



# 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

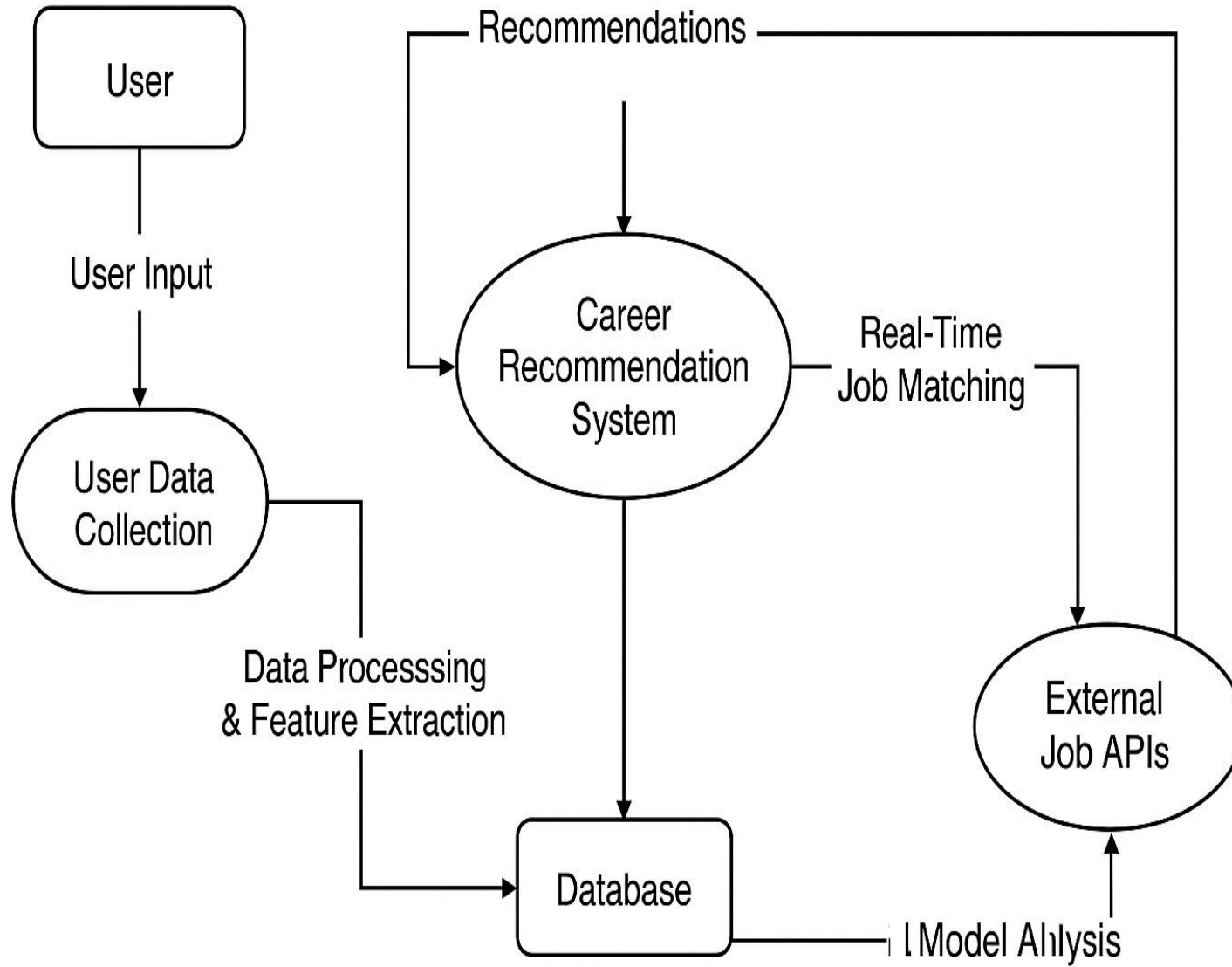
# System Analysis

## Requirements

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

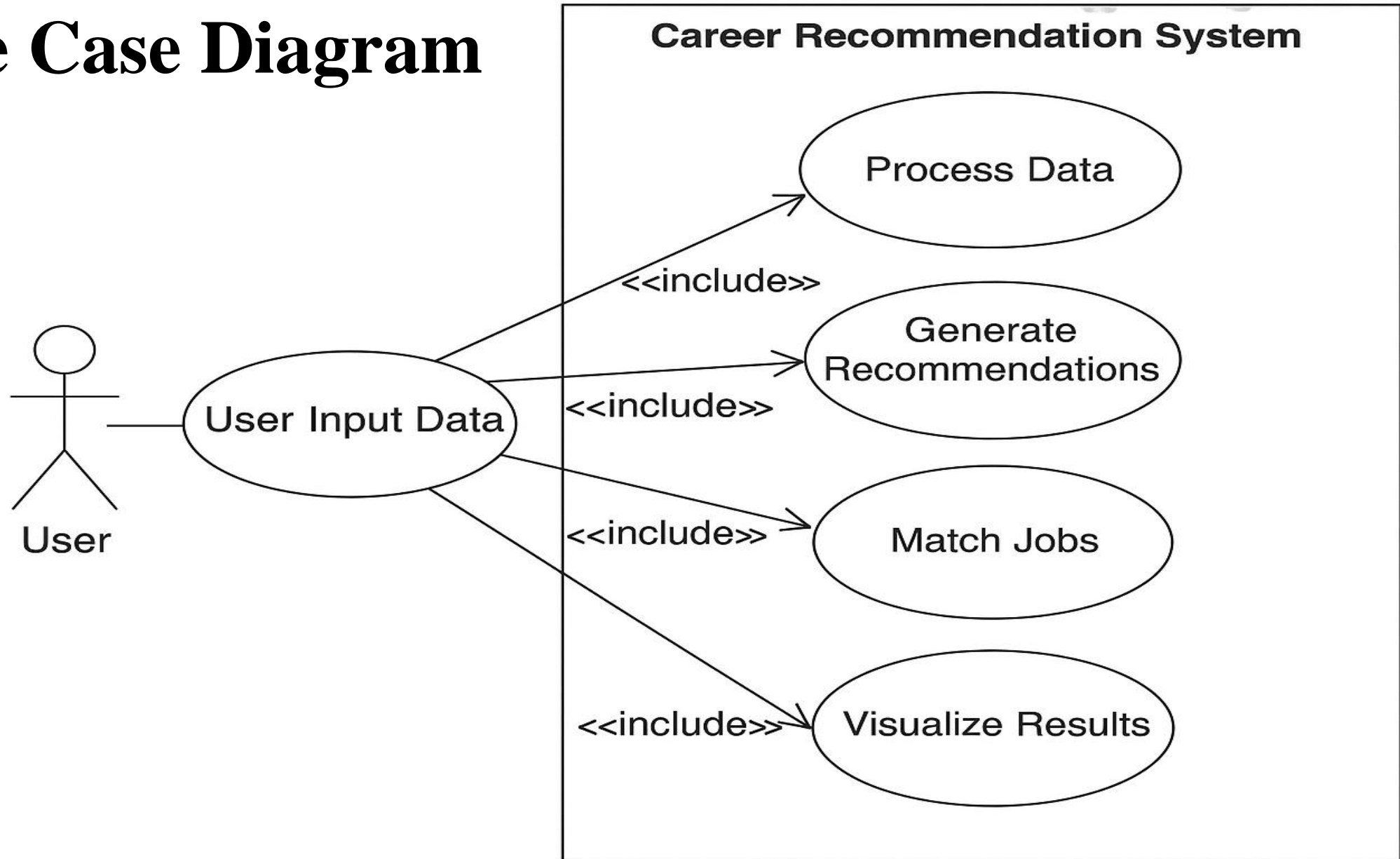
# System Design :

## DFD Diagram (Data Flow Diagram)

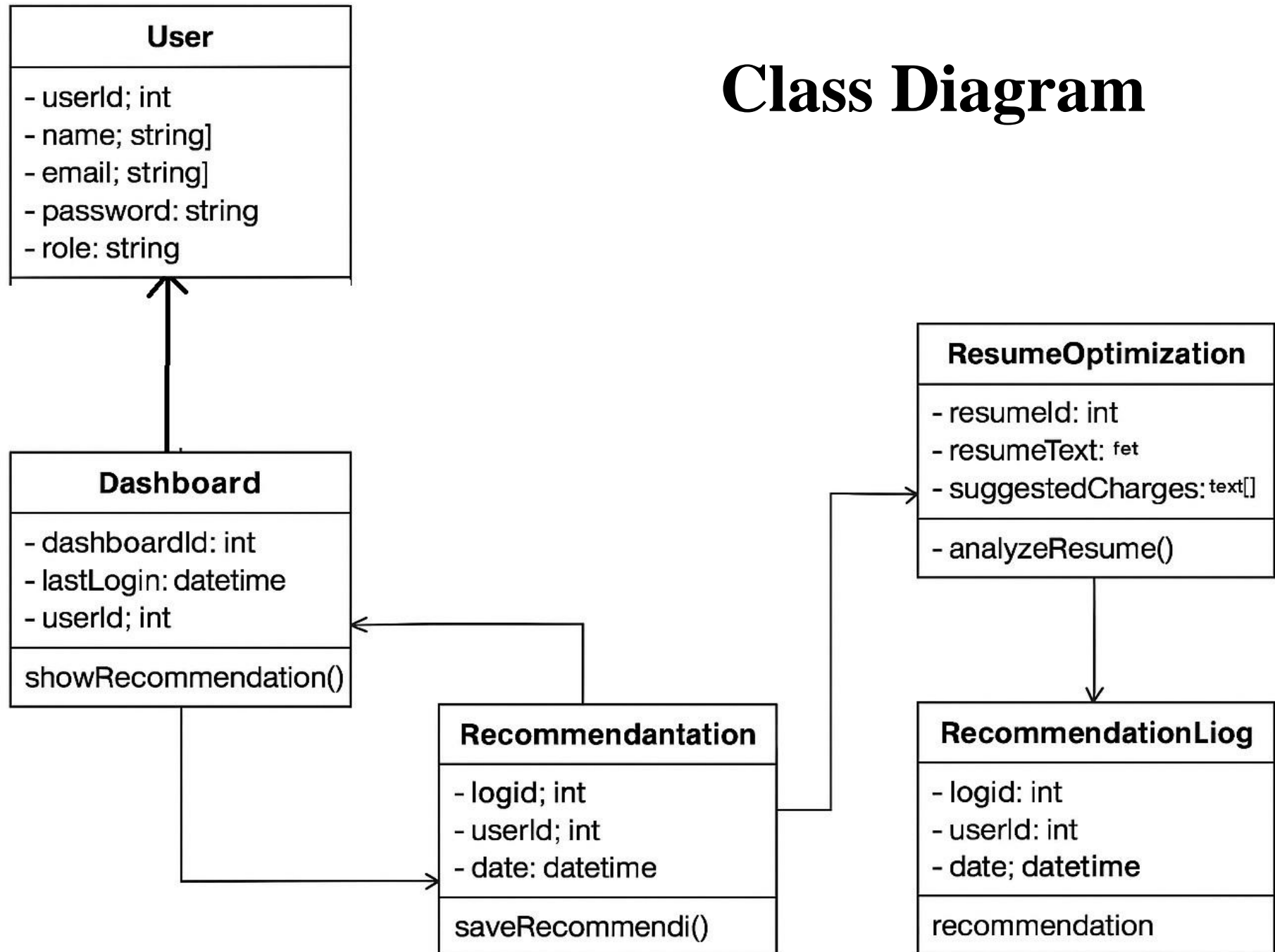




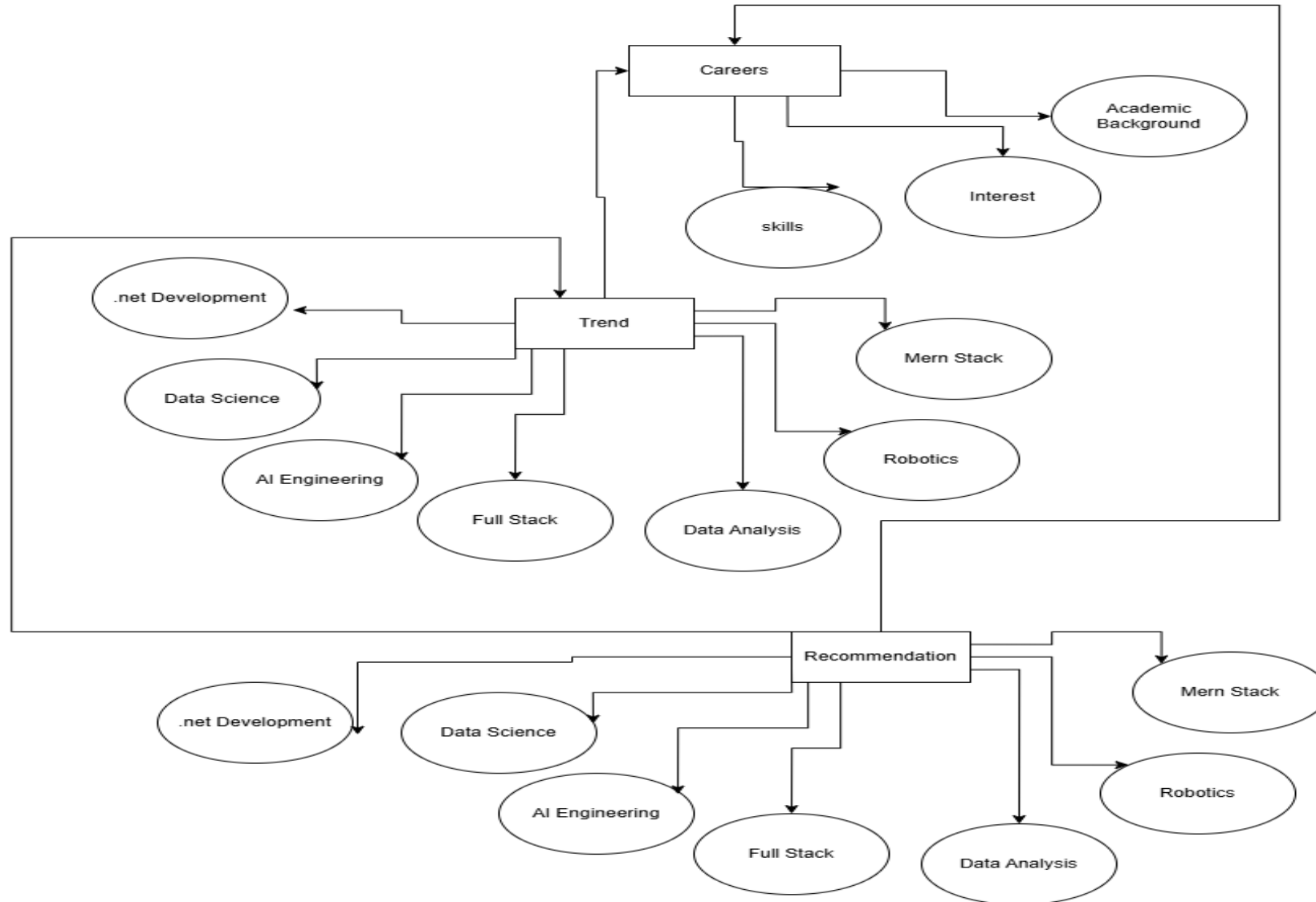
# Use Case Diagram



# 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        |

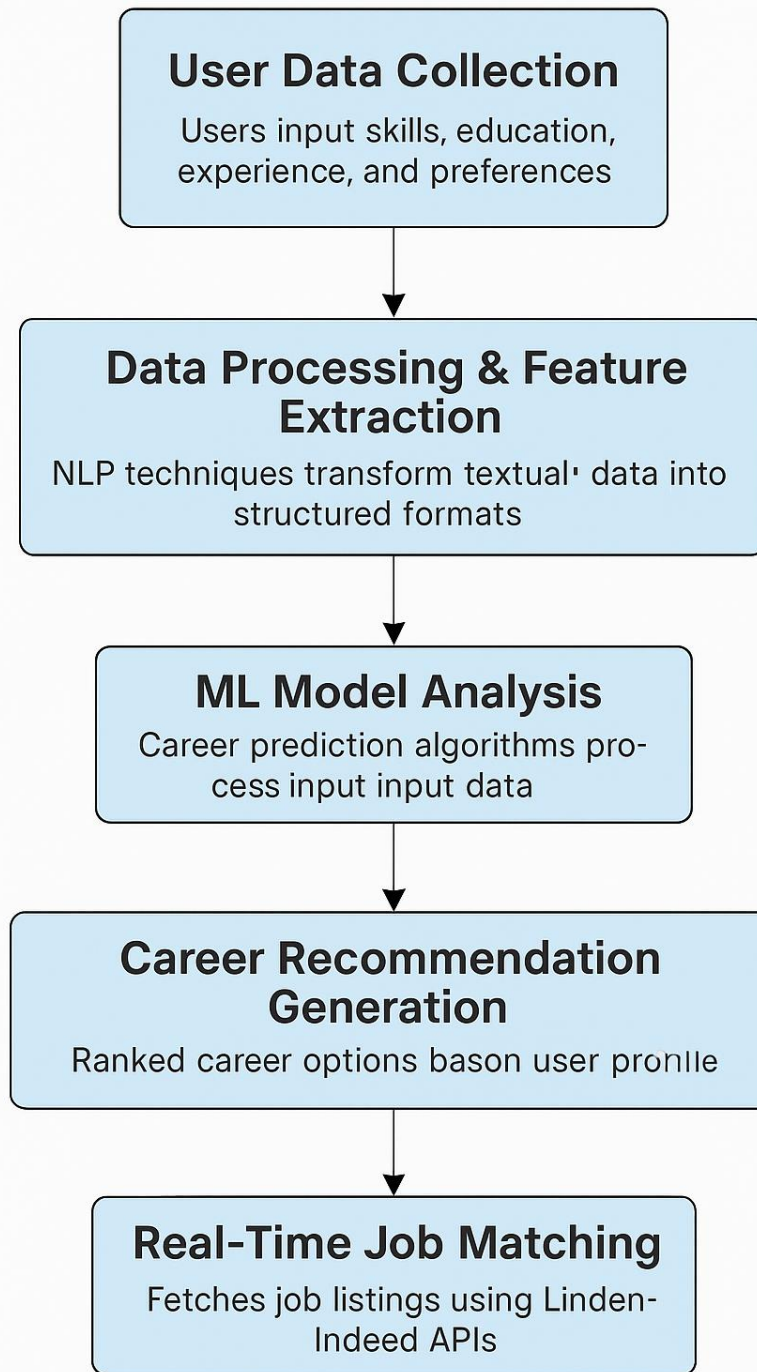
# AI/ML Implementation

- **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

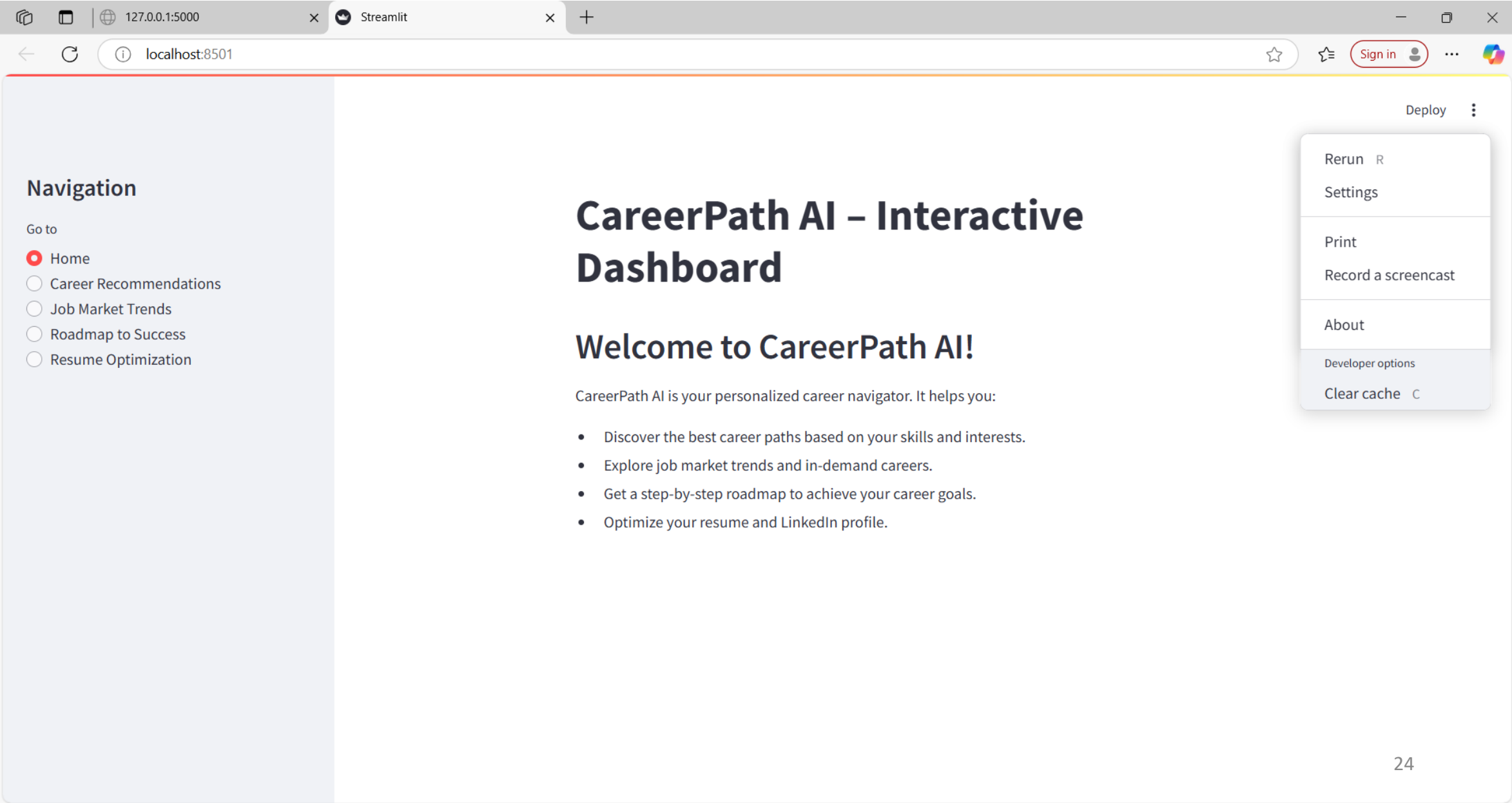
## Welcome to CareerPath AI!

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

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



## 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

# Career Recommendation output

The screenshot shows a web browser window with multiple tabs. The active tab is titled 'localhost:8501'. The web application has a sidebar on the left with a 'Navigation' section containing five radio buttons: 'Home', 'Career Recommendations' (which is selected), 'Job Market Trends', 'Roadmap to Success', and 'Resume Optimization'. The main content area is titled 'Career Recommendations' and includes a sub-header '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):' with the value 'python', 'Enter your interests (e.g., Technology, Literature):' with the value 'AI', and 'Enter your academic background (e.g., Computer Science, English):' with the value 'phd'. A red-outlined button labeled 'Get Recommendations' is positioned below the input fields. Below this button, a green box contains the text 'Your Career Recommendations:'. At the bottom, a list of five recommended careers is shown: 'Digital Marketer', 'Front-end Developer', 'Content Strategist', 'AI Specialist', and 'Data Analyst'. In the top right corner of the application, there is a 'Deploy' button and a 'Sign in' button. The page number '26' is visible in the bottom right corner of the browser window.

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

26

# Job Market Trends

Sign in

127.0.0.1:5000

dashboard · Streamlit

localhost:8501

Deploy

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

Navigation

Go to

☐ Home

☐ Career Recommendations

☒ Job Market Trends

☐ Roadmap to Success

☐ Resume Optimization

Deploy

# 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

# Roadmap to Success

Sign in

127.0.0.1:5000

dashboard · Streamlit

localhost:8501

Deploy

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

# Roadmap to Success output

The screenshot shows a web browser window with the address bar at `localhost:8501`. The browser tabs include a Streamlit application. The web application has a sidebar navigation menu with the following items:

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

The main content area is titled "CareerPath AI – Interactive Dashboard" and "Roadmap to Success". It contains the following text and elements:

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

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

Data Science

**Generate Roadmap**

Roadmap for Data Science:

- 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

In the top right corner of the application, there is a "Deploy" button and a "Sign in" button. The page number "30" is visible in the bottom right corner.

# Resume Optimization

Sign in

127.0.0.1:5000

dashboard · Streamlit

localhost:8501

Deploy

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

# Resume Optimization output

Navigation

Go to

☐ Home

☐ Career Recommendations

☐ Job Market Trends

☐ Roadmap to Success

☒ Resume Optimization

Deploy

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."



# 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