

Resume Builder, Analyser and Job Recomender using Generative AI and ML

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Abstract—In the recruitment process, the resume plays a key role in determining whether a candidate progresses to the next stage. However, many applicants struggle to create resumes that are professional, well-structured, and aligned with job requirements. Traditional screening systems and manual evaluation are time-consuming and often fail to accurately match candidate skills with job descriptions. To overcome these challenges, this project presents an AI-based Resume Analyzer and Builder system that uses Natural Language Processing (NLP) techniques to automatically analyze resumes, extract relevant information, and compare it with job descriptions.

The system calculates a resume–job relevance score using methods such as TF-IDF, keyword matching, and cosine similarity, helping users understand the strengths and gaps in their resumes. The Resume Builder module further assists users in creating ATS-friendly resumes through step-by-step guided input and AI- assisted sentence suggestions, along with multiple downloadable professional templates. The application is developed as a web-based platform, ensuring accessibility and ease of use for job seekers.

This system enhances resume quality, increases the chances of shortlisting, and reduces the effort required by both candidates and recruiters. Thus, the project demonstrates the effective use of AI and NLP in improving the job application and hiring process.

Index Terms—Resume Analysis, Applicant Tracking System (ATS), Natural Language Processing (NLP), Machine Learning (ML), Semantic Similarity, Cosine Similarity, TF-IDF, BERT Embeddings, Resume Parsing, Job Description Matching, AI-Based Resume Builder, Skill Extraction, Web Application, Content Recommendation System.

I. INTRODUCTION

A resume is an essential document that represents a candidate’s skills, education, and experience during the job selection process. However, many resumes are rejected by Applicant Tracking Systems (ATS) due to improper formatting, missing keywords, or lack of relevance to the job description. As a result, even skilled applicants may not get shortlisted.

To address this problem, this project introduces an AI-based Resume Analyzer and Builder system that uses Natural Language Processing (NLP) to analyze resumes and compare them with job descriptions. The system provides a relevance score, highlights missing skills, and suggests improvements. Additionally, the Resume Builder module helps users create ATS-friendly resumes using customizable templates and AI- based content suggestions.

This system aims to improve resume quality, increase shortlisting chances, and support job seekers in presenting their qualifications more effectively.

II. LITERATURE SURVEY

The process of resume evaluation has significantly evolved with the adoption of Artificial Intelligence and Natural Language Processing (NLP). Traditional recruitment systems mainly relied on manual screening or basic keyword-based Applicant Tracking Systems (ATS), which often ignored context and resulted in the rejection of potentially suitable candidates. To improve this, several research works

have introduced advanced semantic and AI-driven methods.

Rosenberger (2025) proposed CareerBERT, a system designed to map resumes and job descriptions into a shared embedding space, enabling better semantic matching. The study revealed that transformer-based embeddings outperform classical text matching approaches. Similarly, Bevara (2025) presented Resume2Vec, a vector representation technique that improves candidate ranking within ATS platforms. The research emphasized that embedding-based models provide higher accuracy in candidate-job alignment than rule-based methods.

Thatavarthi and Sai (2023) focused on Automated Resume Parsing using NLP. Their work applied tokenization, part-of-speech tagging, and Named Entity Recognition (NER) to automatically extract key resume components such as education, skills, and work experience. Mehta and Thomas (2024) enhanced this further by integrating Sentence-BERT (S-BERT) for semantic similarity measurement between resumes and job descriptions. Their model demonstrated improved matching accuracy by capturing sentence-level context.

Studies published in IOSR Journals (2025) compared the performance of TF-IDF, Word2Vec, and BERT for resume-job relevance scoring. The results showed that BERT achieved the highest semantic accuracy due to its deep contextual learning ability. Research from IJFMR (2024) implemented a cosine similarity-based scoring model to evaluate job fit, concluding that hybrid scoring models combining keyword and semantic matching provide more reliable evaluation results.

The IJESAT (2024) study proposed a machine learning-based resume shortlisting system that classified resumes into “fit” or “not-fit” categories. This system reduced manual screening time significantly. Lastly, a Stanford CS224n (2023) project analyzed job description understanding and document alignment using word embeddings and similarity ranking techniques, confirming that embedding models greatly improve the matching of relevant professional experiences to job requirements. Overall, the literature indicates a clear shift from

simple keyword matching to semantic similarity, contextual embeddings, and AI-driven content evaluation, highlighting the need for smart resume analysis and resume builder systems that support ATS compliance, real-time suggestions, and candidate skill improvement.

III. METHODOLOGY

The methodology adopted for the development of the AI Resume Analyzer and Builder involves a systematic and structured approach based on text processing, machine learning, and interactive user interface design. The complete workflow consists of several sequential stages as described below:

3.1 Data Acquisition

The system accepts resumes uploaded by the user in formats such as PDF or DOCX, along with the Job Description (JD) text. Both inputs serve as the primary data source for analysis.

3.2 Text Extraction and Preprocessing

The uploaded resume is first converted into raw text using document parsing tools. The extracted text is then preprocessed using Natural Language Processing (NLP) techniques:

- Tokenization
- Stop-word removal
- Lemmatization
- Part-of-Speech (POS) tagging
- Named Entity Recognition (NER) for identifying skills, education, and experience

This step ensures that the data is clean and structured for further analysis.

3.3 Feature Representation

To compare the resume with the job description, both texts are transformed into numerical vector representations. Two key techniques are used:

- TF-IDF (Term Frequency–Inverse Document Frequency) for keyword weighting
- BERT / Sentence-BERT Embeddings for semantic sentence-level similarity

These representations allow the system to capture both important keywords and meaningful contextual similarity.

3.4 Similarity Measurement

The similarity between the resume and job description is computed using Cosine Similarity:

$$\text{Similarity} = \frac{A \cdot B}{\|A\| \times \|B\|}$$

Where A and B are the vector forms of the resume and job description.

This step produces a Relevance Score, indicating how well the resume matches the targeted job.

3.5 ATS Compliance and Suggestions

The system evaluates the resume structure based on Applicant Tracking System (ATS) standards, checking:

- Header formatting
- Section order
- Skill keyword density
- Font and layout consistency

Based on the evaluation, the system provides improvement suggestions, such as missing skills, sentence refinement, and formatting corrections.

3.6 Resume Builder Module

Users can modify or rebuild their resumes using the integrated Resume Builder, which:

- Allows step-by-step data entry
- Offers ATS-friendly professional templates
- Provides AI-generated sentences for summaries and job descriptions
- Supports export in PDF or DOCX

3.7 Implementation Platform

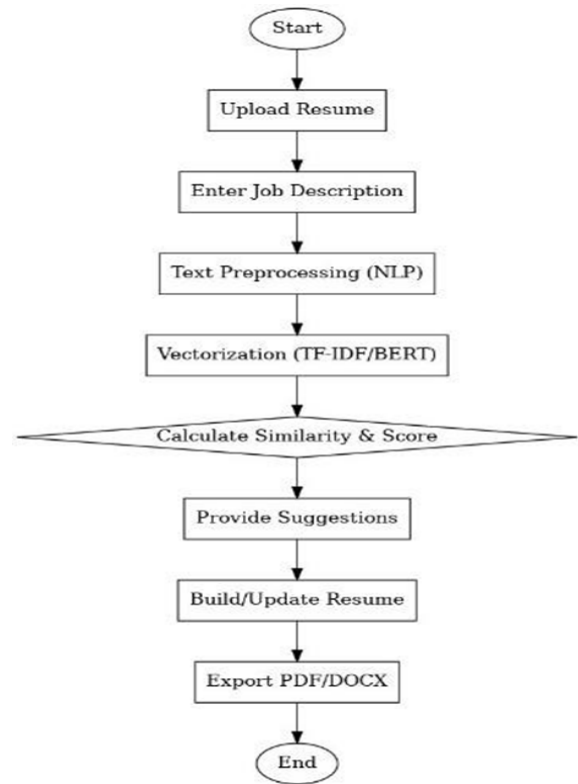
- Frontend: React / Next.js
- Backend: Node.js / Django
- NLP Models: spaCy, NLTK, BERT / SBERT
- Database: MongoDB / PostgreSQL
- Deployment: Vercel / Heroku / Firebase

3.8 Testing and Validation

Multiple resumes and job descriptions were tested to ensure:

- Accuracy of extraction
- Reliability of similarity scoring
- Usability of the resume builder interface

System Architecture Diagram:



IV. CONCLUSION

This project successfully demonstrates the development of an AI-based Resume Analyzer and Builder that assists job seekers in creating professional and ATS-friendly resumes. By integrating Natural Language Processing (NLP) and Machine Learning methods, the system is able to analyze resume content, compare it with job descriptions, and generate a relevance score along with improvement suggestions. The Resume Builder module further enables users to create structured resumes with AI-assisted wording and pre-designed templates, ensuring better alignment with industry expectations.

The system reduces the manual effort required in resume evaluation and increases the chances of candidate shortlisting by improving both content quality and keyword relevance. Thus, the project shows how intelligent automation and AI tools can effectively enhance the job application process and support job seekers in presenting their skills more efficiently. Future enhancements may include integration with job portals, multilingual support, and advanced LLM-based personalized career guidance.

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