

SMART CAREER ADVISOR

AI-Powered Career Decision Engine for Students

Team: Code Crafters

Frontend: React (Vite) + TailwindCSS + Recharts

Backend: FastAPI + Python NLP + ML Models

Modules: Dashboard | Find Jobs | Resume Builder | Job Prep | Success Roadmap | Career Roadmap | Company Prep | Model Prediction | Report Card

1. Overview

Smart Career Advisor is an AI-powered career guidance platform designed to solve one of the biggest problems students face today: **career preparation confusion**.

Currently, students use separate platforms for:

- Resume checking
- Job searching
- Course learning
- Mock interviews

However, these tools do not communicate with each other and do not provide a single unified answer to the most important question:

“Am I preparing in the right direction?”

Smart Career Advisor integrates all these steps into a **single modular AI decision engine**. It provides measurable outputs such as:

- Resume vs Job Description match score
- Missing skill gap detection
- Job vacancies by domain
- Resume generation + improvement suggestions
- Mock interview preparation
- Career and success roadmaps
- Company hiring pattern analysis + crack plan
- ML predictions for salary, job role, domain fit, placement probability, and skill match
- A final Report Card showing progress, performance, and future projection

2. Problem Statement

Students often prepare for placements and careers without a clear plan.

Major Issues

1. Fragmented Platforms

- Resume tools, job portals, and interview apps work separately.

2. No Progress Tracking

- Students cannot track how their preparation is improving over time.

3. Generic Recommendations

- Most platforms give the same advice to everyone.

4. No Explainability

- Students do not know why they are not selected or what exactly is missing.

5. No Future Projection

- Tools do not show how improvements affect salary, role fit, or company opportunities.

Result

- Wrong preparation
- Confusion
- Wasted time
- Missed opportunities

3. Objective of the Project

The main objective is to build a unified career guidance system that is:

- Personalized
- Explainable
- Measurable
- Actionable
- End-to-end

Specific Objectives

1. Compare resume and job description using NLP.

2. Identify matched and missing skills.
3. Suggest missing skills learning paths and project ideas.
4. Provide job listings across domains and vacancy counts.
5. Generate professional resumes from user Q&A.
6. Provide AI suggestions to improve resume content.
7. Provide job preparation tools: aptitude, technical, coding, and mock interviews.
8. Generate career and success roadmaps.
9. Provide company preparation:
 - o last 3 years hiring patterns
 - o 7-week crack plan
10. Provide ML predictions:
 - placement probability
 - job role
 - salary
 - domain fit
 - skill match
11. Generate a final report card summarizing all modules with before/after projections.

4. Methodology

Smart Career Advisor is built using a modular pipeline methodology. Each feature works independently but contributes to a unified report.

Step-by-Step Methodology

Step 1: Input Collection

- Resume upload (PDF/DOCX/TXT)
- Job description upload
- User profile information (skills, education, experience)
- Domain/company selection

Step 2: Text Extraction

Text is extracted from files using:

- PDF parsers
- DOCX parsers
- raw text parsing

Step 3: NLP Analysis

- Skill extraction using:
 - spaCy NER (if enabled)
 - keyword fallback
- Similarity computed using:
 - CountVectorizer + cosine similarity
- Outputs:
 - matched skills
 - missing skills
 - extra skills

Step 4: Recommendation Engine

- Missing skill learning resources mapping
- Project ideas generation
- Resume enhancement suggestions

Step 5: ML/DL Predictions

Multiple trained ML models generate:

- placement prediction
- job role prediction
- salary prediction
- domain fit prediction
- skill match prediction

Step 6: Roadmaps

- career roadmap by domain
- success roadmap by timeline

Step 7: Report Card Generation

All module outputs are combined into:

- readiness score
- explainability reasons
- improvement plan
- future snapshot projection

5. System Architecture

The system follows a 2-tier architecture:

Frontend (React)

- UI pages for each module
- Interactive charts and dashboards
- API integration using Axios
- Real-time result rendering

Backend (FastAPI)

- REST API endpoints
- NLP pipeline
- ML model inference
- recommendation logic
- report card aggregation

6. Implementation and Working of the System

6.1 Dashboard Module (Resume vs JD Analyzer)

Purpose

To analyze resume and job description and compute skill match.

Inputs

- Resume file
- Job description file

Core Logic

- Extract text from both documents

- Convert text to vectors using CountVectorizer
- Compute similarity score
- Extract skills using NLP
- Build a dataframe of matched/missing skills
- Suggest:
 - missing skills
 - learning resources
 - projects to add
- Generate graphs:
 - skill match chart
 - radar chart

Outputs

- Resume match score (%)
- matched skills list
- missing skills list
- project suggestions
- live graphs

6.2 Find Jobs Module

Purpose

To provide job availability across domains and show vacancy counts.

Inputs

- selected domain
- selected job role

Core Logic

- Fetch job dataset via API or JSON
- Filter by domain/role
- Count vacancies
- Show trending roles

Outputs

- job list with domain
- vacancy count
- role-wise availability

6.3 Resume Builder Module

Purpose

To generate a premium resume from user answers and improve it.

Inputs

- user Q&A form
- experience
- education
- skills

Core Logic

- Convert form input into structured JSON
- Generate HTML resume template
- Provide AI-based improvement suggestions
- Allow user to download the resume

Outputs

- premium resume HTML
- improvement suggestions
- downloadable resume

6.4 Job Prep Module

Purpose

To prepare users for interviews and placements.

Inputs

- job role
- skills

- job description

Core Logic

- Generate technical questions from JD
- Generate aptitude questions
- Provide coding challenges
- Provide mock interview simulation
- AI feedback + scoring

Outputs

- question sets
- mock interview feedback
- skill improvement areas

6.5 Success Roadmap Module

Purpose

To provide a timeline-based preparation plan.

Core Logic

- Uses structured templates for:
 - 7 days
 - 30 days
 - 90 days
- Assign tasks:
 - skills
 - projects
 - job applications
 - interview practice

Outputs

- weekly plan
- progress checklist

6.6 Career Roadmap Module

Purpose

To provide a domain-based learning roadmap.

Core Logic

- Domain selection:
 - Web Development
 - Data Science
 - AI/ML
 - Cybersecurity
 - Cloud
- Generates phases:
 - foundation
 - intermediate
 - specialization
 - projects
 - interview prep

Outputs

- structured roadmap
- resources

6.7 Company Prep Module

Purpose

To help users crack a company using hiring history and targeted preparation.

Inputs

- company name
- role

Core Logic

- Stores last 3 years hiring process:
 - number of rounds

- difficulty level
- subjects asked
- Generates:
 - 7-week crack plan
 - required core subjects
 - required projects
 - required DSA topics

Outputs

- 3-year hiring process report
- 7-week preparation plan
- skill checklist

6.8 Model Prediction Module

Purpose

To provide AI/ML-based career predictions.

Models Included (5 predictions)

1. Placement prediction
2. Job role prediction
3. Salary prediction
4. Domain fit prediction
5. Skill match prediction

Core Logic

- Uses pre-trained ML models (.pkl)
- Inputs:
 - academics
 - experience
 - skills
 - certifications
- Outputs:

- prediction label
- confidence score

6.9 Report Card Module (Final Decision Engine)

Purpose

To unify everything into a measurable final report.

Inputs

- all module outputs
- usage tracking
- timestamps

Core Logic

- Calculate Career Readiness Score out of 100
- Breakdown score by:
 - resume match
 - skill match
 - domain fit
 - internship/certifications
 - interview readiness
- Generate:
 - Current Snapshot (before improvement)
 - Future Snapshot (after improvement)
- Show:
 - recommended roles
 - expected salary
 - target companies
 - vacancy status

Outputs

- final report card
- before vs after comparison

- downloadable report

7. Results and Discussion

Smart Career Advisor successfully demonstrates an end-to-end AI pipeline.

Achieved Results

- Resume vs JD match scoring
- Skill gap detection
- Job vacancy listing
- Resume generation and improvement
- Interview prep question generation
- Roadmap generation
- Company prep plan
- ML predictions
- Final report card

Discussion

The platform differs from LinkedIn/Naukri because it does not only list jobs.

It provides:

- readiness score
- explainability
- future projection
- actionable plan

8. Conclusion and Future Enhancements

Smart Career Advisor proves that career guidance can be:

- measurable
- explainable
- personalized
- end-to-end

Future Enhancements

- Real-time job scraping

- Database for persistent history tracking
- Semantic matching using transformers
- LLM-powered interview simulation
- Mobile app version

(B) WORKFLOW DIAGRAM TEXT (WORKBOOK)

[User Login]

|

v

[Dashboard: Upload Resume + JD]

|

v

[Text Extraction]

|

v

[NLP Skill Extraction + Similarity]

|

v

[Matched Skills | Missing Skills | Score | Graphs]

|

+-----+

|

|

v

v

[Find Jobs]

|

v

[Resume Builder]

|

v

[Jobs + Vacancies]

|

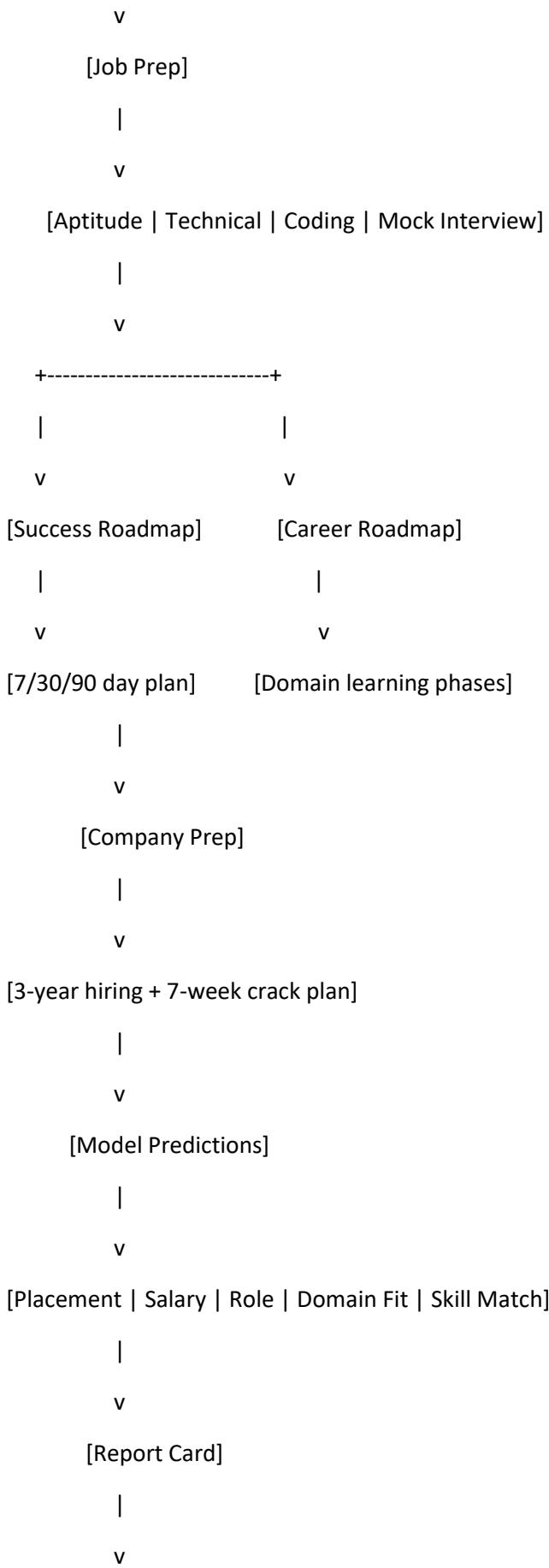
|

[Q&A -> Resume HTML + Enhancer]

+-----+

-----+

|



[Readiness Score + Before/After + Final Report Download]

(C) DATAFLOW DIAGRAM TEXT (DFD)

External Entity

- User

Processes

1. Resume/JD Analyzer
2. Jobs Finder
3. Resume Builder
4. Job Prep Engine
5. Roadmap Generator
6. Company Prep Engine
7. Prediction Engine
8. Report Card Generator

Data Stores

- Skills Resource Store
 - Jobs Dataset/API
 - Company Hiring Dataset
 - ML Model Store (.pkl)
 - Report History Store
-

Dataflow

User -> Resume/JD Analyzer -> Skill Match Results -> Report Card

User -> Jobs Finder -> Vacancy Results -> Report Card

User -> Resume Builder -> Resume Output -> Report Card

User -> Job Prep Engine -> Prep Score -> Report Card

User -> Roadmap Generator -> Roadmap Plan -> Report Card

User -> Company Prep -> Company Crack Plan -> Report Card

User -> Prediction Engine -> Predictions -> Report Card

Report Card -> Final Report -> User