

AI-Powered Career Prediction and Smart Job Application Tracking Platform

Tejaswini B N¹, Kushmitha P², Lekhana D R³, Monika T P⁴, Nikhitha S⁵

Department of Computer Science and Engineering, City Engineering College, Bengaluru, India

Received: Sep 21, 2026

Accepted: Oct 18, 2026

Published: Oct 20, 2026

Abstract

The changing needs of skilled professionals and a dynamic job market create challenges for students and job seekers exploring their career options. Limited career guidance, weak skill assessment, inefficient job search and inadequate job tracking hinder their career growth. This paper proposes an AI-Powered Career Prediction and Smart Job Application Tracking Platform that applies artificial intelligence (AI) and machine learning (ML) to support career prediction and job application tracking in one web-based system. Users can build a profile, upload a resume, have skills extracted from it automatically, and receive career recommendations based on their educational background, skills and interests. The platform detects skill gaps, suggests learning material to close them, analyses resumes, recommends jobs, and lets users follow their applications, interviews and recruitment progress through a dashboard. The system is implemented using Python, Django, MySQL and machine learning libraries. By combining these functions, the platform helps students and job seekers make informed career decisions with ease.

Keywords

Artificial Intelligence; Machine Learning; Career Prediction; Resume Analysis; Skill Gap Analysis; Job Recommendation; Application Tracking; Django; MySQL

1 Introduction

Selecting the right career is a crucial decision for students and freshers. Many students have technical skills but do not fully use them because they lack an appropriate career plan. Career choices are often guided by manual counselling, general suggestions or simple job searches, which may not reflect an individual's skills and background. Artificial intelligence and machine learning offer an alternative: personalised career plans built from a user's resume, skills, projects, certifications and academics, which act as a profile "fingerprint" that is compared with the skills required for different careers.

A second problem for job seekers is keeping track of applications. A user may apply to many companies through different portals and must remember application dates, interview schedules and other activities, which is hectic and inefficient.

Artificial intelligence has increasingly been applied to career guidance, resume classification, job recommendation and candidate matching [1], [5], [6]. Machine learning techniques can identify patterns in user profiles and associate them with suitable career categories, and recent work has proposed hybrid, semantic and explainable recommendation architectures [8]–[10]. Resume analysis is another active area: NLP and information-extraction techniques can identify entities such as skills, education, experience and qualifications in unstructured resumes, and classification can then group candidates by relevant job or career [11], [15]. Recommendation systems have also been applied to job matching by comparing candidate profiles with job descriptions and ranking by similarity or compatibility [7], [13]. Skill-gap analysis has been explored using semantic and ontology-based matching [12], and human-in-the-loop approaches have been evaluated in real recruitment settings [16].

However, many existing approaches address only one part of the career process. A system may offer career prediction without application tracking, or job recommendations without detailed skill-gap analysis [14]. Students and job seekers therefore use several independent services for resume building, career guidance, skill building, job searching and application tracking, which makes it hard to see their overall status. The main challenges addressed here are: (i) determining the most appropriate career path; (ii) the need for manual resume analysis; (iii) the lack of personal skill-gap analysis; (iv) finding the most suitable jobs; (v) the absence of a single place to track applications; (vi) the complexity of keeping track of interviews; and (vii) the lack of a dashboard giving an overview of activities.

This paper therefore presents an integrated platform that unifies career prediction, skill analysis, job recommendation and application tracking. Its scope covers resume analysis, AI-based career prediction and recommendation, skill-gap detection, learning suggestions, job recommendation, application tracking, interview management and a dashboard.

2 Materials and Methods

The platform is implemented as a web application using Python, Django and MySQL together with machine learning libraries. The overall workflow is shown in Fig. 1. The process starts with registration and profile creation, after which the user uploads a resume in PDF or DOCX format.

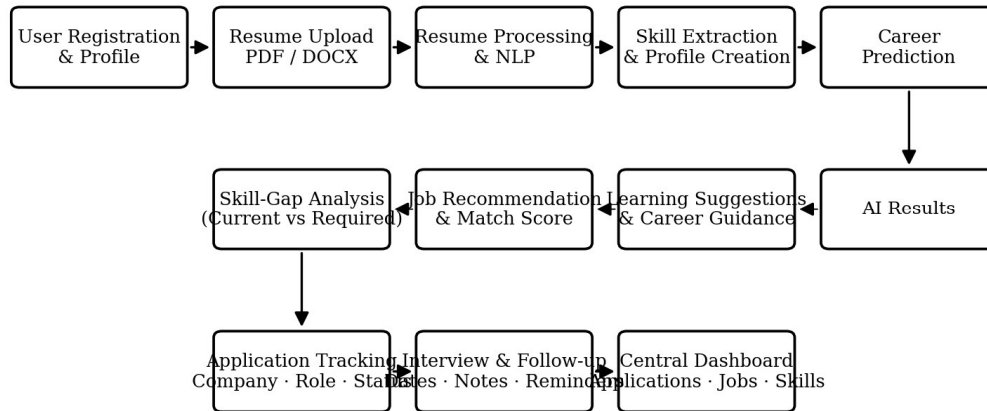


Fig. 1: System architecture of the AI-powered career prediction and job application tracking platform

A. User Profile

The profile stores the user's full name, contact information, location, educational qualification, college, year of graduation, technical skills and interests. This information improves the performance of the other AI modules.

B. Resume Extraction

When a resume is uploaded, its text is extracted using a PDF/DOCX extractor, which converts the unstructured document into a machine-readable format. The information extracted includes education, technical skills, programming languages, frameworks, databases, certifications, projects and experience.

C. Skill Extraction

The extracted text is processed further by an NLP module that identifies relevant skills from terminology and keywords. For instance, a resume containing Python, Django, MySQL, HTML, CSS and JavaScript yields a corresponding skill set for the user.

D. Career Prediction

The career prediction module matches the extracted skills and profile information against predefined career categories: Python Developer, Full Stack Developer, Data Analyst, Data Scientist, Machine Learning Engineer, Web Developer and Software Developer. It returns one or more suitable options for the user. A simplified career-matching function is:

$$\text{Career Score} = f(\text{Skills}, \text{Education}, \text{Experience}, \text{Interests})$$

which estimates the probability that a user's profile matches a given career category.

E. Skill-Gap Analysis

For an identified career category, the skill-gap analysis compares the user's skills with the standard skills required for the role. For example, a user with Python, HTML, CSS and MySQL who targets the Full Stack Developer role would be shown Django, REST API, JavaScript, Git and deployment concepts as missing skills. The platform then recommends learning material to close these gaps.

F. Job Recommendation

The job recommendation module compares a user's skill set with job specifications. A simplified job-matching formula is:

$$\text{Job Match Score} = (\text{Matched Skills} / \text{Required Skills}) \times 100$$

This gives the percentage match between a user's profile and a selected job description. NLP is used to normalise skill terms before matching, so that, for example, experience in "creating dashboards using Power BI" is related to roles requiring data visualisation.

G. Application Tracking

The application tracker stores, for every application, the company name, job title, date of application, job URL, status, interview date, interview notes and follow-up notes. Status is tracked through the stages Applied → Shortlisted → Interview → Selected / Rejected. The tracker helps users organise and sort the jobs they have applied for or are considering, and is linked to reminders for interviews and follow-ups.

3 Results and Discussion

The objective of the platform is to enable an effective, personalised job search while keeping track of the candidate's applications. The system achieves this through resume analysis, career prediction and recommendation, job recommendation, skill-gap identification and application tracking.

Because the resume is analysed with NLP, the system can use the context of the information in it and recommend better-matching positions instead of relying on isolated keywords. The career recommendation feature also exposes skill gaps. For example, the system may suggest data analyst courses to a candidate with experience in databases and programming but limited statistical and visualisation skills.

A significant feature is matching candidates with relevant vacancies and recommending the best-fitting positions. This saves time because irrelevant postings are filtered out, and the system can suggest which skills to highlight when applying for a particular position. The job tracker keeps applications organised by phase (Applied, Shortlisted, Interview, Selected and Rejected) and, with reminders for interviews and follow-up emails, helps candidates avoid missing critical steps.

The computational cost of the main modules is summarised in Fig. 2. Profile processing and skill extraction are linear in the input size n , career matching grows with the number of profile skills n and career categories m , job ranking is $O(n \log n)$ because of sorting, and application lookup is $O(\log n)$ with indexed database access. Fig. 3 shows how these costs grow with input size; comparing every candidate against every posting pairwise would scale quadratically, which is why scoring followed by sorted ranking is preferred. These are theoretical complexity estimates for the design rather than measured benchmarks.

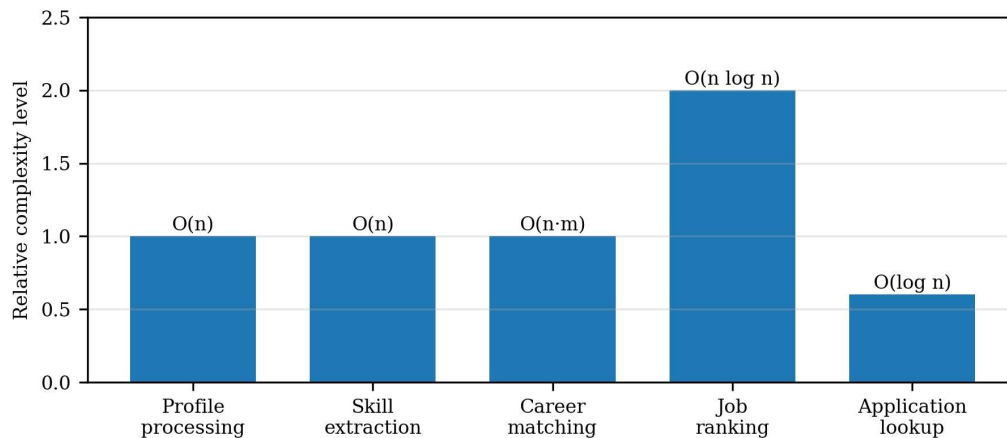


Fig. 2: Algorithmic complexity of the main platform modules

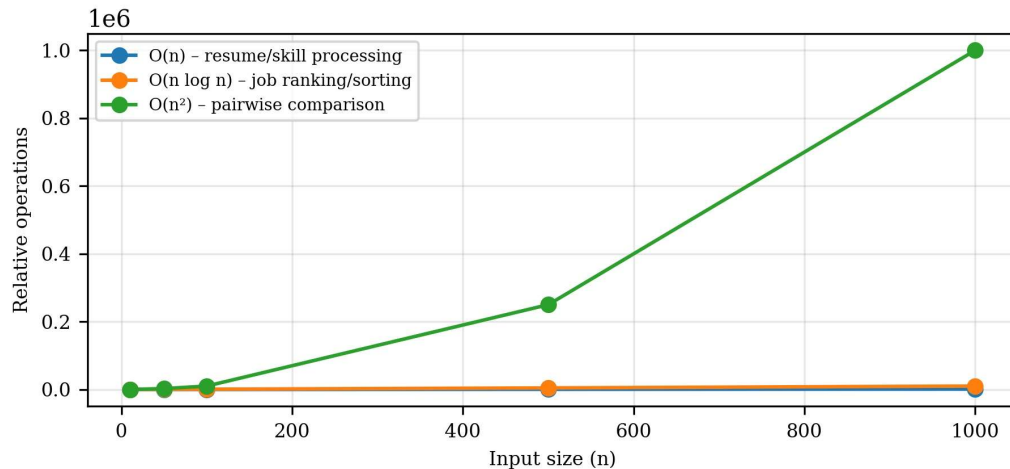


Fig. 3: Growth of relative operations with input size for the complexity classes involved

Although parts of the system can be fully automated, candidates and employers should keep the option to make decisions themselves. Recommendations should be informative and state their rationale, for example “Recommended because your profile matches the following requirements: Python, SQL and Data Analysis.” Transparent suggestions let users make informed decisions, which matters because the effectiveness of the system depends on the accuracy of the data and the appropriateness of the recommendations. Bias, privacy, transparency, explainability and recommendation accuracy must be considered during development [10], [16], and because job requirements and skills evolve constantly, the skill and job data should be updated continuously [2], [3].

This paper describes the design and functional behaviour of the platform. A quantitative evaluation on a labelled dataset (for example accuracy, precision and recall of career prediction) and a user study of the tracking dashboard are still to be carried out.

4 Conclusion

This paper presented an AI-powered platform that integrates resume analysis, skill extraction, career prediction, skill-gap detection, learning suggestions, job recommendation and application tracking in a single web-based system built with Python, Django and MySQL. By replacing several separate services with one workflow and one dashboard, it helps students and job seekers choose suitable careers and manage their applications and interviews. Future work will focus on training and evaluating the prediction models on real datasets, improving semantic matching, adding explanations for every recommendation, and validating the system with users.

Acknowledgment

The authors thank the Department of Computer Science and Engineering, City Engineering College, Bengaluru, for the support and facilities provided during this work.

Competing Interests

The authors declare no competing interests.

References

- [1] S. Broecke, “Artificial intelligence and labour market matching,” OECD Social, Employment and Migration Working Papers, No. 284, OECD Publishing, 2023.
- [2] OECD, “AI and skills: What we know so far,” OECD Publishing, 2026.
- [3] International Labour Organization, “Changing landscape of skills in the age of AI,” ILO, 2026.
- [4] World Economic Forum, “Artificial Intelligence and the Future of Entry-Level Work: A Framework for Safeguarding and Reinventing Early Career Pathways,” 2026.
- [5] World Economic Forum, “Future of work: Using technology to improve job matching,” 2025.
- [6] T. Le Barbanchon, L. Hensvik and R. Rathelot, “How can AI improve search and matching? Evidence from 59 million personalized job recommendations,” 2026.
- [7] S. Jadhav, S. Musmade, A. Vankdavath and R. Mokashe, “AI-Enabled Employment Matching Platform,” Int. J. Advanced Computer Theory and Engineering, vol. 15, no. 2S, pp. 185–193, 2026.

- [8] K. H. Gharte, N. Pawar and A. Bijwe, “AI-Powered Career Recommendation System Using Hybrid Architecture, Semantic Retrieval, and Dynamic Scoring,” *Int. J. Advanced Computer Theory and Engineering*, vol. 15, no. 2S, pp. 91–97, 2026.
- [9] “Nexus: A Multi-Modal Framework for Semantic Job Matching and AI-Driven Resume Analysis,” *Procedia Computer Science*, vol. 283, pp. 922–935, 2026.
- [10] “Explainable and Scalable Job Recommendation System using Transformer-based Text Summarization, Cross-Encoder Semantic Similarity, and Ensemble Learning,” *Procedia Computer Science*, vol. 277, pp. 1019–1030, 2026.
- [11] “Development of a Recommendation System for Resume Tracking and Job Suggestions,” 2024 3rd Edition of IEEE Delhi Section Flagship Conference (DELCON), 2024.
- [12] “AI-Powered Skill Gap Analysis and Career Path Recommendation System Using Hybrid Semantic and Ontology-Based Matching,” *IEEE Conference Publication*.
- [13] “An Intelligent Skill and Job Recommendation System with Predictive Career Analytics,” *Int. J. Novel Research and Development*, 2026.
- [14] “Machine Learning in Career Assistance and Job Application Automation: A Comprehensive Review,” *Int. J. Advanced Research in Computer and Communication Engineering*, 2026.
- [15] “AI-Based Resume Screening and Job Matching System,” *IJCOPE Journal*, 2026.
- [16] M. Kaya and T. Bogers, “Analyzing the Effects of a Human-in-the-Loop Candidate Recommendation Algorithm at Jobindex,” *ACM Transactions on Recommender Systems*, 2026.