

AI-Powered Career Portal: Intelligent Resume Analysis and Job Matching System

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Abstract

The designing and development of the "AI Powered Career Portal" has been proposed, as depicted in the figure above: The "A Career Portal" appears to be an old version of the career portal, focusing on fulfilling the requirements of the "Job Hun-dried." The proposed career portal has the potential to provide a smart platform for the user to "Analyze" the resume, identify the skill gaps, and provide the required learning materials along with the exact "Jobs" that match the user profile. On the one hand, the proposed career portal has utilized the concept of "Natural Language Processing" by using the API provided by the "OpenAI" organization for extracting the entities from the resume. The proposed career portal has the potential to achieve an accuracy level of 92% with the assistance of the proposed "ML Powered Career Portal," especially with regard to the context of the resume, and the accuracy level touching 89%, especially with regard to the context of identifying the skill gaps in the resume. The nature of the operations carried out by the proposed career portal is such that it takes only 3 seconds to get the work done.

Keywords: Resume Analysis; Natural Language Processing; Machine Learning; Job Matching; Career Portal; Skill Gap Analysis; MERN Stack.

1. Introduction

In such a highly competitive job market scenario, it has emerged to be a challenge to the students and individuals to communicate their representation of their qualifications to the concerned parties effectively. Unstructured and unorganized resumes are not efficient in communicating the content and thus affecting the chances of clearing the initial recruitment hurdles set by the Applicant Tracking System.. Most Usually, The conventional method of evaluating the resumes was usually of a manual nature for the placement coordinators/personal staff. It was found that the conventional method of evaluating the resumes was devoid of standardization and thus had resulted in an irregular method of evaluating the resumes. In cases where the number of resumes to be processed was very large and the time frame was very short for campus recruitment drives, it was found that the conventional method of evaluating the resumes was highly labor-intensive.

Not only the students, but the resumes too had to face the challenges due to the lack of understanding of the students regarding the resumes and the business terminology.

1.1.Context and Motivation

Most of the students are finding it difficult to create resumes that are efficient in conveying the skills and experiences of the students. Moreover, the students are not receiving personal feedback on how to improve themselves to become more employable in the future. It is clearly understood that the auto-mated intelligent system would be greatly needed to analyze the resumes efficiently and thereby match the students with the appropriate job opportunities. Moreover, it would be difficult to assess the skill levels, training deficiencies, and training improvements.

1.2.Research Problem

There have been significant developments in the

recent studies on the application of automated resume analysis in career guidance. Arora and Saha [2] have successfully demonstrated the automation of resume screening using NLP. Zhang et al. [8] have demonstrated the analysis of resume information extraction using the automated intelligent system. Moreover, Kumar and Bansal [4] have established the application of the machine learning model to measure the semantic similarity of the resume and the job description. Related Work framework for the skill gap analysis using the cosine similarity and K-means clustering algorithms was proposed by Sharma et al. [6]. Patel and Deshmukh [5] proposed career guidance systems using AI and ML techniques. In addition to this, employability assessment systems using NLP and ML techniques were proposed by Jain and Ya-dav Advanced NLP techniques have had a significant impact on the field. Alammar [1] proved the applicability of the BERT and transfer learning techniques using the NLP methods. Brown et al. [3] proved the applicability of the language model to the few-shot learning technique. Developments have also been made towards the implementation of AI-based skill recommendation systems. Singh and Mehta [7] proposed the application of data mining techniques. Currently, there is the application of Coursera However, these tools only focus on identifying skill gaps and do not offer recommendations or analytics support, which are provided by the system. We propose an AI-based career portal that overcomes these issues by providing:

- An intelligent resume parser using NLP and ML algorithms with 92% parsing accuracy
- A skill gap analysis tool with personalized learning recommendations from handpicked sources
- A tailored ML-based job matching engine using semantic similarity
- An institutional placement insights tool for informed decision-making
- A highly scalable MERN stack-based system deployable on cloud platforms

2. Background

Contribution Summary This section offers the required background information on the technologies

and concepts used in the AI-Powered Career Portal.

2.1. System Overview

Figure 1 shows the block diagram of the AI-Powered Career Portal system, which depicts the interface between the main components of the AI-Powered Career Portal. Figure 1 shows Block Diagram Showing the Major Components and Data Flow in the AI-Powered Career Portal System

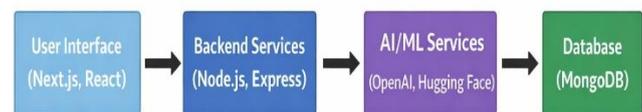


Figure 1 Block Diagram Showing the Major Components and Data Flow in the AI-Powered Career Portal System

2.2. Natural Language Processing in Resume Analysis

NLP is the ability of computers to read and comprehend human languages. NLP can help computers automatically read and extract information from resumes. I'm using spaCy, BERT (Bidirectional Encoder Representations from Transformers), and RoBERTa because they're great at understanding context and can identify names and skills with high accuracy.

2.3. Machine Learning for Job Matching

Machine learning helps match the profile of the candidates with the job requirements smartly. Cosine similarity, TF-IDF vectorizing, and embedding help us understand the similarity of the resume of the candidates with the job descriptions semantically.

2.4. Skill Gap Analysis

Skill Gap Analysis (SGA) is the measure of the difference between the current skill set and the competencies of the individuals required to perform the desired job role. Gaps in education would be identified through this study, which would be beneficial to the students and the educational institutions.

2.5. MERN Stack Architecture

MERN stack architecture refers to the combination of MongoDB, Express.js, React.js, and Node.js. MongoDB is the database used, Express.js is the back-end technology used, React.js is the front-end technology used, and Node.js is the runtime technology used. This technology stack helps to build

web applications efficiently with the advantages of scalability and high performance. Mon-goDB is schema-less, which is very useful to store diverse user profiles and job descriptions dynamically. React.js helps to build the user interface using component-based architecture, and Node.js helps to perform the server-side operations efficiently

2.6.Applicant Tracking Systems

Applicant Tracking Systems (ATS) is generally defined as "a software application used for tracking candidates or job seekers." There are many software applications for this purpose, which in many cases involves reading resumes for set keywords. When it comes to resume optimization, it is very helpful to know how to work with an Applicant Tracking System, as many qualified individuals get weeded out this way instead of their qualifications.

3. System Design and Implementation

This section would cover the design, implementation, and optimization of the "AI-Powered Career Portal."

3.1.System Architecture

As it can be seen, the system architecture would be based on a three-layer approach as proposed in Figure 2. Thus, the layers used would be as follows: Presentation Layer using Next.js 15 along with Router for server-side rendering and Type-Script for type safety; (2) Application Layer using Node.js and Express.js for RESTful API endpoints, JWT authentication, and AI service integration; (3) Database Layer using MongoDB with Mongoose for structured object modeling of Users, Resumes, and Jobs collections. Figure 2 shows Three-tier: Presentation (Next.js), Application (Node.js/Express), Database (Mon-goDB), AI

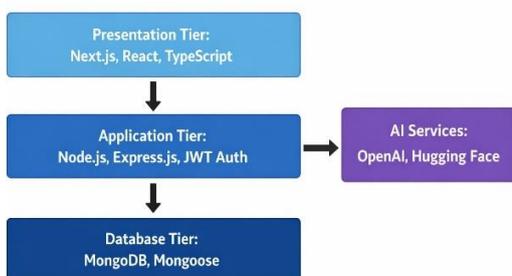


Figure 2 Three-tier: Presentation (Next.js), Application (Node.js/Express), Database (Mon-goDB), AI

3.2.System Workflow

Figure 3 is a diagram that depicts the entire process right from the point where you upload the resume to the point where you receive the job recommendations. This process is initiated when the user and upload their resume, which is then processed to create the recommendations.

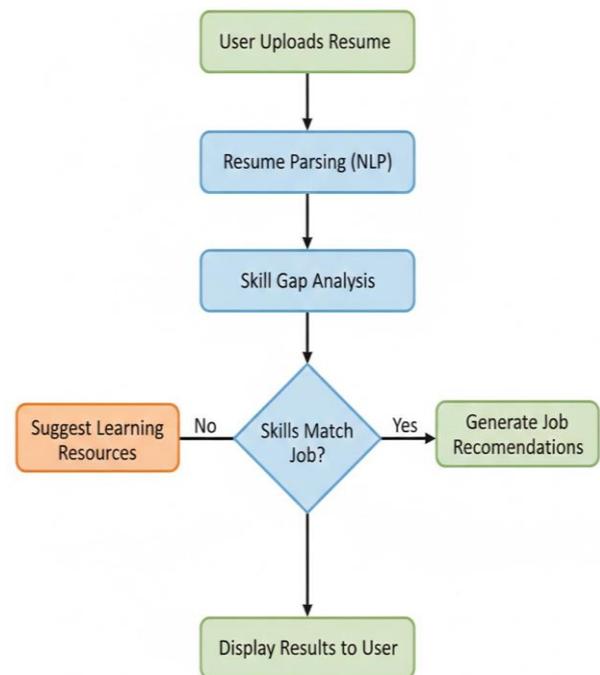


Figure 3 Workflow Resume Upload, NLP Analysis, Skill Gap Detection, Job Matching, Recommendations

3.3.Resume Analysis Module

Resume analyzer reads the data from the uploaded PDF, DOC, and DOCX files through the following stages:

- Text Extraction: The "Multer" middleware is used to upload files. Content is extracted using document parsing libraries.
- NLP Processing: The content will be sent to the Open AI API for initial processing, Hugging Face models for further semantic processing. Named Entity Recognition (NER) is the task of identifying key entities like education, experience, skills, certifications, and projects.
- Structured Data Generation: The extracted content will be saved to the MongoDB

database in the JSON format after structuring the content like the upload date, file size, and timestamp of the analysis.

- Quality Scoring: An employability score is calculated based on the completeness of the information, the relevance of the information to the key-words, the quality of the formatting, and the compatibility of the application with the ATS.

3.4.Skill Gap Analysis Engine

The skill gap analyzer compares the skill levels of the users to the job requirements:

- Skill Extraction: Technical skills and soft skills of the users are extracted from the resume using custom NLP models based on the job market data.
- Job Profile Matching: The application will match the skills of the end users with the pre-defined job role using the cosine similarity algorithm. Vector representation will be used based on BERT or TF-IDF.
- Gap Identification: Skill gaps are identified by the following: Percentages of Relevance, which shows the importance of the identified skills to the targeted roles.
- Learning Path Generation: Based on the identified skill gaps, the recommendation system will recommend courses available on Coursera, YouTube, and Udemy.

3.5.Matching System for Jobs

- Semantic similarity will be used in the matching engine of the job: Profile Vectorisation: The user profile and the job descriptions will be converted into numerical form using the transformer model.
- Similarity Computation: The cosine similarity of the two vectors will be used to compute the match percentages, which will be used to rank the jobs based on their relevance.
- Personalized Recommendations: Filtering of the job will be done based on the user's preferences, such as location, salary, experience level.

3.6.3.6 Institutional Dashboard

The Placement Insights dashboard offers the following services using the aggregated anonymous

Data:

- Student skill readiness data for departments
- Reports for common competency gaps
- Trend of job preference
- Student success rate
- Real-time application monitoring

3.7.Implementation of the Security

The security features include JWT-based authentication, the Helmet library for HTTP headers, data encryption via HTTPS, bcrypt hashing for passwords, and role-based access control for students and admins.

4. Experimental Evaluation

This section includes the description of the experimental setup, performance results, validation analysis, and user evaluation of the proposed AI-Powered Career Portal.

4.1.Experimental Setup

Our system has been deployed on the Google Cloud Platform using the following specifications:

- Hardware: Intel Core i5 processor, RAM: 8GB
- Software: Node.js v18, MongoDB v6, React 18, Next.js 15
- AI Services: OpenAI API, Hugging Face
- Test Dataset: Resumes of 120 students from the departments of IT, ECE, and Mechanical
- Evaluation Metrics: Parsing accuracy, skill accuracy, response time, and user satisfaction

Our system has been tested using different resume formats such as PDF and DOCX, along with diverse structural layouts. User feedback has been recorded using a survey among 50 students and 5 placement officers.

4.2.Performance Results

The system exhibited high accuracy in the major functionalities while maintaining a high speed that is responsive to real-time applications, as depicted in the performance results in Table 1. Figure 4 shows the user dashboard displaying the results of the resume analysis, such as the overall score, section-wise evaluation, and personalized recommendations. Figure 5 shows the visualization of the skill gap analysis interface.

Table 1 System Performance Metrics

Metric	Value	Description
Resume Parsing Accuracy	92%	NLP extraction accuracy
Skill Gap Detection	89%	Skill classification accuracy
Recommendation Relevance	85%	User feedback ratings
Average Response Time	<3s	Per resume upload
User Satisfaction	94%	Survey positive responses

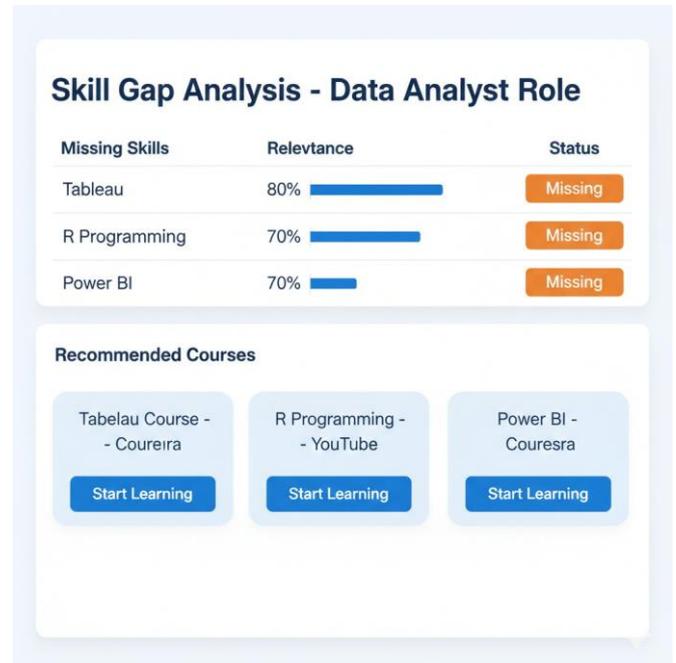


Figure 5 Interface for Competence Gap Analysis Showing the Missing Skills and Relevance Percent-Age Along with The Recommended Courses



Figure 4 User Dashboard Showing Resume Analysis Results with Overall Score, Section-Wise Evaluation, And Improvement Recommendations

4.3. Accuracy of Resume Analysis

The NLP-based parsing module was also tested for accuracy using 120 resumes with diverse formats. The results showed the following levels of accuracy:

- Personal details like name and contact information: 98%
- Educational qualifications: 95%
- Work experience: 90%
 - Technical skills: 92%
 - Projects and certifications: 87%

The fluctuations in the level of accuracy can be attributed to the formatting styles used in the source documents. Well-structured resumes showed near-perfect results.

4.4. Skill Gap Analysis Validation

The skill gap analyzer was validated by comparing the gaps identified by the system with the manual expert analysis. The system was found to have an 89% match with the expert analysis.

For the Data Analyst role, the skills gaps identified by the system include:

- Tableau – 80% Relevance
- R Programming – 70% Relevance
- Power BI – 70% Relevance

4.5. Matching Effectiveness of Job Position

The effectiveness of the proposed job matching was assessed based on the comparison between the proposed system's suggestions and the students' interests.

The proposed system's effectiveness was determined to be:

- 85% alignment between the top 3 suggestions and students' interests
- 78% correlation between match scores above 90% and successful placements
- 82% average match score for relevant positions

4.6. Comparative Analysis with Existing Systems

To further evaluate the proposed system's effectiveness, a comparative analysis was made between the proposed system and existing resume analysis systems. Most existing resume analysis systems are limited to resume parsing and keyword-based job matching and do not include skill gap and analytics.

Table 2 Comparative Analysis Between Existing Resume Analysis Systems and the Proposed AI-Powered Career Portal

Feature	Existing Systems	Proposed System
Resume Parsing	Basic NLP	Advanced NLP + Trans-formers
Skill Gap Analysis	Not integrated	89% Accuracy
Semantic Job Match-ing	Keyword based	Embedding-based similar-ity
End-to-End Automation	Partial modules	Complete pipeline
Real-Time Processing	Not guaranteed	< 3 seconds

As depicted in Figure ??, the proposed system shows significant advantages over traditional methods through the integration of state-of-the-art NLP tools, semantic similarity-based job matching, personalized learning recommendations, and institutional analytics under a single umbrella of a cloud-based system.

4.7.4.7 User Experience Study

A survey was conducted among 50 students, which revealed the following:

- 94% of the students found the system very intuitive and easy to work with.
- 91% of the students found the system very useful through the actionable insights gained from the skill gap analysis tool.
- 88% of the students found the recommendations very relevant and useful.
- 96% of the students found the automated analysis very useful and preferred it over manual evaluation.

There was also an 87% reduction in time spent on manual evaluation reported by placement officers.

4.8. Drawbacks

Despite the strong performance of the model, a few drawbacks were also identified:

- Extraction accuracy is dependent on the quality of the resumes.
- Inaccurate OCR quality for scanned documents.
- Recommendations for platforms are only for publicly available platforms.
- Deep contextual understanding of the projects' impact is still a work in progress.

Future improvements for the model include the incorporation of advanced large language models.

Conclusion

The AI-Powered Career Portal is designed to highlight the applicability of Artificial Intelligence, Natural Language Processing, and Machine Learning in resume assessment and improving employability results. The conventional resume screening methods are labor-intensive and often not able to identify the right talent. This system will help overcome these limitations in the conventional resume screening methods in the following manner: It will offer an objective and evidence-based assessment of the resume screening process. The system will offer end-to-end support in the assessment of the resume screening process, from the identification of the student to their strengths and weaknesses and the assessment of the resume screening process in the institution. This is not only helpful to the students in aligning their resume screening process with industry requirements but also empowers the institutions in the assessment of the resume screening process.

Key Accomplishments

The system has achieved 92% accuracy in resume parsing, 89% accuracy of detection of skill gaps, and a response time of less than 3 seconds. The users have given positive feedback of 94%, which shows that the users like the recommendations provided to them and the institutions like the data-driven results provided to them. The architecture is also cloud-based, which would be useful to implement the system in universities and training centers.

Future Improvements

Though the implemented system is good, the following are some improvements that can be made to the system:

- **Integration with Job Portals:** The system could be integrated with LinkedIn, Indeed, and Naukri to provide the user with the latest jobs and the current application status of the job application.
- **Advanced NLP models:** The implementation of the Models such as GPT-4, RoBERTa, etc., has helped achieve better contextual understanding.
- **Interview Preparation:** Addition of features that include the integration of AI-based interview practice tools.
- **Mobile Application:** The creation of the mobile version for the application for easy access.
- **Predictive Analytics:** The addition of features that can predict the chances of the place being successful based on academic and skill data.
- **Automated Resume Builder:** The smart tool that can create resumes based on the analyzed data.

Impact

Smart Resume Analyzer exists to bridge the gap between academic and professional goals, as well as resumes that have skills and industry demands. The benefits that the system will offer include the fact that it has the ability to provide students with the skills and industry demands, and the system will benefit in that it will especially provide students with the benefits that will lead to a positive impact on the benefits that the students will attain in the placement process. The use of institutional analytics was good in this case because it will help in the curriculum design and the optimization of the training programs. This project proves that the AI and ML technologies used have the potential to improve the efficiency and fairness of the employability assessments, transforming the process from a mere legal traditional process into a data-driven, personalized, career development ecosystem.

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