

Talentmap: Intelligent Career Mapping System

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Abstract - "TalentMap: Intelligent Career Mapping System" is a Python/Flask web application designed to be used as an intelligent tool for analyzing resumes, extracting skills from resume information, predicting suitable jobs for the candidates and offering recommendations for personal career development. The system uses user-defined skills as well as other profile information provided by the user in his/her resume and maps it against the manually generated database of IT career roles. Based on similarities and skillset readiness of the candidate, the system provides suitable career path for the candidate. Moreover, in addition to mapping careers, the system recommends additional skills to be learned and determines skill gaps by comparing user skills with essential and intermediate skills needed for a particular job role chosen by the user. To further help users know how much they have to learn to advance their careers, a structured learning roadmap is offered by the system. Finally, the application supports user authentication, session management, history generation, and reporting features to make it more interactive and personalize the experience. Designed using Flask, SQLite, and skill comparison rules, the project focuses on explainable recommendations instead of predictions.

Key Words: TalentMap, career guidance, resume-based analysis, skill extraction, job role prediction, skill gap analysis, learning roadmap, Flask, Python, SQLite, user authentication, history tracking, session management, rule-based recommendation, IT career mapping.

1. INTRODUCTION

With an ever-increasing number of careers available, along with various types of required skills and learning pathways, career guidance has become a crucial need for today generation. In many cases, the user may know where he/she wants to go, but fails to realize whether his/her skills are sufficient for the targeted position or which skills are missing. Hence, in order to overcome such difficulties, the suggested application can be used to map out the user's career path based on his/her skills and resume as well as to determine the skills gaps.

In this application, the user's skill set or resume will be compared with the information about career roles stored in a pre-selected database. The database contains all types of career roles with corresponding skills needed at the beginner, intermediate, and advanced levels, along with related information concerning demands of the job market. Based on the analysis, the application will make suggestions regarding appropriate careers, determine

missing skills, and calculate the similarity level with respect to the targeted career. The main idea of this project is represented by personalized learning roadmap. Once the skills that are missing have been recognized, they are arranged in phases of learning and estimation of the time period during which they need to be mastered. Thus, the user gets the realistic understanding about the amount of work that needs to be done to reach the target position in a career. As opposed to providing the final scores or percentage matches, the system indicates which knowledge and skills are expected from the user next.

The application itself was designed using Python, Flask, and SQLite with some features aimed at making it more convenient for users: such as login, session management, history tracking, and summarization. Rule-based design principle makes the whole process rather simple and clear for all users. Overall, the use of career matching and skills gap recognition in combination with planning of time periods leads to creation of an easy-to-use.

2. Methodology

The suggested solution is based on a well-defined methodological process, which will help to determine and evaluate the skills provided by the user in terms of his/her resume. The process will help to compare the found skills with career requirements and highlight skills that the user is lacking and need to gain, thus helping him/her find a proper career path.

2.1 Data Collection from the User Profile

The data regarding the skills provided by the user are acquired by collecting either resume-based information or the user's actual list of technical skills. If the resume-based approach is used, the skills, tools, programming languages and technologies used in the resume will be seen as the user's competency profile. This stage is important, as all other stages will depend on whether the user's actual skills are considered in this stage.

2.2 Skills Extraction and Preprocessing

When the input is acquired, skills need to be processed and extracted. The entered skills are preprocessed, standardized, and made similar in their structure, in order not to make errors in comparing skills later when the user's profile is compared to the database

2.3 Career Database Mapping

Once pre-processing has been done, the extracted skills are mapped to the company's career database. The career database contains career paths together with their requirements based on skill levels. These skill levels include essential, intermediate, and advanced skill levels. This will help identify the level at which the individual has these skills and whether the career database requires someone at his/her level.

2.4 Career Matching

Matching the user's profile to many careers will help to identify the best matches for the user among various career paths. This is accomplished by analyzing the relationship between the user's skill and those required by each career path and ranking the paths on basis of the similarity. This will show which career path is the most suitable for the individual based on the current skills he/she possesses

2.5 Recommended Skills for Selected Career Role

The system recommends certain skills required to perform the selected or predicted career role. Recommended skills are those which are needed in the selected role. These skills can be classified based on their importance or level, e.g., essential skills, intermediate skills, and advanced skills. The purpose of including the step is not just to show a career path but also provide an indication of what knowledge domains should one acquire for mastering the role.

2.6 Skill Gap Assessment and Learning Roadmap

Skill assessment is done for determining the difference between the current skills possessed by the user and the necessary skills of the selected career role. In skill assessment, first, essential skills present in the user are identified. Then, essential skills lacking in the user are determined and also intermediate skills lacking in the user are recognized. Coverage percentage is then computed along with the user's preparedness level, i.e., beginner, developing, intermediate, or advanced.

Based on skill gaps, a learning roadmap is generated by the system. It includes various learning stages such as foundation, core competencies, and advanced. Missing skills are prioritized and placed in the learning roadmap.

2.7 Evaluation of Time for Resume-based Career Mapping

The next step after preparing the roadmap is an additional time evaluation process that helps calculate the period needed by the user to acquire new skills and achieve the desired career level. The process of time evaluation should

be distinctly indicated in resume-based career mapping only.

2.8 Supporting Options for Users

Besides, there are some other options provided by the system, such as user sign-up and log-in processes, history of activities. Using those, the users have a possibility to save previous results and examine them later on. Nonetheless, these are supportive options that are not involved in the methodological aspects of career predictions.

Results:



Fig-1: HOME PAGE

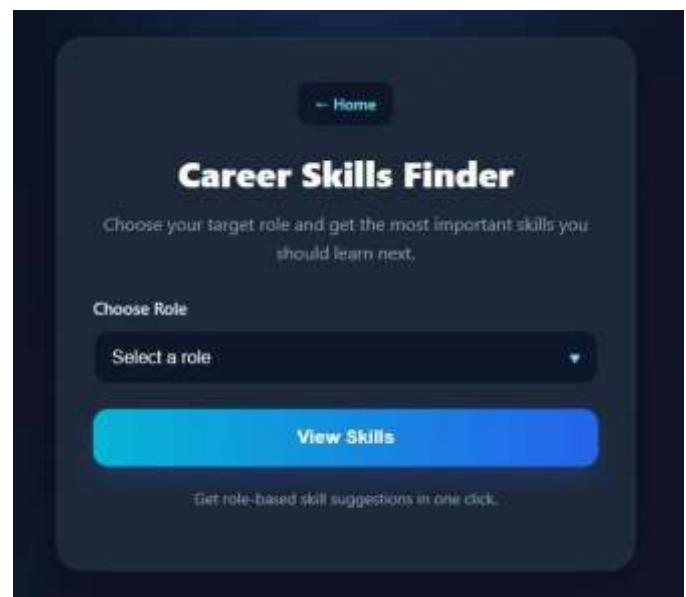


Fig-2: SKILL RECOMMENDATION PAGE



Fig-2.1: SKILL INPUT PAGE

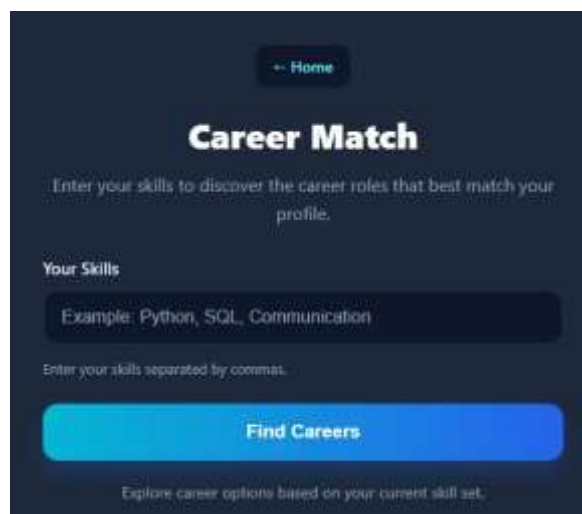


Fig-3: CAREER MATCHER PAGE



Fig-2.2: SKILL OUTPUT PAGE

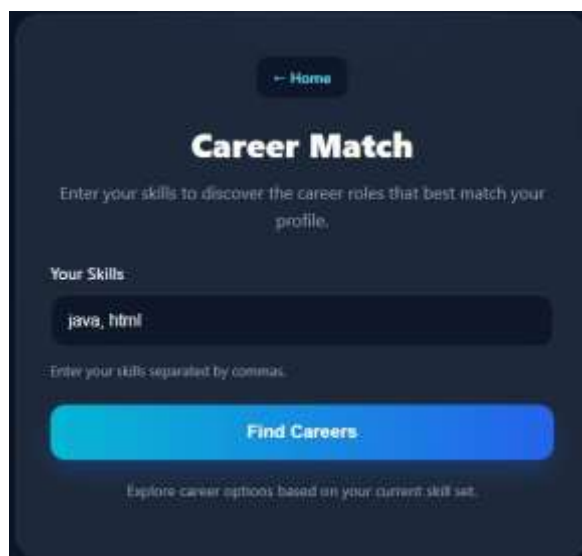


Fig-3.1: CAREER MATCHER INPUT PAGE



Fig-2.3: SKILL OUTPUT PAGE



Fig-3.2: CAREER MATCHER OUTPUT PAGE



Fig-2.4: SKILL OUTPUT PAGE



Home

Skill Gap Analysis

Enter your current skills and choose a target role to see what you need to improve next.

Your Skills

Example: Python, SQL, Machine Learning

Choose Role

Select a role

Analyze Gap

Identify missing skills and build your learning path.

Fig-4: SKILL GAP ANALYSIS PAGE



Home

Skill Gap Analysis

Enter your current skills and choose a target role to see what you need to improve next.

Your Skills

python, sql, data analysis

Choose Role

Data Analyst

Analyze Gap

Identify missing skills and build your learning path.

Fig-4.1: SKILL GAP ANALYSIS INPUT PAGE



Skill Gap Analysis

Review your progress, identify missing skills, and follow a structured learning roadmap.

Data Analyst

Role: Data Analyst

Experience: Beginner

Progress: 21.4%

PROGRESS OVERVIEW

21.4%

Have Essential Skills

sql

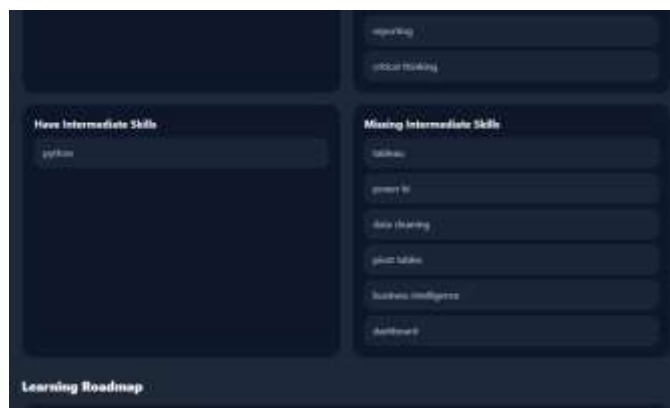
data analysis

Missing Essential Skills

excel

data visualization

Fig-4.2: SKILL GAP ANALYSIS OUTPUT PAGE



Home

reporting

critical thinking

Have Intermediate Skills

python

Missing Intermediate Skills

sql

power bi

data cleaning

data tables

business intelligence

dashboard

Learning Roadmap

Fig-4.3: SKILL GAP ANALYSIS OUTPUT PAGE



Learning Roadmap

Phase 1 - Foundation (Essential Skills)

These are the most important skills to learn first.

data visualization	Required: 5/10
statistics	Required: 5/10
excel	Required: 5/10
reporting	Required: 5/10
critical thinking	Required: 5/10

Phase 2 - Core Competency (Intermediate)

Build these skills after mastering Phase 1.

sql	Required: 5/10
power bi	Required: 5/10

Fig-4.4: SKILL GAP ANALYSIS OUTPUT PAGE



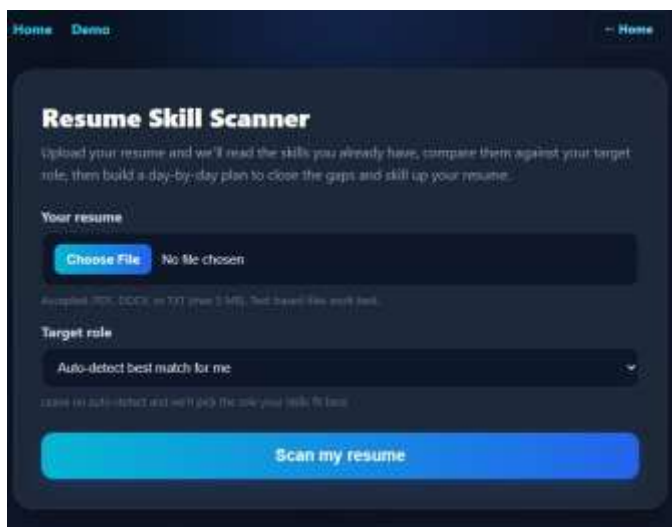
power bi	Required: 5/10
business intelligence	Required: 5/10
dashboard	Required: 5/10

Phase 3 - Advanced Expertise

These are the most advanced skills to learn.

python	Required: 5/10
advanced sql	Required: 5/10
ml	Required: 5/10
predictive analytics	Required: 5/10
machine learning basics	Required: 5/10
storytelling with data	Required: 5/10

Fig-4.5: SKILL GAP ANALYSIS OUTPUT PAGE



Resume Skill Scanner

Upload your resume and we'll read the skills you already have, compare them against your target role, then build a day-by-day plan to close the gaps and skill up your resume.

Your resume

Choose File No file chosen

Accepted: PDF, DOCX, or TXT (max 5 MB), Text-based files work best.

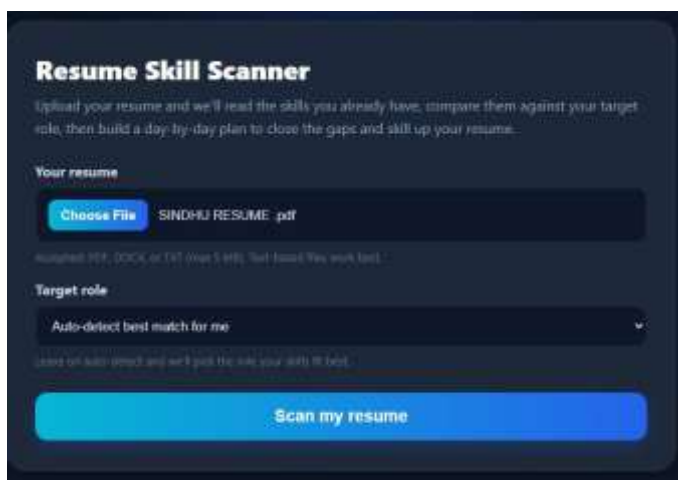
Target role

Auto-detect best match for me

Click on auto-detect and we'll pick the role your skills fit best.

Scan my resume

Fig-5: RESUME SCANNER PAGE



Resume Skill Scanner

Upload your resume and we'll read the skills you already have, compare them against your target role, then build a day-by-day plan to close the gaps and skill up your resume.

Your resume

Choose File SINDHU RESUME .pdf

Accepted: PDF, DOCX, or TXT (max 5 MB), Text-based files work best.

Target role

Auto-detect best match for me

Click on auto-detect and we'll pick the role your skills fit best.

Scan my resume

Fig-5.1: RESUME SCANNER INPUT PAGE



Resume Analysis — Web Developer

Auto-detect best match for me

We found 8 integrated skills in your resume:

communication, js, html, java, python, reporting

Where you stand for Web Developer

Beginner 13.2%

Coverage of the essential & intermediate skills for this role:

Skills you already have for this role

html, js

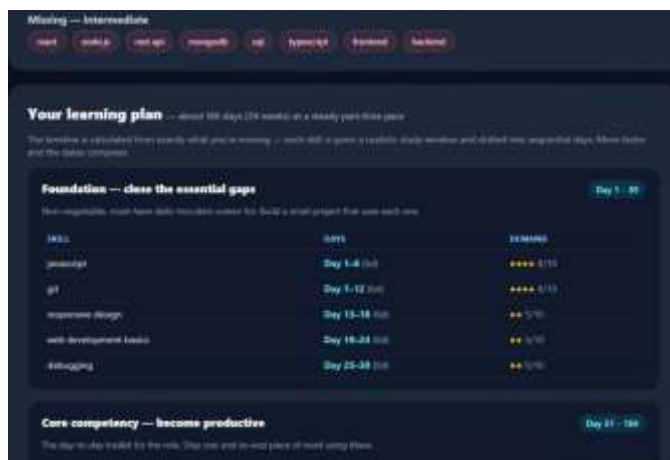
Missing — essential (learn these first)

communication, responsive design, git, web development basics, debugging

Missing — intermediate

react, next.js, next api, mongoose, mongodb, typescript, frontend, backend

Fig-5.2: RESUME SCANNER OUTPUT PAGE



Missing — Intermediate

react, next.js, next api, mongoose, mongodb, typescript, frontend, backend

Your learning plan — about 100 days (24 weeks) at a steady pace (one page)

The timeline is calculated from exactly what you're missing — each skill is given a realistic study window and divided into sequential steps. Follow these and the data compares.

Foundation — close the essential gaps Day 1 - 30

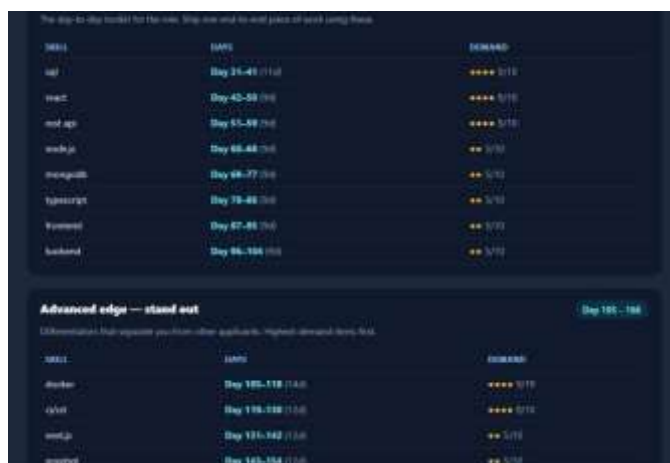
Non-negotiable: must have skills foundation course for build a small project that uses each one.

SKILL	DAYS	DEMAND
javascript	Day 1-4 (4d)	★★★★ 5/10
git	Day 5-12 (8d)	★★★★ 5/10
responsive design	Day 13-18 (6d)	★★ 5/10
web development basics	Day 19-24 (6d)	★★ 5/10
debugging	Day 25-30 (6d)	★★ 5/10

Core competency — become productive Day 31 - 100

The day-by-day to-do list for the role. Day one and on-ward place all work using flow.

Fig-5.3: RESUME SCANNER OUTPUT PAGE



The day-by-day to-do list for the role. Day one and on-ward place all work using flow.

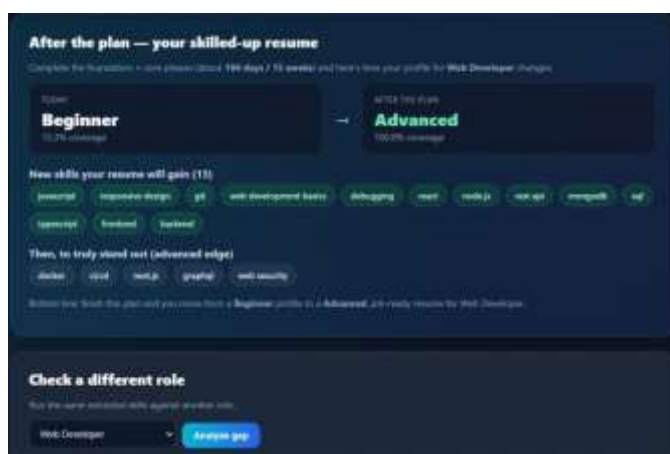
SKILL	DAYS	DEMAND
react	Day 31-40 (10d)	★★★★ 5/10
next	Day 41-50 (10d)	★★★★ 5/10
next api	Day 51-59 (9d)	★★★★ 5/10
mongoose	Day 60-68 (9d)	★★ 5/10
mongoose	Day 69-77 (9d)	★★ 5/10
typescript	Day 78-86 (9d)	★★ 5/10
frontend	Day 87-95 (9d)	★★ 5/10
backend	Day 96-104 (9d)	★★ 5/10

Advanced edge — stand out Day 101 - 166

Differentiation: high-quality problem-solving applications. Highest demand items first.

SKILL	DAYS	DEMAND
docker	Day 101-110 (10d)	★★★★ 5/10
cloud	Day 111-120 (10d)	★★★★ 5/10
next.js	Day 121-142 (22d)	★★ 5/10
graphql	Day 143-164 (22d)	★★ 5/10

Fig-5.4: RESUME SCANNER OUTPUT PAGE



After the plan — your skilled-up resume

Complete the first section — now planned (about 100 days / 24 weeks) and learn how your profile for Web Developer changes.

Before: Beginner 13.2% coverage → After: Advanced 100.0% coverage

New skills your resume will gain (15)

communication, responsive design, git, web development basics, debugging, react, next.js, next api, mongoose, mongodb, typescript, frontend, backend

Then, to truly stand out (advanced edge)

docker, cloud, next.js, graphql, web security

Below you finish the plan and you move from a Beginner profile to a Advanced, job-ready resume for Web Developer.

Check a different role

Run the same automated skills against another role.

Web Developer Analyze gap

Fig-5.5: RESUME SCANNER OUTPUT PAGE

3. DISCUSSION

The implemented system proposes an organised strategy to career counselling by integrating skills assessment with role determination and education. The design of the system makes sense in a way that the tool goes beyond just finding matching jobs but also analyses gaps in skills, readiness for the job, and even creates a pathway for the individual's future career path. One of the significant benefits of the proposed system is that it relies on skills provided through the resume or by the user themselves. In such a manner, the system will analyze the current skills of the candidate and generate meaningful results. Thus, the system can match the user's skills with the predefined career roles available in the database. The career matching module is significant in determining the most appropriate job roles, considering the skills that have been identified. In this case, the algorithm avoids providing a generic output but evaluates the suitability of a range of roles and rates them accordingly in relation to the user's profile. The output provides will be of better value and enable the user to appreciate careers that best suit his/her skills.

Another significant component is the skill gap analysis module. This module categorizes the skills into core, intermediate, and advanced skills making it easier to assess how prepared one is for a chosen career. The determination of coverage percentage and readiness level enables the user to evaluate his/her skills in an easy-to-understand manner.

4. CONCLUSIONS

Such an integrated approach to career advice offers users an easy way to improve their skills and acquire knowledge on how to be ready for working on their desired jobs. The system analyzes the user's readiness and provides him/her with an opportunity to become closer to the desired career. One of the strengths of the system under analysis is that the process starts with skill input based on resume analysis. In contrast to answering a question in a general manner, the analysis tool checks the skills of the user against the set of career roles and determines the most suitable ones.

Gap analysis and readiness evaluation increase the meaning of the output as the user can determine the skills he/she lacks and his/her preparedness for the certain position. Further learning roadmap development allows making a concrete action plan and time evaluation shows the necessary efforts to succeed in resume-based career mapping. The system under consideration would be useful for students, unemployed people or even individuals who need career advice to work in the IT domain in the future. Its simple construction and workflow allow defining this system as effective.

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