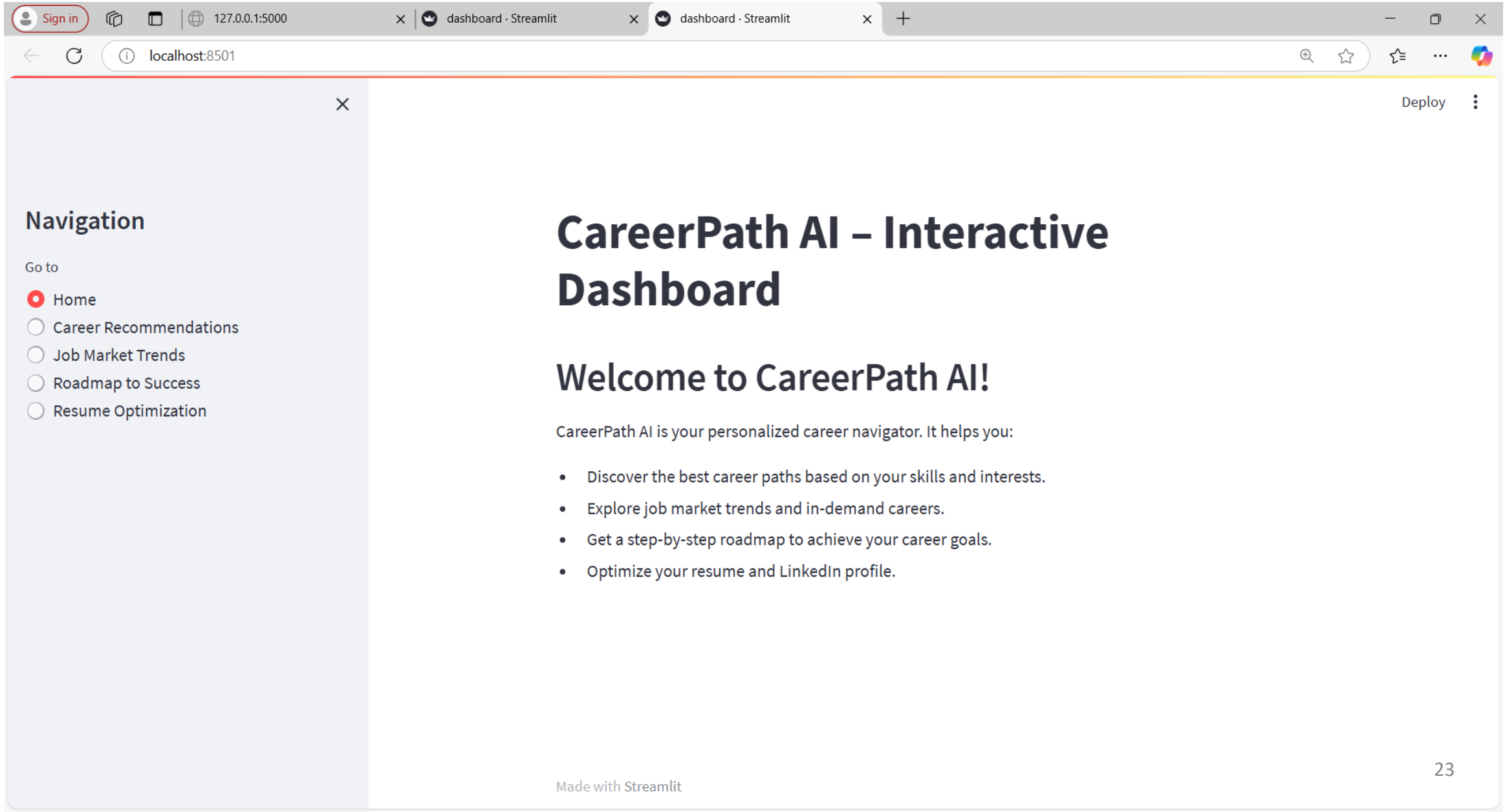
Help users directly apply for matching job opportunities

Test Cases

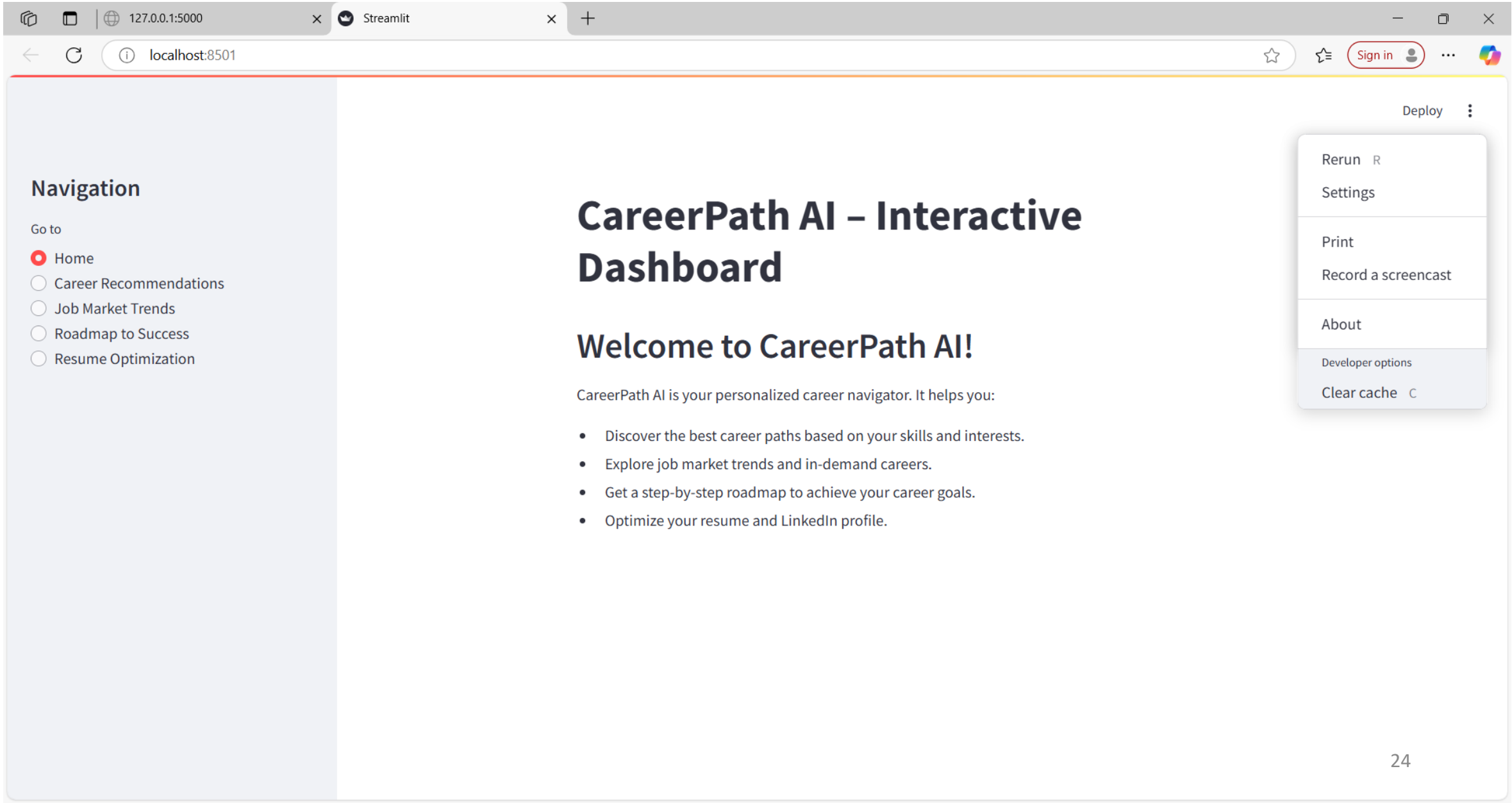
Test Case ID	Test Scenario	Test Steps	Expected Result	Actual Result	Status
TC_01	User Login	Enter valid email and password	User successfully logs in	As Expected	Pass
TC_02	User Login - Invalid Credentials	Enter invalid email or password	Error message displayed	As Expected	Pass
TC_03	Register New User	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

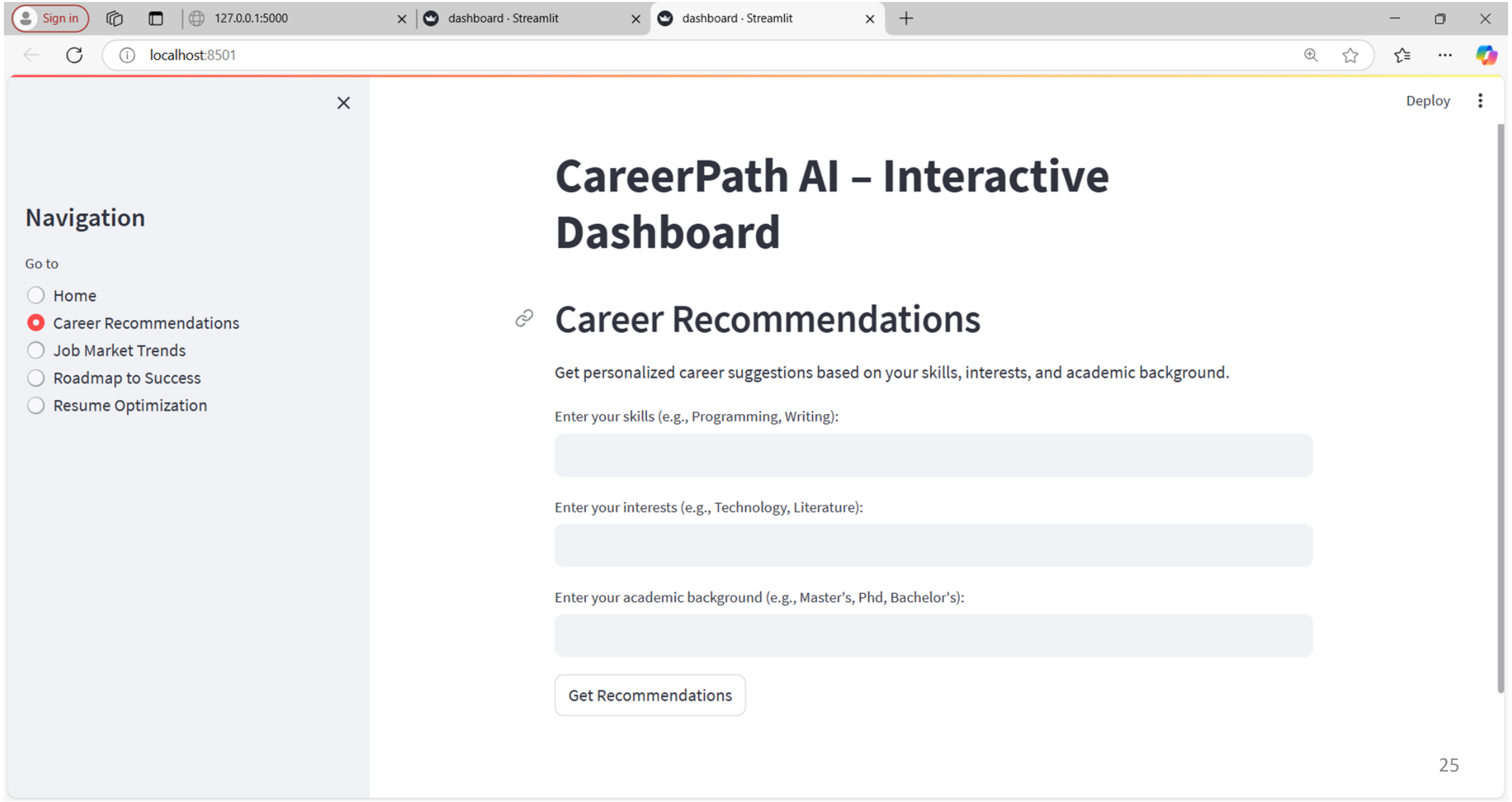
Home Page


Sign in
127.0.0.1:5000
dashboard · Streamlit
dashboard · Streamlit
localhost:8501
Deploy
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

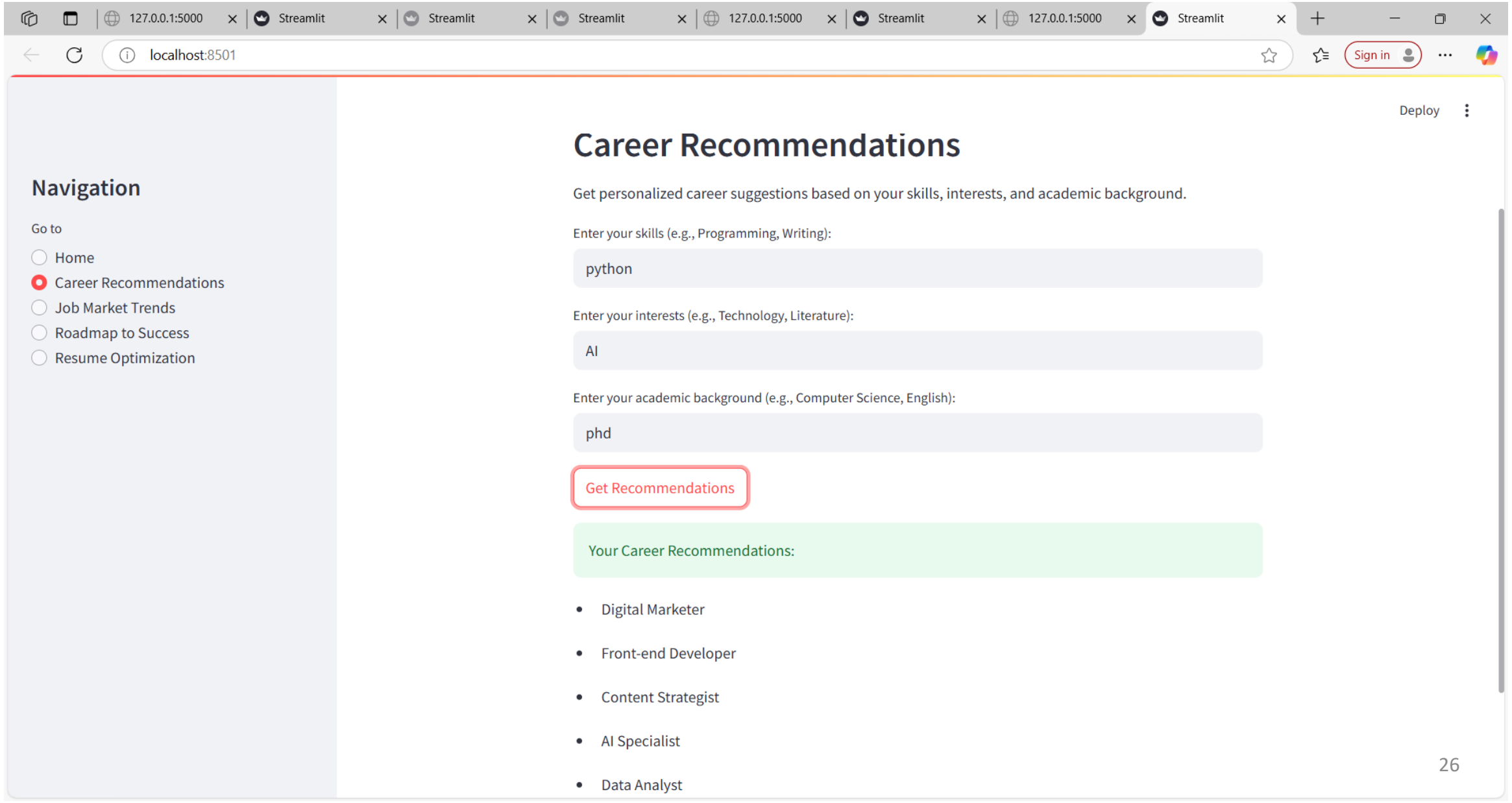
setting Page



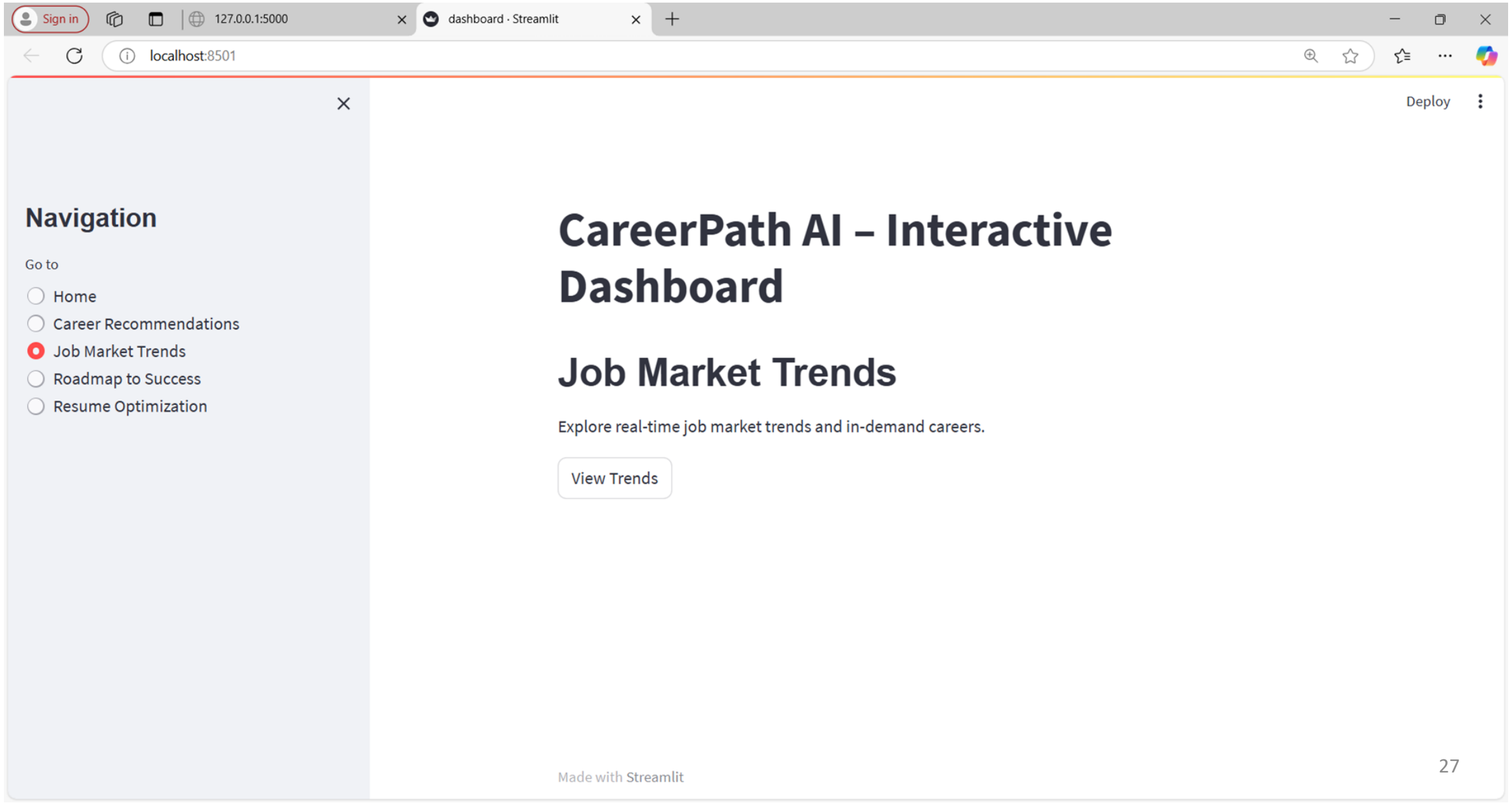
Career Recommendation



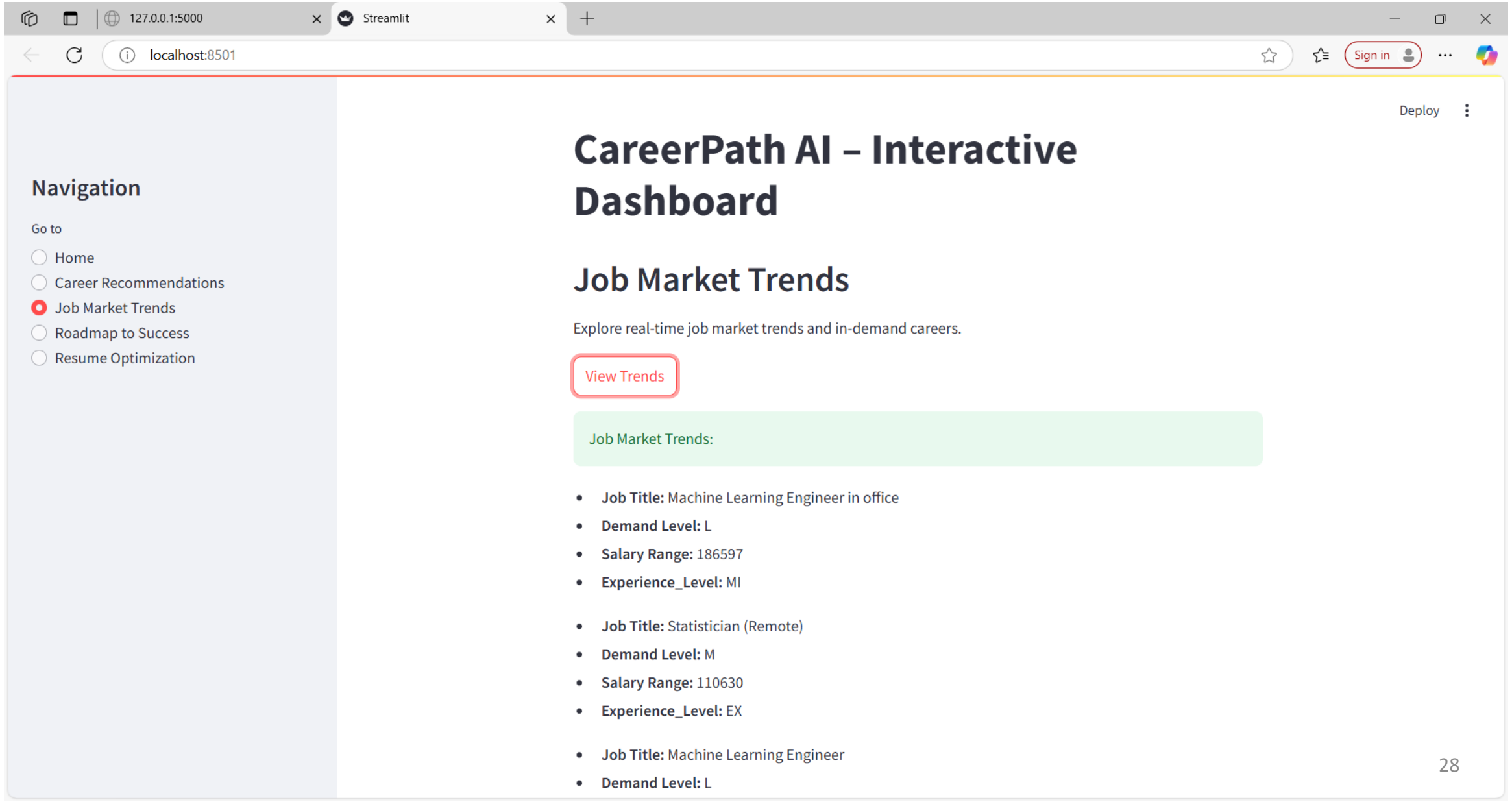
Career Recommendation output



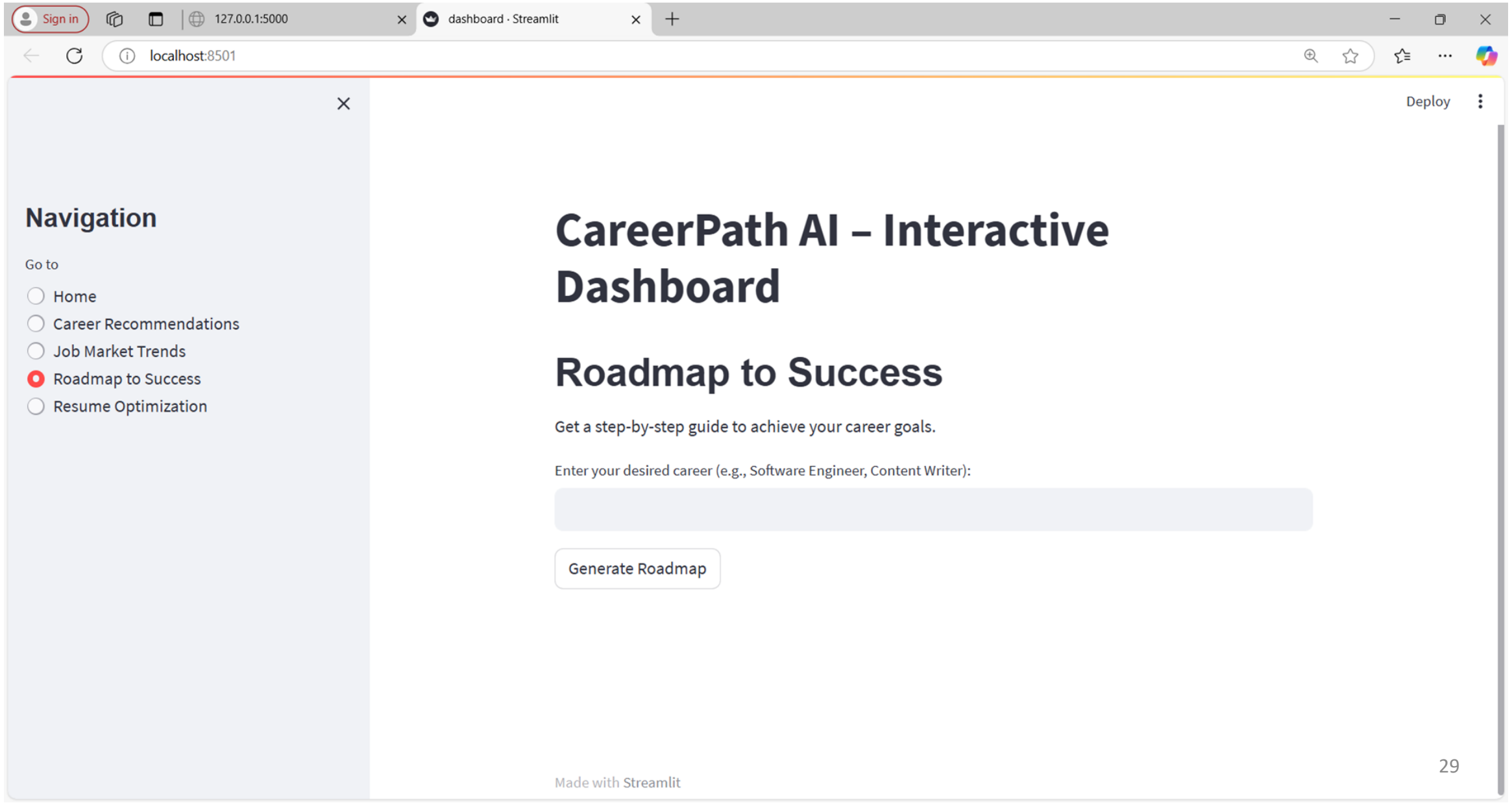
Job Market Trends



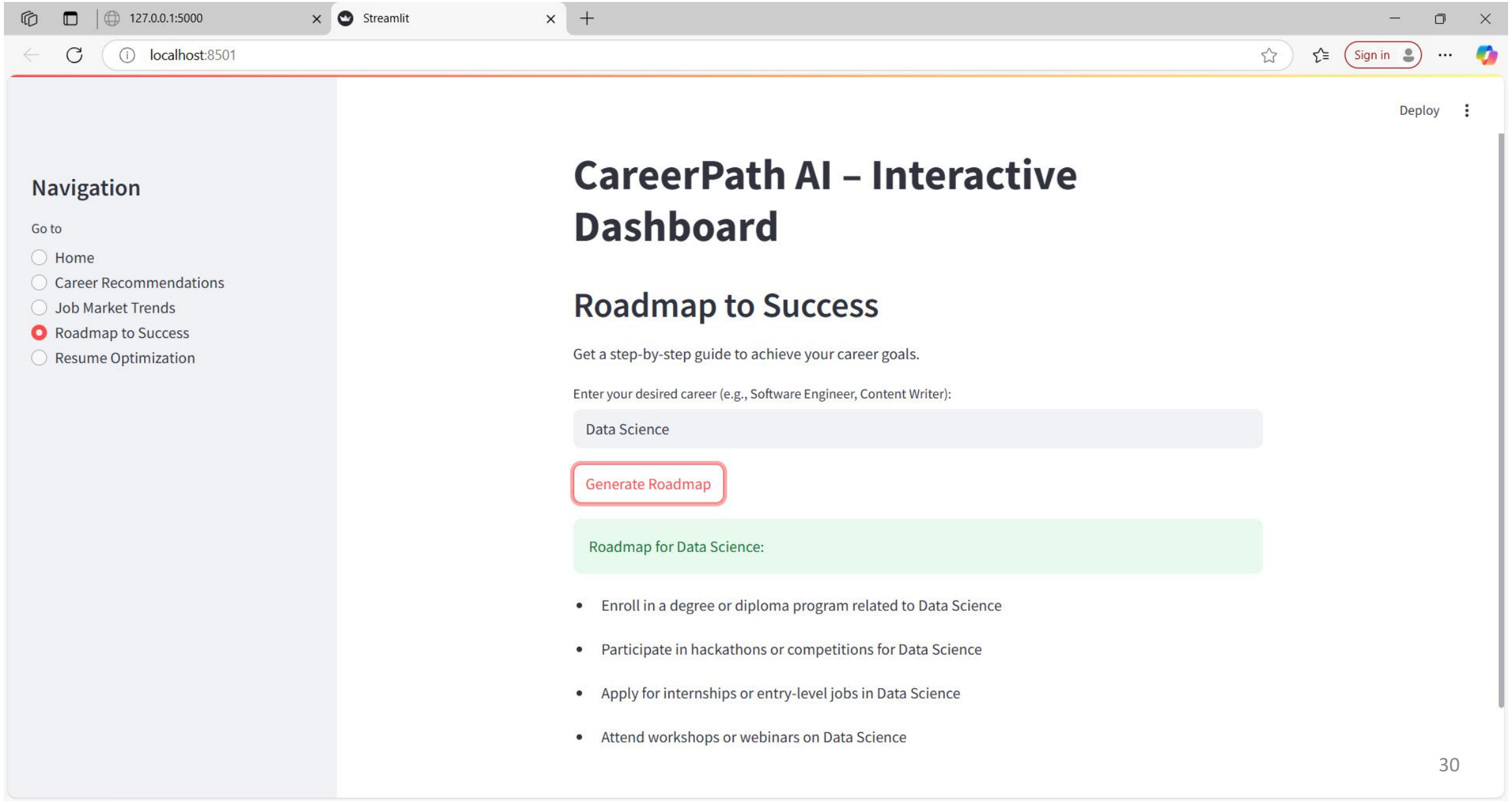
Job Market Trends output



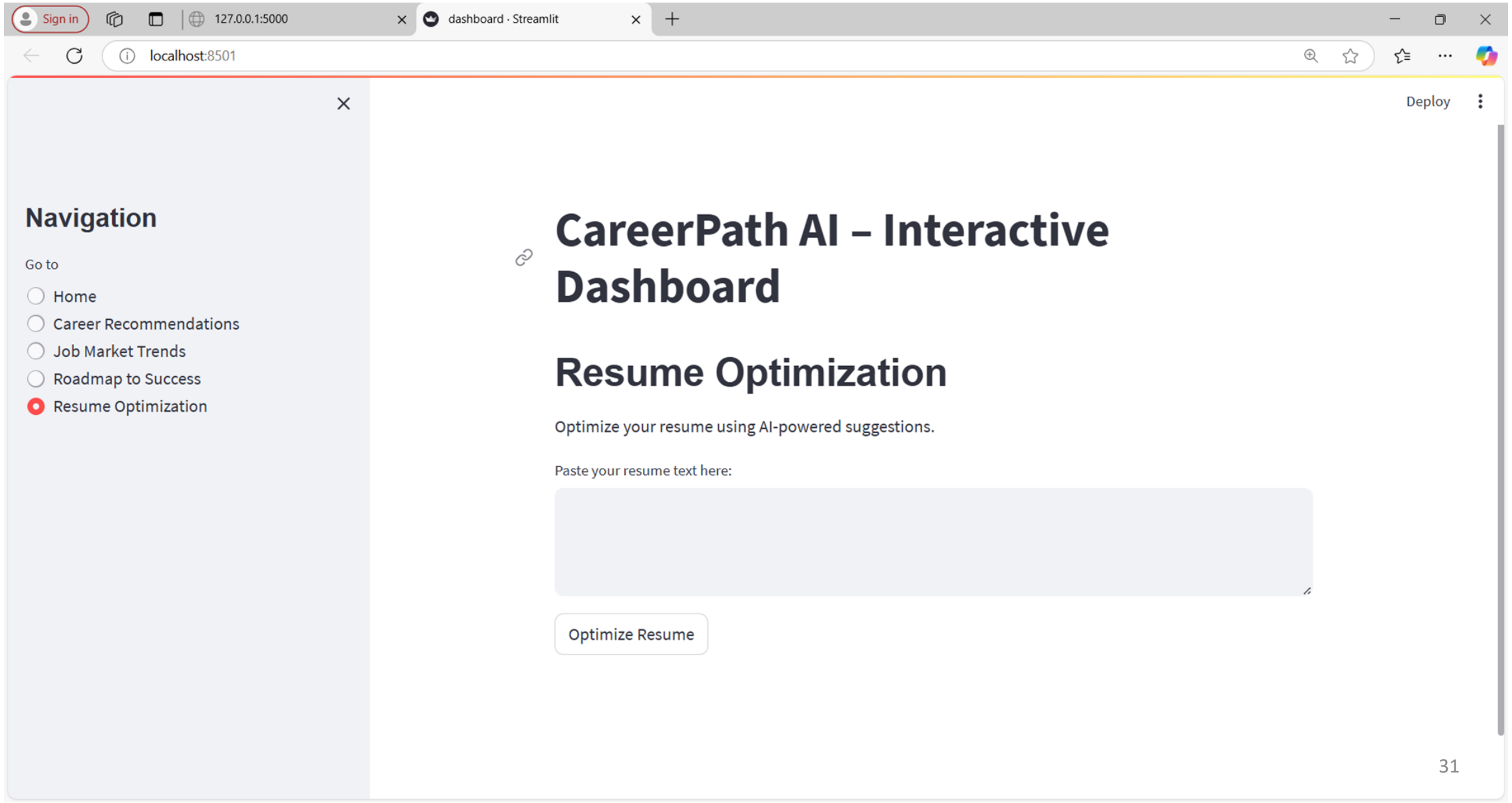
Roadmap to Success



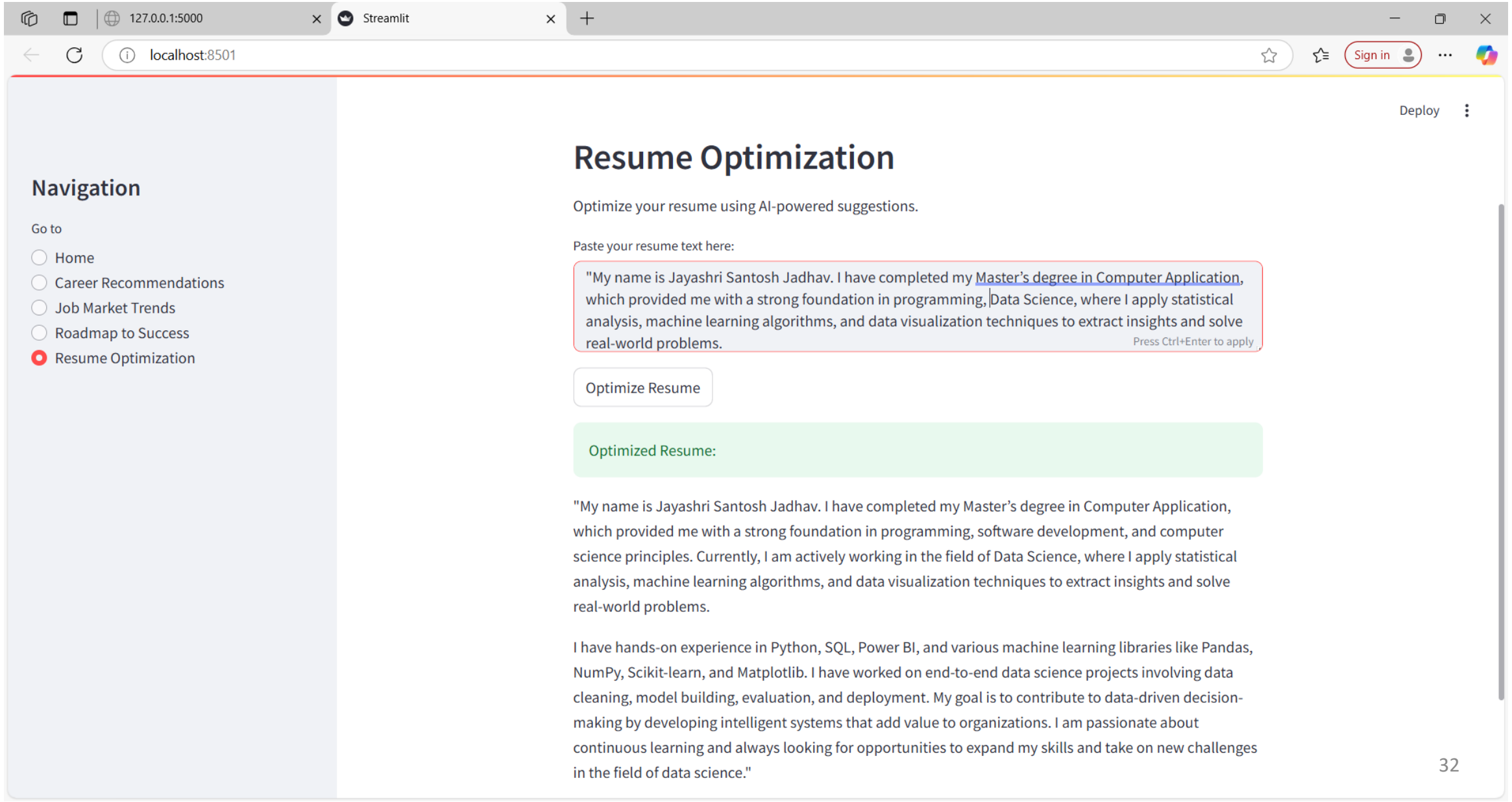
Roadmap to Success output



Resume Optimization



Resume Optimization output



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