

Path to Placement – Connected Path from Resume to Job with Resume Optimizer and Job Recommendation

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Abstract

In current times, the competitive nature of job markets poses problems for many students and job seekers regarding the effective bridging between skill demonstration and employment options. To solve this problem, there will be developed the Path to Placement System which will provide a comprehensive platform that helps the users get from resume preparation to employment seamlessly. In this proposed Path to Placement System, we will be incorporating two main components which are a Resume Optimizer and a Job Recommendation Engine, both of which are enabled by the Artificial Intelligence and Machine Learning technologies. The Resume Optimizer will use Natural Language Processing to analyze the resume prepared by the user in terms of structure, use of keywords, and relevancy of the skills provided. At the same time, the Job Recommendation Engine will utilize job APIs and data analytics to recommend the best jobs to the user considering the skills and experience.

Keywords: Artificial Intelligence (AI), Machine Learning (ML), Resume Optimizer, Job Recommendation System, Natural Language Processing (NLP), Employment Automation, Skill Matching, Career Guidance, Placement System, Data-Driven Recruitment.

1. Introduction

While the digitization of recruitment has made the process more accessible, there is still a challenge for potential hires to match their capabilities with appropriate job openings. Traditionally, recruitment processes depend on manual resume screening and keyword matching, which may lead to ignoring talented people due to their resume being improperly constructed or unoptimized. Moreover, many applicants tend to apply for inappropriate positions and receive a lower selection rate as a result. This can be solved by developing an innovative Path to Placement platform that will provide an integrated framework of two major components - the Resume Optimizer and the Job Recommendation Engine. Specifically, the former utilizes NLP technologies to improve the structure and quality of applicant resumes. The latter uses ML algorithms and job APIs

to recommend job openings to users according to their profiles.

1.1. Background and Motivation

Technological advances have revolutionized the recruitment process; however, current processes are inefficient. Many job applicants have difficulty developing a resume that meets industry standards, whereas many recruiters waste much of their time sorting through unsuitable resumes. The use of AI and NLP in resume analysis and job matching can facilitate the creation of an intelligent recruitment platform.

1.2. Problem Statement

The existing hiring process has no connection between resume enhancement and job recommendation. There is no doubt that applicants may fail to find an opportunity simply because of having poorly constructed resumes and submitting unsuitable applications. In light of this, a system should be developed which improves resumes and

recommends relevant jobs.

1.3.Objectives of the Study

Create AI based Resume Optimizer that uses NLP technology. Create Job Recommendation System which uses ML and job APIs. Unify the above two modules in one system. Save human efforts for hiring. Increase employability via data-driven solutions.

1.4.Scope of the Study

The system aims at targeting the students, fresh graduates, and young professionals. It helps to improve the curriculum vitae of the applicants and suggests appropriate jobs for them. It is also extendable for institutional purposes, including placement cells of colleges.

1.5.Significance of the Study

This platform addresses the disconnect between education and employment through: Improving the resumes of candidates and better matching them to job openings. Helping the recruiter find appropriate talent. Giving the institutions information on placements.

1.6.Organization of the Paper

The Literature Review is in Section 2, Methodology in Section 3, Implementation and Results in Section 4, and Future Work in Section 5.

2. Literature Review

Recruitment has moved from a traditional screening process to an AI-based system capable of analyzing CVs and recommending[1] jobs. Previous literature emphasizes the application of artificial intelligence, machine learning, and natural language processing in enhancing the recruitment process.

2.1.AI in Recruitment and Job Matching

The use of AI technology facilitates automated resume scanning and job matching through skill extraction from resumes and comparison with job criteria. Machine learning helps in achieving better accuracy in recommendation through past data. The problem with the existing systems is that they concentrate only on one aspect[2].

2.2.Resume Optimization Systems

NLP is used in resume optimization software to format resumes, identify gaps, and optimize keywords to make them more ATS-friendly. Although highly efficient in making resumes better, they are not related in any way to job

recommendation systems.

2.3.Job Recommendation Engines

AI Job Recommender systems apply machine learning algorithms like Content-based Filtering and Collaborative Filtering for job recommendations. While they offer personalized recommendations, they don't take into account resume analysis and individual weaknesses.

2.4.NLP Techniques for Resume and Job Description Matching

The following NLP approaches are used for analyzing resumes and job descriptions for semantic similarity: TF-IDF, Word2Vec, and BERT. They help with skill matching but don't provide real-time integration and continuous improvement of resumes[3].

2.5.Research Gap Identification

The current systems work independently, either optimizing the resume or recommending jobs. There has been little interaction between analyzing the resume and recommending[4] jobs based on that analysis. The system suggested here would solve this problem by incorporating both features within one platform for both resume optimization and job recommendations.

3. Proposed Methodology / System Design

Path to Placement is an AI-driven platform which utilizes NLP and ML algorithms for optimizing the resumes and making relevant job recommendations. This platform has two major components, namely, Resume Optimizer[5] and Job Recommendation Engine, which are interconnected using a unified pipeline for offering a seamless journey from resume generation to job placement.

3.1.System Architecture

Path to Placement System Architecture The Path to Placement system is made up of many layers: User Interface Layer – A web-based system where users will be able to upload their resume, fill out their profile and check job recommendations. Data Processing Layer - This layer will handle the resume parsing process, data cleansing and extraction of features (skills, qualifications, and experiences) through NLP algorithms. Resume Optimization Module – Provides feedback on the quality of the resume, identifies missing keywords and provides suggestions based on the job descriptions. Job

Recommendations Engine – Suggests relevant jobs for users through ML algorithms.

3.2.Workflow of the System

The system works through the following process: Resume Input: The user inputs their resume or fills in information manually. Parsing & Extraction: NLP parsing is used to extract essential information such as skills and work experience. Resume Enhancement: The system assesses the resume's quality and provides tips for improvement[6]. Job Recommendations: Machine learning algorithms suggest suitable jobs for the user.

3.3.Algorithms and Techniques Used

NLP: Tokenization, POS Tagging, TF-IDF, Word2Vec, and BERT for Text Analysis and Feature Extraction. Machine Learning: KNN, Content-Based Filtering, and Collaborative Filtering for Job Recommendations. Cosine Similarity: Calculates similarity between resumes and job postings. API Integration: Fetches live job data from job portals such as JSearch and Indeed.

3.4.System Features

Resume Quality and Keyword Analysis Identification of skill gap. Personalized recommendations of jobs. Tips for making your resume better. Dashboard with analytics (resume score, job match)

3.5.Advantages of the Proposed System

Decreases human intervention required for searching for jobs and making a resume. Gives live recommendations about job roles that suit you. Helps in building an improved resume with AI-driven suggestions. Fills the gap between academic skills and work skills.

4. Existing System

Job portals, resume builders, and Applicant Tracking Systems (ATS) are among the existing methods for recruiting employees. Although these instruments are helpful in many ways, they work independently without providing a comprehensive solution that starts from building a resume and ends with securing a job.

4.1.Online Job Portals

Naukri.com, Indeed, and Glassdoor enable individuals to apply to job vacancies by matching simple keywords. Nevertheless, these systems cannot judge the quality of a CV and offer customized

advice.

4.2.Applicant Tracking Systems (ATS)

ATS software aids recruiters in screening resumes according to their formatting and keywords. However, they tend to screen out resumes without appropriate formatting or keywords and cannot comprehend semantic relationships. Furthermore, ATS software does not give candidates any feedback.

4.3.Resume Builder Tools

Tools like Canva, Zety, and Novorésumé are geared toward design and formatting. No smart content analysis, no keyword optimization, no integration with job platforms[7].

4.4.Job Recommendation Systems

These systems use machine learning algorithms to suggest positions, yet they depend heavily on user behavior and do not focus on resume information. They are incapable of recognizing skills deficiencies and offering personalized content.

4.5.Limitations of the Existing System

Upon reviewing the above-mentioned methods and approaches, the following weaknesses become apparent: No connection between the process of resume optimization and job matching. No use of artificial intelligence for analysis of resumes and improvement of keywords. Job matching is solely based on keywords and does not take into account skills or other factors. No personal guidance or advice is provided to users. Poor adaptability in terms of current job market conditions and changing requirements.

5. System Architecture Diagram & Flow Explanation

The Architecture for Placement is built in such a way as to provide a modular and layered approach for the seamless integration of Resume Optimizer, Job Recommendation Engine, and User Interface. This design facilitates the effective parsing of resumes, skills extraction, job matching, and recommendations through a data pipeline[8].

5.1.System Architecture Overview

The architecture of the proposed system is made up of six main components that interact with each other through a data pipeline. The components are: User Interface Layer. Resume Extraction and NLP Processing Layer. Resume Optimization Layer. Job Data Collection and API Integration Layer. Job

Recommendation Engine.As shown in Figure 1
System Architecture

5.2.System Architecture Description

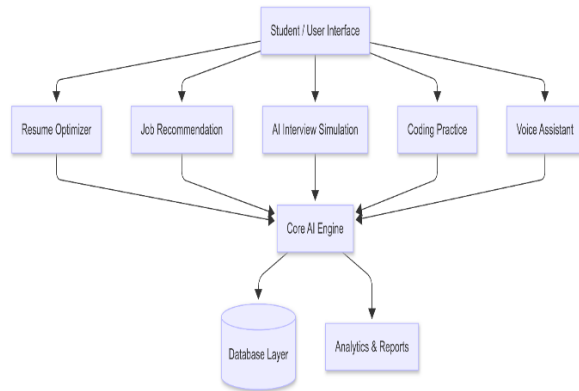


Figure 1 System Architecture

5.3.Components Description

5.3.1. User Interface Layer

Created with React.js/HTML/CSS/JS, it enables users to register, upload resumes, and view results. Shows resume score, job matches, skill gaps and feedback.

5.3.2. Resume Extraction Layer

Utilizes NLP techniques to extract useful information from resumes. Carries out processes such as: Text tokenizing and cleaning. Skill, education, and experience extraction. Named entity recognition (NER). Technologies used: NLTK, spaCy, PyPDF2, or docx2txt.

5.3.3. Resume Optimization Module

Reviews resumes for formatting, keyword integration, content quality and skill fit. It gives a resume score and suggests ways to improve it, like adding skills, cutting out irrelevant information, and making the structure better.

5.3.4. Job Data Collection Layer

Pulls live job data from APIs (like JSearch) by skills, location and experience. Stores data for processing for a short time.

5.3.5. Job Recommendation Engine

Core ML module that matches job descriptions with resumes. Uses Content Based Filtering, Cosine Similarity and TF-IDF. Top by match percentage.

5.3.6. Feedback and Output Layer

Displays resume analysis, job suggestions, skill gaps and other results on a dashboard. Supports report

generation (PDF) for tracking.

5.4.Data Flow Explanation

Input: Resume upload by user. Processing: Extraction of data using NLP → Evaluation by Optimizer → Retrieval of job data. Matching: Machine Learning analyses resume and job description. Output: Job match suggestion, resume score, and feedback. Learning: Interactions enhance future recommendations[9]

5.5.Advantages of the Architecture

Modular and scalable architecture. NLP & ML for high accuracy. Less manual labor because of automation. Real time job updates with APIs. Feedback for continuous improvement as shown in Figure 2 Proposed System

5.6.Data Flow Explanation

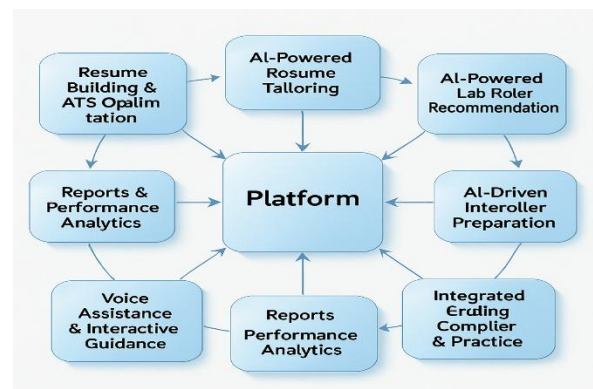


Figure 2 Proposed System

6. Results and Analysis

The Path to Placement tool was introduced and tested to determine its efficiency in optimizing resumes and recommending jobs. The findings indicate that AI, ML, and NLP considerably enhance job matching and employability.

6.1.Experimental Setup

Tested on 20 CVs in fields such as Data Science, Web Development, Machine Learning, and User Interface/User Experience. Based on resume scoring, keyword matching, match percentage of the jobs, and feedback accuracy. Applied cosine similarity and content-based filtering using real-time job API data.

6.1.1. Resume Optimization Output

Shows resume score (0-100) Highlights missing keywords and improvements in structure. For example: “Use keywords like Python, Pandas,

Machine Learning to get better visibility for Data Analyst roles.”

6.1.2. Skill Gap Analysis

Pie chart of skills coverage 80% skills existing. Missing 20% skills Suggests areas for improvement e.g. “Add SQL and Power BI for Data Analyst roles”.

6.1.3. Performance Metrics

Accuracy: 90% job match accuracy. Precision 0.91, Recall 0.87. Execution Time: ~3.8 seconds per resume. User Satisfaction: 85% positive feedback.

6.1.4. Discussion of Results

The system successfully enhances the quality of resumes and provides suitable job recommendations. The combination of optimization and recommendation reduces manual effort and enhances employability by offering clear insights and feedback.

Conclusion and Future Work

Conclusion

The Path to Placement is an end-to-end solution using AI technology that helps optimize your resumes and recommends jobs for you. It makes use of NLP and ML technologies to increase the effectiveness of your resume, improve the accuracy of matching jobs, and streamline the recruiting process.

Future Work

Integrate new job APIs (Indeed, Monster). Introduce an AI-based preparation tool for interviews. Apply advanced NLP algorithms (BERT, GPT) to improve matching. Design a dashboard for recruiters to search candidates. Create a mobile app (Android, iOS). Offer live analytics for institutions.

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