Analyzing Resume with AI – Get Hired

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ABSTRACT

As competition for jobs intensifies, job seekers must focus on crafting descriptions that align well with organizations, making it imperative to have a proper resume. The investigation involves the development of an ML-driven Advanced Application Tracking System (ATS) that reviews resumes and provides in-depth feedback on their quality. It will analyze resumes for factors such as relevance to the job descriptions, keyword optimization, structure, and overall presentation. Some aspects include Resume evaluation, rating resumes as poor, good, or excellent based on preset parameters, and providing specific suggestions for improvement. It will then optimize keywords by identifying essential terms from a job description and validating their inclusion and contextual relevance in a candidate's resume, ensuring alignment with automated HR screening protocols. By integrating a personality-prediction module, the system would analyze resumes using Natural Language Processing (NLP) and sentiment analysis to predict personality traits that may help employers assess whether the applicant will fit their particular company culture and team dynamics. With appropriate guidance, candidates can tailor their job applications to secure the most suitable employment opportunities. Moreover, this tool, built as a result of machine learning combined with natural processing, simplifies the hiring procedure, leading eventually to better resume quality for hiring candidates and consequently better candidate suitability on the recruiting party's side - all these result in the holistic efficiency of the hiring process.

1. Introduction

The hiring process in organizations involves sifting through large volumes of resumes to identify suitable candidates. Traditionally, resume screening has been a time-consuming process for Human Resources (HR) departments. Applicant Tracking Systems (ATS) were introduced to mitigate this challenge; however, these systems are limited in understanding semantic relationships within the content. This paper introduces an Intelligent Resume Tracking System, known as IRTS, which emphasizes the use of NLP and machine learning techniques for resume screening, providing a more nuanced analysis by comparing resumes with job descriptions based on insights into improvements. Innovations in natural language processing and machine learning [1] can really help in this regard. Ability to understand the written word and to extract important information from it to teach the machine is essential for analyzing written information like a resume. Natural language processing can be considered as a sub-area of machine learning that gives computers the ability to understand the meaning of human speech. There are many ways to train the model [2] and solve the problem. Some basic functions of natural language processing include automatic content translation, name recognition [3] [4], analysis, data extraction, and data recovery. By automating these tasks, IRTS

accelerates the recruitment process while minimizing the risk of human error and the need for routine tasks such as resume parsing and matching. IRTS empowers recruiters to devote more time and resources to strategic decision-making [5].

To begin developing your app on the platform of your choice, select a language and adhere to the setup instructions [6]. There are numerous applications for Gemini models. The Gemini model responds to notifications and takes in both text and image data. Additionally, Gemini supports callbacks, allowing developers to exchange role and function definitions and pass parameters that best match the descriptions. This feature can be accessed by developers through external APIs and services [7]. We will develop a software application that helps applicants analyze our resumes against the skills we mention and those required for a specific job. This entire task is performed using a Google API key.

2. Literature Review

This was the case before the advent of Applicant Tracking Systems, when HR teams had to sort resumes according to job criteria, such as education, skills, and experience, to align them with the job description. Usually, referrals and those from reputable sources, such as well-known institutions or recruiters, took precedence.

The findings of this study [12] underscore the transformative potential of Resume2Vec in redefining modern recruitment processes by addressing critical limitations of conventional Applicant Tracking Systems (ATS). By employing transformer-based architectures such as BERT, RoBERTa, DistilBERT, GPT-4, Gemini, and Llama, Resume2Vec demonstrates a clear advantage in aligning candidate profiles with job descriptions via semantic embeddings. Unlike traditional ATS platforms that rely heavily on keyword matching, Resume2Vec captures nuanced contextual relationships, enabling a more holistic assessment of candidates' qualifications.

The first study, titled "Initial and Chronological Smart Developments in Resume Parsing in HR Recruitment Process," was published in July 2021 by Aakankshu Rawat, Siddharth Malik, Seema Rawat, Deepak Kumar, and Praveen Kumar. For this research, the study traced the startup's evolution from inception to the present, examining developments in SMART (specific, measurable, achievable, impactful, and time-based).

The Resume Application Tracking System, powered by Google Gemini Pro, streamlines resume screening in a way that brings revolutionary change into the hiring world [8]. By leveraging advanced AI to interpret diverse data formats, this approach guarantees speed and accuracy. Integrating Streamlet and PyPDF2, it analyzes resumes against job descriptions, reporting matching percentages, missing keywords, and summary statistics. The real-time system simplifies recruitment, saving time and reducing costs, and enhancing candidate selection, benefiting any sector, particularly in today's competitive, recession-hit job market.

The proposed automated resume ranking system addresses inefficiencies in traditional hiring by using machine learning and NLP techniques like KNN and Cosine Similarity [9]. It preprocesses resumes, removes noise, and extracts features using TF-IDF to rank candidates based on job descriptions. This system ensures relevance, improves efficiency, and reduces manual effort in recruitment. Achieving 98.96% accuracy, it performs well across diverse job categories and provides real-time resume screening and ranking. While currently limited to CSV-formatted resumes and to minor data loss during summarization, these limitations can be addressed through improved format compatibility and optimized techniques.

The study presents a multi-label classification model based on CNNs by [10] for predicting high-level skills from resumes, though this is not explicitly stated. It addresses the challenges posed by the skills gap by identifying abstract and implicit skills in raw text resumes, thereby streamlining hiring processes. Using anonymous IT resumes, the method had 98.79% recall and 91.34% precision. The model also identifies specific resume terms that affect predictions, thereby enhancing transparency.

Another study by [11] introduced a new approach, “Intelligent Resume Retrieval Grounded on Lucene," which aims to enhance the effectiveness of capsule reclamation processes. It presents a detailed description of how Lucene, a high-performance search engine library, is employed to index and search resumes effectively. By leveraging Lucene's indexing capabilities, the system is well-suited to organizing and storing capsule data in a structured manner.

2.1 Existing System

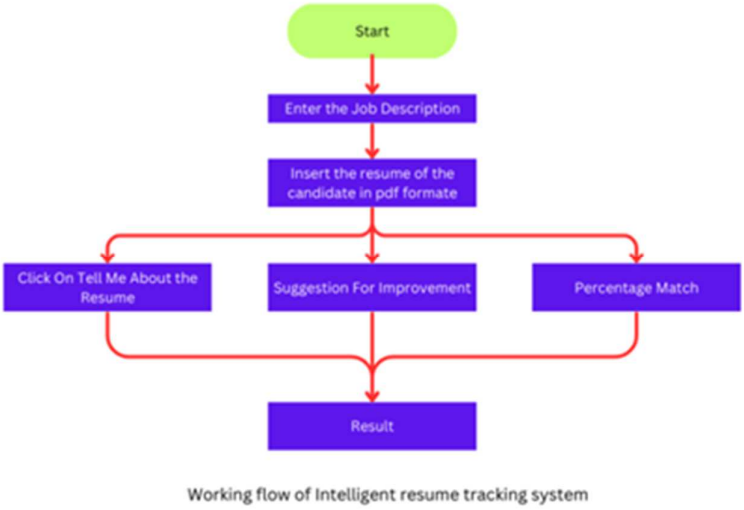

Figure 1. Flow of Working

2.1.1 PDF Text Extraction

The first step in the Intelligent Resume Tracking System (IRTS) is to extract the required documents, typically provided in PDF format.

2.1.2 Preprocessing Text

Once the text is extracted, it must be cleaned and prepared for analysis. This step uses the *nltk* library to perform a series of preprocessing tasks. It is the lowercase conversion to ensure case-insensitive analysis.

Punctuation Removal: Eliminates unnecessary symbols for clearer text.

Tokenization: This breaks the text into individual words (tokens).

Stopword Removal: This eliminates common words that add little value to the text, such as "the" and "and”. The preprocess_text() function performs these steps to standardize and clean the text, making it ready for analysis. This allows comparison only with meaningful terms.

2.1.3 Text Similarity Calculation

This is calculated by the AI model, which helps in determining how well our resume matches the job description. Use the *TfidfVectorize*r to convert the vector of word frequencies to document frequencies to assess the importance of specific words.

2.2 Missing Keywords Identification

It identifies missing keywords that could improve consistency between resumes and job descriptions. The function suggest_improvements() compares the job description with the resume and identifies key points in the job description that are absent from the resume.

2.3 Generative AI and ATS Integration

To provide appropriate feedback, the system uses AI via Google's Gemini API [5]. This model analyzes resumes and offers detailed feedback, similar to human feedback. It guides candidates in improving their resumes by highlighting their strengths, weaknesses, and skill gaps.

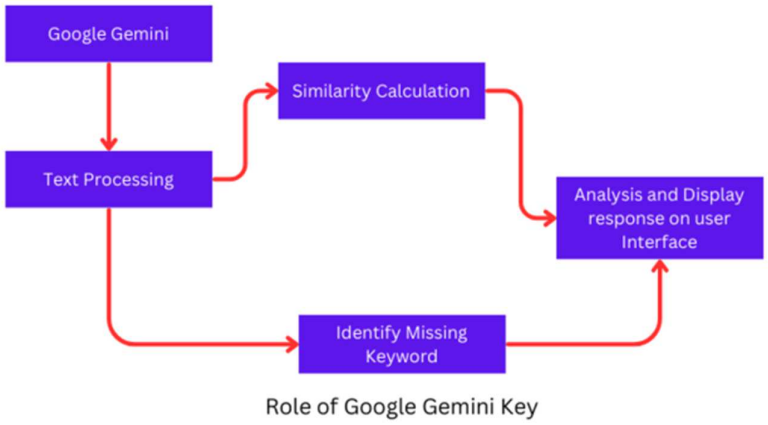

Figure 2. Analyzing a Resume by Google Gemini

2.4 Modules and Functionalities

2.4.1 Text Processing

Text preprocessing is an essential phase of this project, which ensures that the text is consistent and relevant. NLP (natural language processing) is used in a model to remove random text, words, and symbols to reduce noise.

2.4.2 Calculating Similarity

The compare_text_with_cosine() function uses cosine similarity with a *TfidfVectorizer* to calculate how closely a resume matches the job description.

2.4.3 Missing Keywords Analysis

Using job criteria, the system can identify gaps between a candidate's resume and the job requirements and suggest skills or content that could strengthen the candidate's competitive position.

2.4.4 Streamlet Interface

To deploy our model, we use the Streamlet interface, which allows users to upload a job description and resume.

2.5 System Design

This system operates through a step-by-step process. In this process, first we need to enter the job description for which we are going to apply, and after that we have to insert our resume so that we can analyze whether our skills fit the job description or not.

2.5.1 Enter Job Description

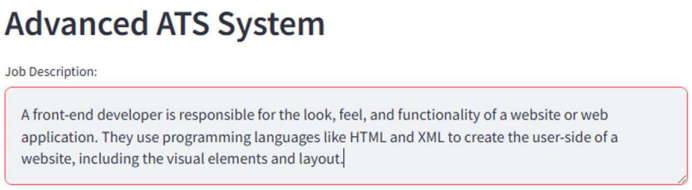

Figure 3. Insert Job Description

Here, we present the job description for a company hiring a candidate for a front-end development position.

2.5.2 Upload Our Resume

After the job description, we have to upload your resume by clicking on the Browse file

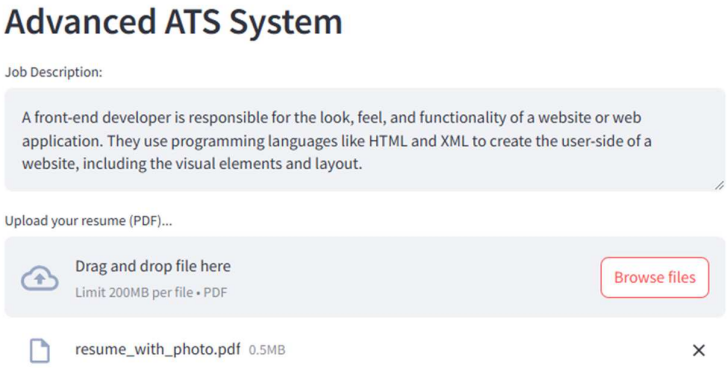

Figure 4. Browse Resume PDF

2.6 Gap In Existing Solution

We do not rely entirely on AI-generated data or responses, as they may contain biases or inconsistencies. **Solution**: To overcome this problem, we need to verify AI-generated data. I use real-time job data that includes columns for job title, job description, required skills, and industry. By analyzing these data, we can determine which job titles align with our skill set. This approach helps in making more accurate and informed career decisions. It also ensures that our resumes and job applications align with current industry demands, increasing the likelihood of being shortlisted by recruiters. With this, we can also verify the AI's response.

In today's competitive job market, matching candidates with suitable job opportunities based on their skills has become increasingly important [18]. This project presents a machine-learning-based job recommendation system that recommends job roles to candidates by analyzing their skill sets. The system leverages natural language processing (NLP) and content-based filtering techniques to analyze job descriptions and match them with candidates' skills. Personalized Job recommendations tailored to individual needs are among the most significant challenges people face, particularly in matching job vacancies to the skills they have highlighted in their CVs. Most job applicants find it challenging to select jobs that are actually suitable for their abilities and interests. By using real-time job information and assessing required skills across sectors, we can provide more precise and personalized job recommendations. This not only saves time but also increases the likelihood of securing a job that aligns with the individual's strengths and career aspirations.
Solution: Various platforms provide your real-time opening in the IT sector, like LinkedIn, naukri.com, indeed, and many more. Here we are using LinkedIn because I noticed that the most

authentic job postings in various sectors like sales, financial, and IT, where we map jobs that require only the skills mentioned in our resume.

2.7 System Design (Advancement in Existing System)

This ATS system provides functionalities such as analyzing a resume and job description to give suggestions for improvement, matching percentages between a resume and a job description, job suggestions from LinkedIn, and an ATS Resume builder to create a friendly resume. Under services, we can also analyze our resume using real-time data. A virtual assistant is also integrated with the system to guide individual users and perform various functionalities.

The entire project was developed using HTML, CSS, JavaScript, and Node.js, with VS Code; GitHub was used for version control [19]. Resume Builder System Using Full Stack Web Development" is to create an efficient system that is quick, precise, consistent, dependable, and flexible enough to accommodate any future improvements.

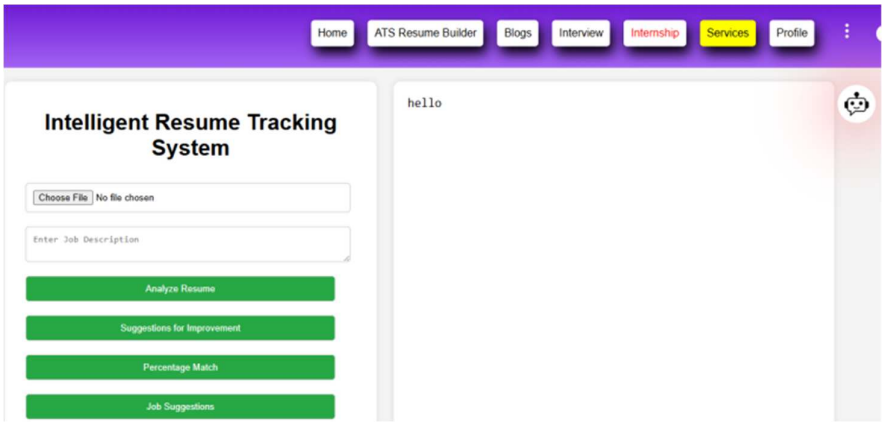

Figure 5. Interface of the New System

2.7.1 Real-Time Job Posting

The Gemini API provides functionality for accurately extracting skills from a resume. After removing all relevant skills, they can be used to interact with LinkedIn's job search capabilities by uploading them via the LinkedIn API or a designated URL. This enables the system to retrieve newly posted job opportunities that best match the skills listed in the resume. By automating this process, users can receive personalized job recommendations in real time, reducing effort and increasing the likelihood of finding a job that fits their profile.

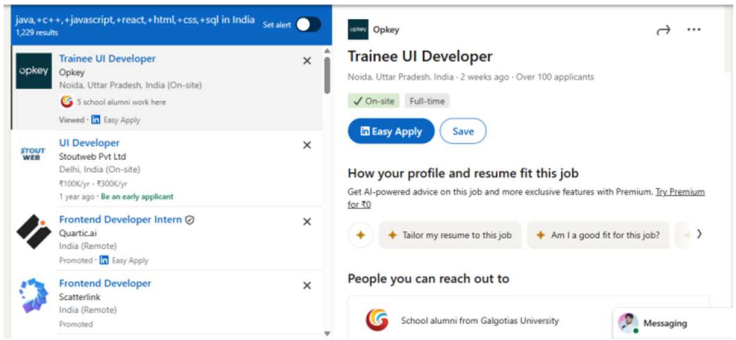

Figure 6. Job Searching on LinkedIn

2.7.2 Generate ATS-friendly resume

Based on a thorough analysis of the user's resume, the system suggests improvements to ensure compliance with all requirements outlined in the job post. It would be revolutionary if the system were able to automatically generate a resume that best fits the requirements of a given job, skills, and tools. Moreover, providing the option to download the optimized resume in PDF format would significantly improve the user experience and simplify the job application process [16]. Resume Craft employs machine learning (ML) for data analysis and user navigation. In contrast, the user interface is developed using Hypertext Markup Language (HTML), Cascading Style Sheets (CSS), and JavaScript to provide an interactive experience. Users can enter their personal and professional information via a series of form fields, and a real-time preview of the resume layout is displayed as they enter their details [19]. It provides reliability, saves time, and is easy to use. An authorized user can store data and view it at any time that he/she desires. It includes nearly all the modules required for practical college coursework. Such modules support resume building, training tracking, job placement, employee data, employee records, and student data.

2.7.3 Validating Job Skill

To overcome this problem, we need to verify AI-generated data. I use real-time job data downloaded from Kaggle, which includes columns such as job titles, job descriptions, required skills, and industry. By analyzing these data, we can determine which job titles align with our skill set.[15] The experiments in this research are carried out on the resume dataset originally collected from Kaggle (database). This dataset includes 14,806 CRs. Each profile contains fields such as the resume title, location, role descriptions, education, technical skills, certifications, and additional information. There are various methods for this purpose, such as building a system using a vector space model, which represents documents as vectors [20]. A similarity measure is used to find the relevant document from the corpus. The representation of a set of documents as numeric vectors is called the vector space model.

Table 1. Data used in Validating Job Skills

Job Title	Job Description	Required Skills	Experience Level
Software Engineer	Good Knowledge of Software Development	Java, Python, C++	Entry-Level
Data Analyst	Analyze data using advanced tools.	SQL, Excel	Entry-Level
UX/UI Designer	Designing user-friendly user Interfaces.	UI/UX Design	Mid-Level
Front-end Developer	Development of web Interfaces.	HTML, CSS, JavaScript, ReactJS	Entry-Level
Full-Stack Development	Development of Interactive web applications.	HTML, CSS, JavaScript, Nodejs, SQL, MongoDB	Senior

Skills: HTML, CSS, JavaScript, ReactJS, SQL

Figure 7. Matching Job with Resume: Mention Skills

2.7.4 Personalize Chatbot or Virtual Assistant System

A virtual assistant is used to run machines like laptops or PCs on your own command [17]. A virtual assistant is an application program that understands natural language and voice commands to complete tasks for the users. To enhance the human-machine interaction, several IT companies have established different forms of Virtual Personal Assistants (VPAs) depending on their usage and applications, such as Google Assistant, Amazon Alexa, Apple's Siri, and Microsoft's Cortana [14]. We developed an integrated virtual assistance system within a resume-tracking system to guide users in building ATS-friendly resumes by suggesting relevant keywords, missing sections (e.g., skills and certifications), and formatting tips. It also facilitates interview preparation by suggesting common interview questions based on the job role (job description) and the skills you mention in your resume, and by simulating mock interviews with a conversational flow [13]. This research explores the development of an AI-based resume builder designed to assist users in creating highly customized, professional resumes that align precisely with industry standards and job-specific requirements. By integrating natural language processing (NLP) and machine learning, the system analyzes job descriptions to identify key keywords, skill sets, and role-specific requirements.

3. Results and Discussion

After entering and uploading the job description and resume, we can now analyze our resume by clicking the provided button. The first step is to examine resumes, provide suggestions for improvement, calculate percentage matches, and recommend a job. This enables the system to retrieve newly posted job opportunities that best match the skills listed in the resume on LinkedIn. The development of ATS friendly resume for job application because we can also download resume in pdf format and we get fully functional AI based chatbot what will guide us on every stage of recruitment process like providing interview questions and tips to do some changing in resume so our chances of getting selected is increased and one of the main feature that we can match our skills that are mention in resume with real time data downloaded from Kaggle. All these functionalities are provided by a single web-based intelligent resume-tracking system, which increases our chances of selection.

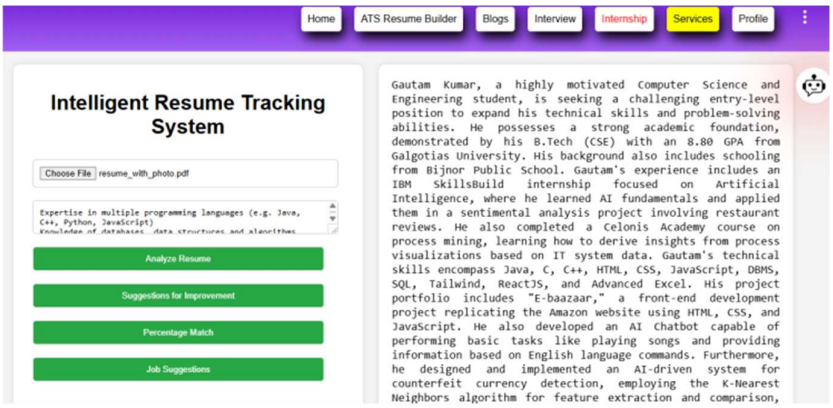

Figure 8. Resume Summary

4. Conclusion

An intelligent resume-tracking system is beneficial for this generation because the traditional process is complex and time-consuming. We need to manually analyze our resume to ensure it aligns with the job description and requirements, but with the help of generative AI for parsing and analysis. An intelligent resume process needs NLP and machine learning to provide this kind of analysis to both the students and HR professionals for practical resume analysis. Further work can focus on research, the enhancement of scoring algorithms, and the generation of AI responses to provide personalized guidance. Integrating multiple platforms into our web application enables users to conduct interviews and acquire new skills. We can now submit the resume only in PDF format. Still, there may be situations where we need to analyze our resume in Word or another format. Hence, we need to add functionality to support viewing a resume in any format, such as an image (JPEG, PNG), PPT, or a web document.

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