Project Proposal

Project Title

MatchMyTalent Engine – AI-powered Career Recommendation & Skill Gap Analysis System

Introduction

Career development is one of the most crucial aspects for students, graduates, and professionals in today's fast-paced job market. With emerging technologies and evolving industry requirements, it becomes challenging to identify which skills are in demand and how well a person's current skill set aligns with potential job roles.

Existing career recommendation platforms often provide generic job suggestions and do not offer personalized insights into skill gaps or actionable learning plans.

The **MatchMyTalent Engine** aims to bridge this gap by:

- Recommending suitable job roles based on user-input skills or desired job titles.
- Highlighting missing skills required for target roles.
- Providing a personalized learning roadmap to fill skill gaps.
- Suggesting relevant courses from online learning platforms.

This system empowers users to make data-driven decisions about their career growth and learning priorities.

Problem Statement

Despite the availability of career guidance tools, users face several challenges:

1. **Mismatch between skills and jobs:** Users often apply for jobs without knowing if they possess the required skills.
2. **Lack of skill gap visualization:** There is no intuitive way to highlight which skills need improvement.
3. **Limited learning guidance:** Existing platforms rarely suggest actionable steps to acquire missing skills.
4. **Generic recommendations:** Recommendations are not tailored to the user's current skill set or interests.

Project Goal: To develop an interactive system that evaluates user skills, identifies gaps, and provides personalized career recommendations and learning plans.

Objectives

The main objectives of the project are:

1. **Skill-Based Job Recommendation:** Recommend jobs that align with the user's current skill set.
2. **Job Title Search:** Allow users to search for jobs by entering a desired job title and obtain detailed requirements.
3. **Skill Gap Analysis:** Identify skills the user lacks for a particular job role.
4. **Learning Roadmap Generation:** Create a step-by-step plan to acquire missing skills.
5. **Course Recommendations:** Suggest online courses for acquiring missing skills.
6. **User-Friendly Interface:** Develop a clean, modern, and interactive UI to visualize matches, missing skills, and learning roadmap.

Scope of the Project

Target Users:

- Students, graduates, and working professionals seeking career guidance.

Functional Scope:

- Job recommendation based on skills or job titles.
- Visual display of matched and missing skills.
- Personalized learning roadmap for skill development.
- Suggested online courses for missing skills.
- Display job descriptions, match scores, and confidence levels.

Technical Scope:

- Backend: Python, Flask
- Data Processing: pandas, scikit-learn
- Skill Analysis: TF-IDF vectorization, cosine similarity
- Frontend: HTML, CSS, JavaScript, badges, progress bars, Particles.js

Limitations:

- Recommendations are limited by the dataset used.
- Does not predict future job trends or evolving skill requirements.
- No user account management or persistent storage in the current version.

Literature Review

Several existing systems provide job recommendations, but they have limitations:

System	Limitation
LinkedIn Career Explorer	Generic recommendations, lacks skill gap analysis

System	Limitation
Coursera Career Path Tool	Focused on courses rather than job matching
Kaggle datasets projects	Typically offline and require manual analysis

Innovations of MatchMyTalent Engine:

- Personalized recommendations based on **user skills**.
- Skill gap visualization using interactive badges and progress bars.
- Generation of **learning roadmap** for acquiring missing skills.
- Integration of **recommended courses** from multiple platforms.

Methodology

Data Collection

- Dataset: new_jobs.csv
- Columns: Job Title, Skills (comma-separated), Job Description

Sample:

Job Title	Skills	Job Description
Data Scientist	Python,SQL,Machine Learning	Responsible for data analysis and model building

Data Preprocessing

- Remove missing values.
- Standardize skills to lowercase.
- Strip whitespace and special characters.
- Prepare skill data for **TF-IDF vectorization**.

TF-IDF Vectorization

- Converts textual skill sets into numerical vectors.
- Captures the importance of skills relative to other jobs.

Formula:

$$\text{TF-IDF} = \text{TF} \times \log \frac{N}{n_t}$$

Where:

- (TF) = Term frequency of a skill in the job
- (N) = Total number of jobs
- (n_t) = Number of jobs containing the skill

Cosine Similarity

- Measures similarity between user skill vector and each job vector.
- Formula:

$$\cos(\theta) = \frac{A \cdot B}{\|A\| \, \|B\|}$$

- Score range: 0 (no match) to 1 (perfect match).

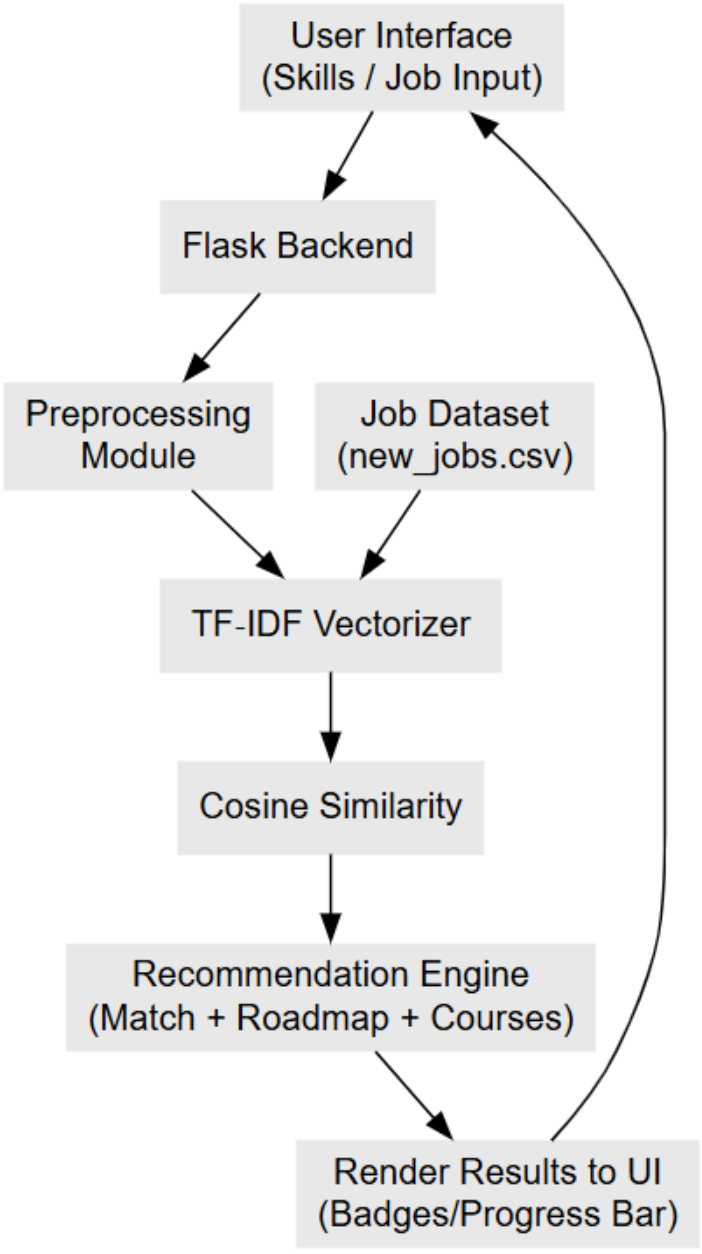
Recommendation Algorithm

1. Input: Skills or job title.
2. Convert skills into TF-IDF vector.
3. Compute cosine similarity between user skills and all jobs.
4. Select **top 5 matching jobs**.

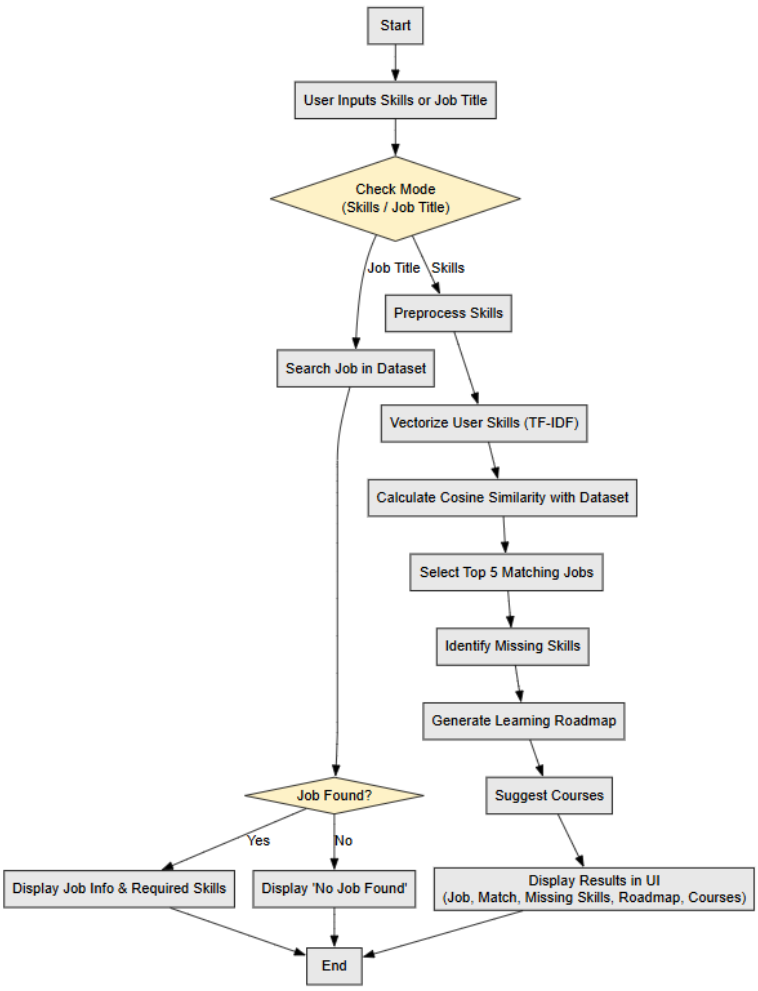
5. Identify missing skills for each job.
6. Generate **learning roadmap** for missing skills.
7. Suggest online courses relevant to missing skills.

System Design

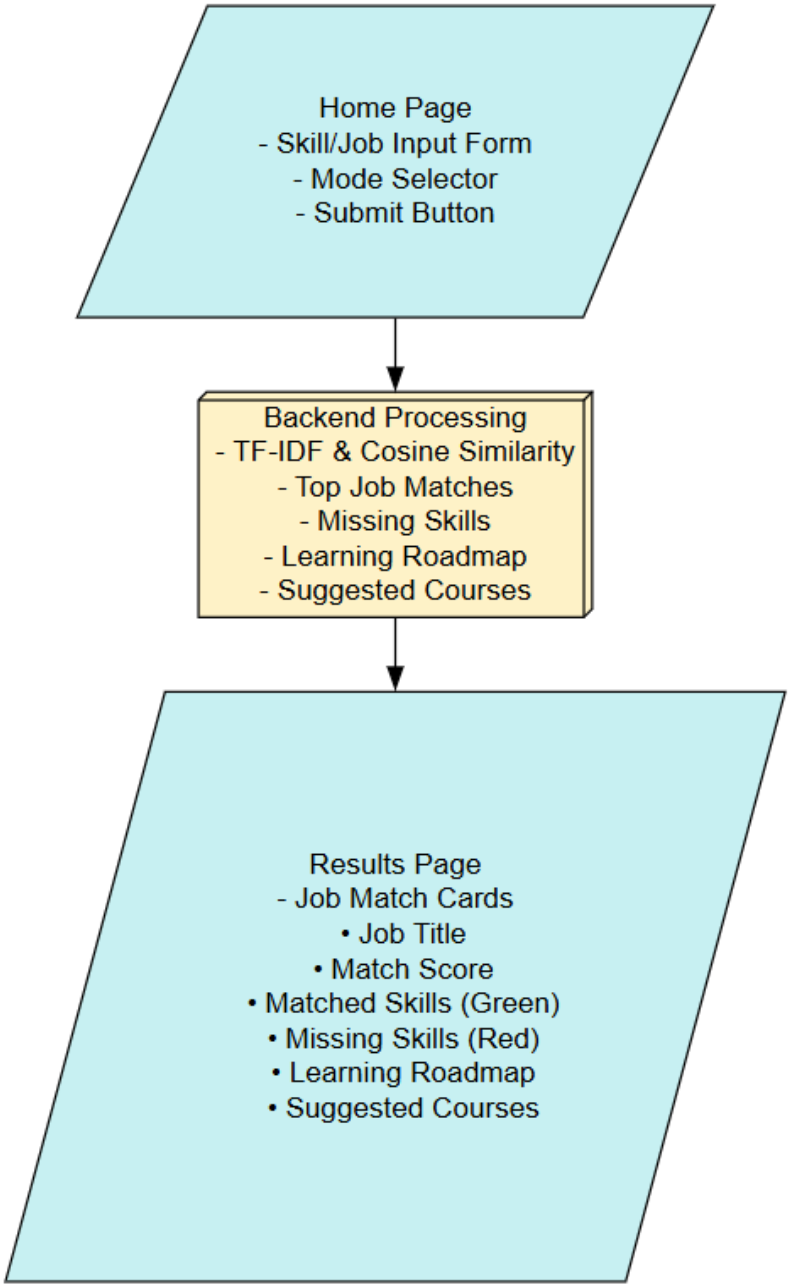
Architecture Diagram



Flowchart


Start
User Inputs Skills or Job Title
Check Mode
(Skills / Job Title)
Job Title
Skills
Preprocess Skills
Search Job in Dataset
Vectorize User Skills (TF-IDF)
Calculate Cosine Similarity with Dataset
Select Top 5 Matching Jobs
Identify Missing Skills
Generate Learning Roadmap
Suggest Courses
Job Found?
Yes
No
Display Job Info & Required Skills
Display 'No Job Found'
Display Results in UI
(Job, Match, Missing Skills, Roadmap, Courses)
End

User Interface



Tools and Technologies

Component	Technology / Library
Backend	Python, Flask
Data Processing	pandas, scikit-learn
Skill Analysis	TF-IDF, Cosine Similarity
Frontend	HTML, CSS, JavaScript
UI Enhancements	Particles.js, CSS badges, progress bars
IDE	VS Code

Perfect! Here's a **ready-to-add section for your report** showing **working of the app**, a **detailed description**, and placeholders for images. You can replace the placeholders with your actual screenshots.

Working of the App

The **MatchMyTalent Engine** is an AI-powered career recommendation system that analyzes a user's skills or desired job title to provide personalized job recommendations, skill gap analysis, learning roadmap, and suggested courses.

Step 1: Home Page Input

- **Description:**
  The user opens the home page and sees a clean interface with:
  - An **input box** to enter skills (comma-separated) or a **job title**.
  - A **mode selector** to choose between "Search by Skills" or "Search by Job Title."

- A **submit button** labeled **Analyze**.

- **Purpose:**
  Collect user input to generate personalized recommendations.

Screenshot Example:

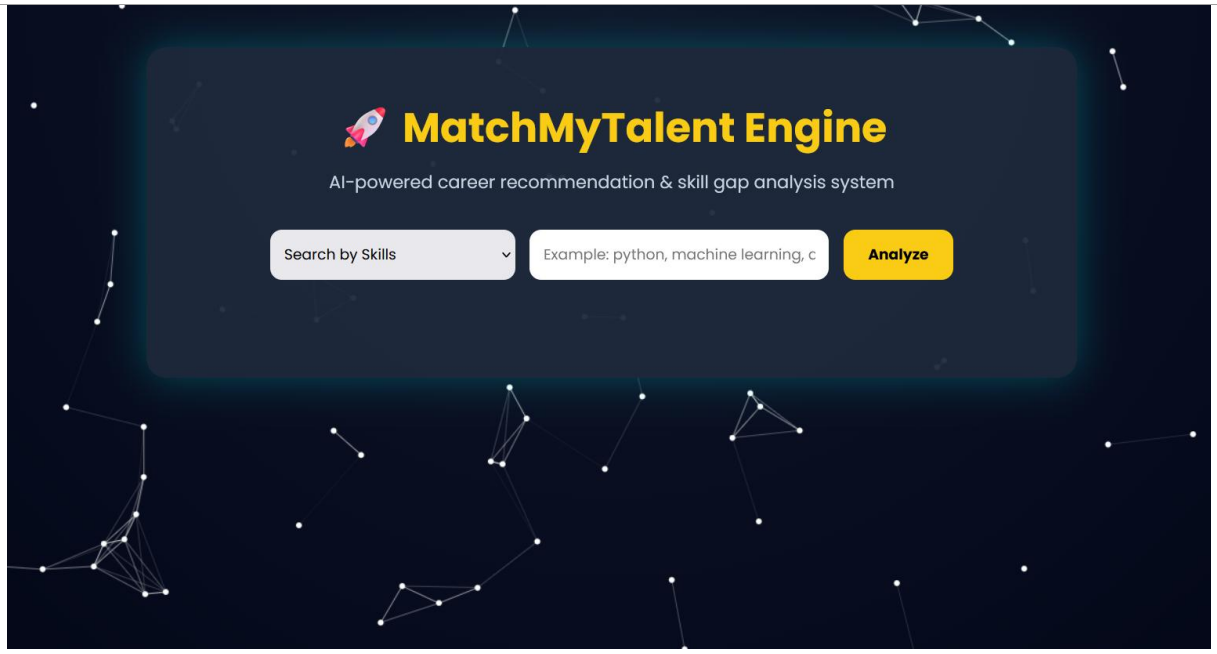


Fig1:Home page with job/skill input form.

Step 2: Backend Processing

- **Description:**
  After submission, the backend performs the following steps:

  1. **Input Parsing:** Splits skills or identifies job title.
  2. **Vectorization:** Uses **TF-IDF Vectorizer** to convert skills into numerical vectors.
  3. **Similarity Calculation:** Computes **cosine similarity** with all job profiles in the dataset.
  4. **Match Score:** Calculates how closely user skills match the job requirements.
  5. **Skill Gap Analysis:** Identifies **missing skills**.
  6. **Learning Roadmap:** Suggests skills to learn next.

7. **Course Recommendations:** Provides top courses from platforms like Coursera, Udemy, and IBM.

Step 3: Results Page

- **Description:**
  The results page displays the recommendation in a **card-based layout** for each matching job. Each card includes:
  - **Job Title**
  - **Match Score** (visualized with a progress bar)
  - **Matched Skills** (green badges)
  - **Missing Skills** (red badges)
  - **Learning Roadmap** (step-by-step guide)
  - **Suggested Courses**
- **Purpose:**
  Helps users quickly understand which skills they have, which they are missing, and how to improve for a targeted career path.

Screenshot Example:

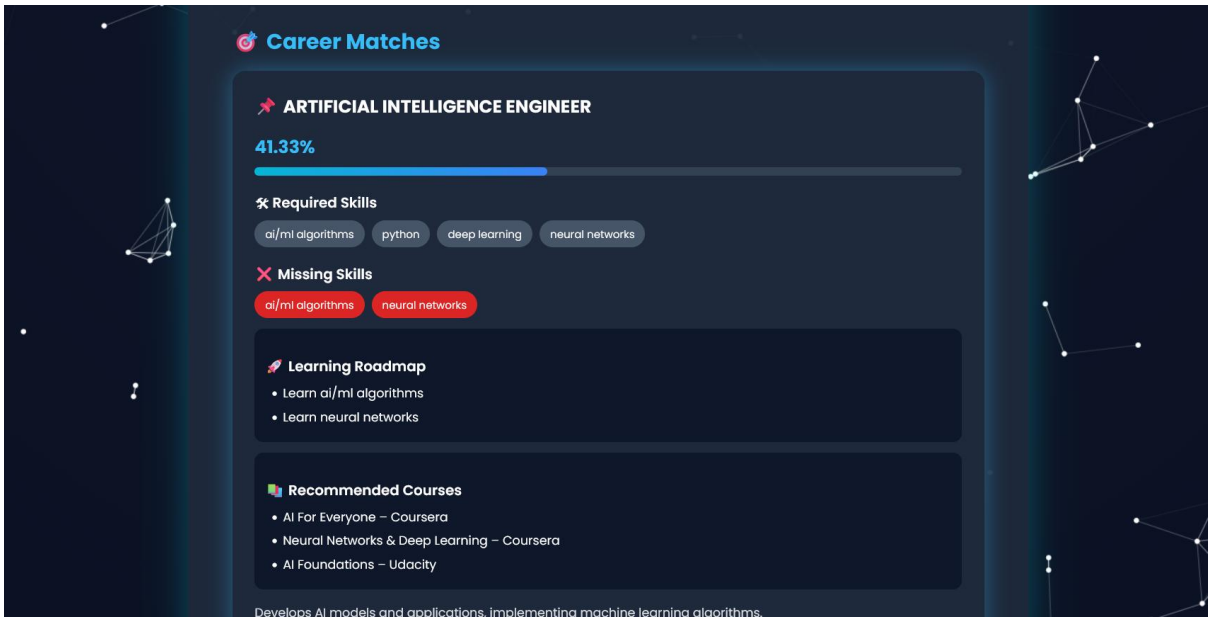


Figure 2: Results page showing match score, missing skills, learning roadmap, and recommended courses.

Screenshot :

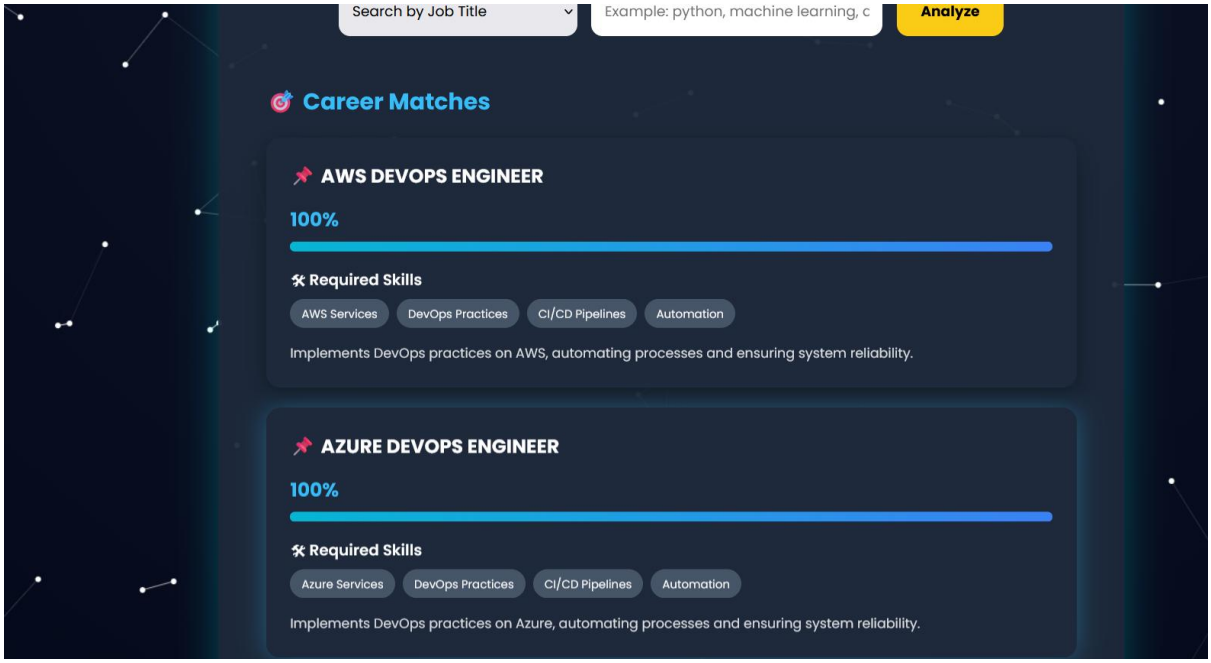


Fig:Matching Skills

Step 4: User Action

- Users can review their **skill gaps** and follow the **learning roadmap**.
- Users can take the **suggested courses** to improve missing skills.
- This ensures a **clear path from current skills to desired job roles**.
- Here's a **polished conclusion** you can add at the end of your report:

Conclusion

The **MatchMyTalent Engine** successfully demonstrates a skill-based career recommendation system that bridges the gap between a user's current skills and desired job roles. By leveraging **TF-IDF vectorization** and **cosine similarity**, the system accurately identifies job matches, highlights missing skills, and generates a personalized **learning roadmap**.

The web application provides an **intuitive interface** where users can search by skills or job title and receive detailed insights into their career path. Suggested courses help users address skill gaps efficiently, making the platform not only a recommendation engine but also a **career guidance tool**.

In summary, this project showcases the **practical integration of machine learning with web development** to solve a real-world problem, offering users actionable insights and a structured path for career growth. Future enhancements could include **advanced ML models for better recommendations, interactive dashboards, and real-time job market data integration** to make the system even more dynamic and personalized.