Resume analyzer and skill suggestions system

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***Abstract*—In this fast-paced, highly competitive job market of today, it is more difficult than ever to stand out from a crowd of hundreds of applicants. A resume well written is usually the key to opening the door to an interview, but many applicants are not able to present their skills, experiences, and accomplishments effectively. On the other hand, employers are confronted with the arduous task of sifting through enormous amounts of resumes, most of which may not even present a real picture of an applicant's fit for a specific job. In order to fill this gap, we created a Resume Analyzer and Skill Suggestion System an easy-to-use system intended to benefit job hunters and recruiters alike by optimizing the process of analyzing a resume to make it more effective, informative, and in accordance with today's job market needs. This tool applies smart algorithms to read and review the contents of a resume and judge it on some key parameters like relevance, formatting, keywords, and matching specific job positions. The tool does not return standard feedback but offers individualized recommendations that assist users in knowing where their resume is lacking and how to rectify it. For instance, it is able to identify missing sections, poor phrasing, or a deficiency in industry-specific keywords necessary for applicant tracking systems (ATS) employed by numerous businesses today. One of the best things about this system is its skill recommendation engine. After reviewing the resume and the desired job description, the system determines the skill gaps and suggests individual technical or soft skills that can be added to improve the candidate's profile. These recommendations are informed by up-to-date employment market trends and employer needs, rendering them both useful and relevant. For early career users or those wishing to transition into a new field, these suggestions offer direct guidance for upskilling or tailoring their individual development objectives. The Resume Analyzer and Skill Suggestion System is accessible. Its intuitive and user-friendly interface makes it accessible to a broad user base, from students and new graduates to experienced professionals and career transitioners. By providing rich feedback and actionable recommendations, the tool enables users to take the reins on their careers with better confidence and direction. Overall, this system both enhances the quality of resumes submitted and enables more informed and effective hiring decisions. It is a win-win scenario that leaves job candidates more ready to impress employers and recruiters to select the better candidates with ease. In a world that starts first impressions on paper with a resume, this tool leaves applicants with the best shot at making theirs count.**

***Index Terms*—Resume optimization, Skill suggestions, Natural language processing (NLP), Smart resume analysis, Job role matching, ATS-friendly resumes, Career improvement tool, Resume scoring, Machine Learning**

I. INTRODUCTION

The modern, fast-paced and competitive job market poses serious challenges for both the job seekers and hiring teams. Job applicants usually find it difficult to adapt their resumes to fit a particular job role, while hiring teams sift through scores of CVs that do not necessarily highlight a candidate's potential. To fill this gap, we propose a Resume Analyzer and Skill Suggestion System an intuitive system meant to streamline the recruitment process and make it more focused. In addition to scanning and analyzing resumes according to industry-related parameters, this system offers feedback and recommends skills that may enhance an individual's profile. By matching the content of a resume to the demands of the job market, the system enables people to represent themselves more effectively and enhance their chances of securing appropriate opportunities. Whether recent graduate or professional seeking to switch to another career, this tool provides advice with application to enable your resume to work better for you. To make the process simpler for everyone, we developed the Resume Analyzer and Skill Suggestion System. It's a intuitive, intelligent tool that eliminates the guesswork in resume creation. Through resume analysis based on what employers really want, it provides individualized feedback and recommends suitable skills that can make candidates really stand out. Whether you've just graduated or are looking for a career shift, this system

is here to help you with candid, practical advice so your resume doesn't simply enumerate your experience but accurately represents your potential. Writing a resume that catches the eye is more difficult than it appears. Most applicants find it difficult to decide what to write, what not to write, and how to sell their experience as best they can to fit the job they are gunning for. Meanwhile, employers must sift through resumes that don't make it easy to tell if someone is a good hire. The Resume Analyzer and Skill Suggestion System was designed to assist both parties. It provides users immediate, tailored feedback on their resumes and makes recommendations for applicable skills that align with the employment market. By providing actionable advice and clever suggestions, it allows individuals to be more confident in what they are submitting and enables employers to more easily visualize their potential. Through the current employment market, employers are substantially dependent on computer systems to sift through and analyze resumes before a human has even laid eyes on them. Sadly, this leaves numerous highly qualified candidates in the dark simply because their resumes don't get optimized for those systems or the positions they are applying for. This is a problem that Resume Analyzer and Skill Suggestion System is designed to address. Utilizing intelligent analysis, it scans the extent to which a resume fits industry standards and proposes precise changes. It also suggests skills that match the user's career aspirations, which increase their likelihood of getting interviews. The tool de-mystifies resume construction, converting it from a series of educated guesses into an orchestrated effort. In this day and age of digital media and extremely competitive employment, the resume is now more than merely a qualification summary it's a determinant to professional access. Whether one is a fresh graduate, a veteran employee seeking to change jobs, or a returning worker, the resume usually decides whether their application makes it to the next stage or falls by the wayside. To employers and recruiters, it is the initial screen in assessing prospective applicants from an immense array of job seekers. In spite of its importance, designing a good resume is a daunting and largely unfamiliar procedure. Most applicants are not aware of what employers want, while many employers receive applications that are ambiguous, irrelevant, and not directly related to the applied job. To fill this gap, researchers and developers have long sought to utilize technological means based on artificial intelligence (AI), natural language processing (NLP), and data-driven feedback mechanisms to scan resumes and offer individualized skill recommendations. One of these solutions is the Resume Analyzer and Skill Suggestion System, which is a system capable of not only analyzing resumes in terms of industry-specific requirements but also suggesting missing and applicable skills that make a candidate more marketable. This review paper delves into the design rationales, functionality, current approaches, and the scope of potential applications of such systems, providing a wider perspective on the role they have in determining the future of recruitment and career growth.

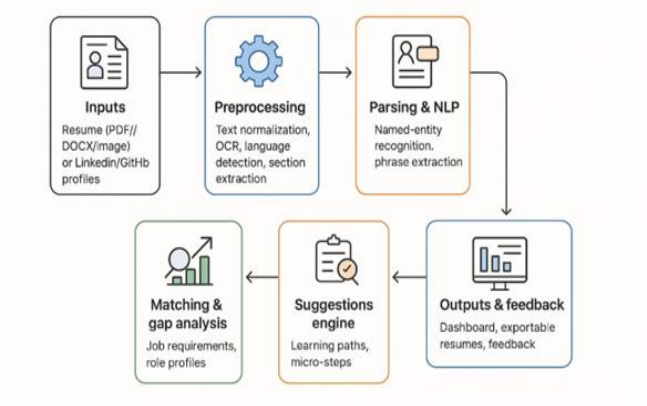

Figure 1. Overview of system

II. LITERATURE REVIEW

The discusses how Artificial Intelligence (AI) is transforming contemporary recruitment using automated resume analysis and skill recommendation platforms. It identifies the ineffectiveness of traditional manual hiring, including slow reviews, variable evaluations, and inadvertent prejudice. Through technologies such as Natural Language Processing (NLP), Optical Character Recognition (OCR), and Machine Learning, these platforms are able to extract, analyze, and sort candidate data with great precision and give fair and data-based results. The article also addresses sophisticated models such as BERT and GPT-based Large Language Models (LLMs) that have improved resume comprehension, created feedback, and recommended applicable skills or learning courses. Constructed primarily on Python frameworks, such AI-based tools score more than 90% accuracy and dramatically enhance hiring efficacy.

Finally, the research highlights the fact that AI is reshaping recruitment from a traditional manual filtering process to a clever, ethical, and individualized talent management system [1]. The research study "Resume Analyzer (AI): Improving Recruitment using AI-based Resume Screening" introduces an AI-enabled system capable of automating and enhancing the recruitment process. It remedies the issues of manual screening of resumes, which is usually time-consuming, inconsistent, and susceptible to bias. The system encompasses modules like automated parsing of resumes, ranking candidates, job recommendation, and analytics dashboards to facilitate streamlined recruitment. Developed with Python, Streamlit, and SQLite3, Resume Analyzer effectively parses candidate data, analyzes skills, and assigns profiles to requirements with a high level of performance in parsing accuracy of more than 92% and candidate ranking precision of 87%, while lowering bias levels by 73%. Future improvements such as integration with deep learning (BERT models), multilingual functionality, and real-time chatbot functionalities are also touched upon in the paper. By and large, the research highlights that using AI in resume analysis makes hiring more efficient, equitable, and fact-based, for both employers and candidates [2]. The research article "Resume Parser Using Machine Learning" targets automating the time-consuming process of resume screening through Artificial Intelligence (AI) and Natural Language Processing (NLP). It describes how recruiters are usually left with the hassle of dealing with huge numbers of unstructured resumes received in the format of PDF or DOCX. The system proposed employs machine learning methods combined with Python libraries like NLTK, spaCy, and Regex to extract critical information such as skills, education, and experience from resumes in a structured manner. The model enhances efficiency, accuracy, and equity in hiring by minimizing manual labor and human prejudice. It also learns over time via continuous learning, further improving the accuracy of entity recognition and semantic comprehension. In all, the paper determines that machine learning–driven resume parsing is a quicker, more accurate, and scalable approach to recruitment in the modern era, revolutionizing how organizations find and shortlist the top talents [3]. The research article "Resume Analyzer and Recommender System Using Python" discusses an AI-driven solution for automating and improving the recruitment process. It addresses issues regarding manual resume screening, which is usually time-consuming, prone to errors, and biased. Developed with Python, Natural Language Processing (NLP), and Machine Learning, the system scans resume, identifies important information such as skills, experience, and education, and screens them against job postings. With Pyresparser for parsing, MySQL for secure data storage, and Streamlit for an interactive interface, the system enables recruiters to review candidates quickly while maintaining data privacy and scalability with cloud deployment. The paper points out that such a machine learning-based method greatlyenhances accuracy, minimizes human effort, and facilitates data-driven recruitment decisions. Finally, it highlights that AI-based resume analysis has the potential to revolutionize conventional recruitment into an intelligent, swift, and equitable process for employers and candidates alike [4]. The research paper titled "AI Resume Analyzer and LinkedIn Scraper" presents a smart system that utilizes Artificial Intelligence (AI) and Large Language Models (LLMs) to assist job applicants in enhancing their resumes and finding relevant job positions. The software scans uploaded resumes and offers customized feedback regarding the positives, negatives, and areas of improvement along with recommending the appropriate job positions based on the user's skills and experience. It also combines web scraping through Selenium to crawl current job listings on LinkedIn, making sure users are exposed to the most up-to-date job listings. Built through Python, LangChain, Streamlit, NumPy, and Pandas, the system provides a user-friendly and secure platform that saves 30% in resume preparation time and enhances job application effectiveness. Overall, the project emphasizes how AI can enable job candidates to enhance their resumes, be in sync with the latest job market trends, and improve their prospects of finding employment within a competitive job market [5]. The research paper "Resume Parsing Using NLP" emphasizes the creation of an automated system that parses resumes using Natural Language Processing (NLP) and Machine Learning (ML) to extract key information. It solves the problem of recruiters having to deal with huge numbers of unstructured resumes in different formats such as PDF and DOCX. The system parses this unstructured data into a structured form, extracting information such as the name of a

candidate, skills, education, and experience. It employs Python libraries such as PyMuPDF, python-docx, and spaCy, as well as tokenization, part-of-speech tagging, and lemmatization, to enhance extraction accuracy. Moreover, Regular Expressions are used to identify crucial patterns like email and phone numbers. The model classifies resumes into particular job types (data scientist, Java developer) for the benefit of recruiters in quick screening. In total, the paper shows how NLP-driven resume parsing can save time, minimize human bias, and automate the process of recruitment by making it quicker, more just, and data-oriented [6]. The research article "Personalized Job Search with AI: A Recommendation System Integrating Real-Time Data and Skill-Based Matching" discusses an AI-based intelligent job recommendation system based on Artificial Intelligence (AI), Natural Language Processing (NLP), and Large Language Models (LLMs) that offers personalized and precise job recommendations. The system extracts skills, experience, and keywords from resumes using SpaCy NLP and regex-based text analysis, then applies Ollama Mistral, an advanced LLM, to predict suitable job roles based on skill relevance and industry trends. Real-time job postings are fetched through Rapid API's Job Search API, allowing users to view up-to-date job opportunities filtered by location and preferences. The research points out how this AI-based method greatly enhances the accuracy of job suggestions, minimizes manual work, and increases career matching in contrast to conventional keyword-based platforms. The authors also propose future developments like support for multiple languages, integration with LinkedIn and GitHub, and AI-supported skill gap analysis. Overall, the system demonstrates how AI can make job searching more efficient, context-aware, and personalized, transforming how candidates connect with the right career opportunities [7]

III. TECHNOLOGICAL FRAMEWORK

The technical architecture of the Resume Analyzer and Skill Suggestion System forms the foundation of how the system functions right from the time a resume is uploaded until the issuance of customized feedback and suggested skills. Developed employing Python as the fundamental programming language, the system exploits natural language processing (NLP) and web technologies to parse textual content and offer useful insights to users. At its base, the system has two primary layers: the frontend, which performs user interaction, and the backend, which conducts processing and logic. The frontend is coded with HTML, CSS, and Bootstrap to design a clean, user-centered interface through which users can upload resumes and access results easily. The backend, driven by Python (in the PyCharm development environment), performs activities like file parsing, resume section extraction, keyword analysis, and skill matching. Critical Python libraries like pdfminer or python-docx are employed for file text extraction, whereas NLP tools like spaCy or NLTK assist in understanding and analyzing resume content. This framework guarantees that the system is not just accurate in resume evaluation but also scalable and maintainable. By integrating language processing with web development, the system is made to provide quick, relevant, and personalized feedback to aid job seekers in enhancing their professional profiles.

Requirement analysis

Designing a Resume Analyzer and Skill Suggestion System is not just a matter of technical development but also realizes the different expectations from stakeholders and users. The objective is to design a system which processes a resume's quality, structure, and the objective is to design a system which processes a resume's quality, structure, and content intelligently and accordingly suggests improvements and lacking skills. In order to do so successfully, a well-defined and organized requirement analysis has to be performed. This involves the determination of functional and non-functional requirements and the software and hardware capabilities necessary to execute the system optimally.

3.1 Functional analysis

The system's functional requirements specify what the system is supposed to perform. The system, in this scenario, has to accept user input in the form of a resume file preferably in PDF or Word format—and glean useful information from the file. This information includes sections such as personal details, education, work experience, technical and soft skills, certifications, and achievements. Once extracted, the system must analyze this content using natural language processing techniques to evaluate its relevance and completeness in relation to common job roles or specific job descriptions provided by the user.

One of the very essential roles of the system is to grade the resume according to predetermined parameters like keyword use, inclusion of the primary sections, grammar, and layout. Another critical role is to match the resume against a familiar set of industry-needed skills or a given job description and determine the skill gaps afterward. The system must also provide relevant skills that the applicant can include in their resume in order to have a higher probability of being chosen. The outputs resume score, missing skills, and recommendations must be presented to the user in an understandable, easy-to-read format. Features such as job title input, resume section feedback, and interactive recommendations are nice-to-have features that can make the system more effective and user-friendly.

3.2 non-functional analysis

While functional requirements cover what the system does, non-functional requirements describe how the system performs those functions. Usability is one of the most important aspects of a system like this, as the primary users may not be technically skilled. The interface should be intuitive, easy to navigate, and responsive across various devices including desktops, laptops, and mobile phones. Performance is another critical factor. It should respond promptly preferably within seconds after uploading the resume and deliver accurate analysis with minimal wait times. Security and privacy are just as crucial. Resumes could contain personal sensitive data like contact information, educational history, or professional experience, so the system needs to guarantee that user information is not stored, abused, or opened up to unauthorized people. Maintainability and reliability are also crucial. The system must execute without surprising errors or crashes, and it must be designed in a modular fashion so that future modifications such as new databases of skills or resume scoring models can be added with minimal downtime. Finally, the system must be scalable, particularly if it's being applied in an institutional or commercial environment where lots of users are uploading resumes simultaneously.

3.3 Software Requirements

To create and operate the Resume Analyzer and Skill Suggestion System, a collection of software libraries and tools is needed. The system is designed mainly with Python, considering that it has extensive support for natural language processing, file operations, and backend programming. The development tool employed may be PyCharm or any other Python-compatible environment. Python libraries like pdfminer.six or PyMuPDF are utilized for PDF resumes to extract text, while python-docx is utilized for Word documents. For NLP operations, spaCy, NLTK, or even pre-trained models such as BERT can be utilized to scrape skills, jobs, and other keywords from the resume. Python's Flask or Django frameworks can be utilized to develop the backend server to manage data flow, logical processing, and interfacing between the frontend and the NLP modules. HTML, CSS, and Bootstrap are employed for the frontend to develop a responsive and easy-to-use interface. JavaScript can be added optionally for dynamic functionality. In case the software is to be hosted online, other software such as a web server (e.g., Nginx), database (e.g., SQLite or PostgreSQL), and deployment tools (e.g., Docker) will be needed.

3.4 Hardware Requirements

In hardware terms, Resume Analyzer and Skill Suggestion System is light-weight and can be run effectively on ordinary computing hardware. For small-scale or local development, a lower-end personal computer with a minimum Intel i3 processor and 4 GB of RAM will suffice. For better performance particularly when opening multiple resumes or using more complex NLP models a device with at least 8 GB of RAM and an i5 or better processor is best. Storage needs are minimal except when the system is optimized to hold resumes or logs over a period of time. In that scenario, extra disk space might be required, along with associated backup and data protection. When the application is running on a cloud service or shared server, the system has to be able to sustain multiple concurrent user requests without major performance degradation

IV. PROPOSED SYSTEM

User-Friendly Resume analysis: The platform enables users to upload resumes in PDF or DOCX format and gain immediate, easy-to-understand feedback on resume quality, structure, and content pertinence.

Intelligent Resume Parsing: It parses key information including education, skills, experience, and

certifications with the help of Python-based text parsing tools and document parsing tools.

Natural Language Processing (NLP) Integration: The system uses NLP methods to examine the resume's language, keywords, and layout, with the ability to pick up gaps or lacking industry-specific keywords.

Resume Scoring System: A scoring system provides users with a numeric gauge of the strength of their resume, enabling them to instantly gauge its strength compared to that demanded by the job market.

Skill Gap Identification: The system identifies which of the critical skills are absent from the resume through comparison with a database of skills based on the job title or description given.

Personalized Skill Suggestions: Following analysis, the system suggests additional skills the user can acquire or emphasize to customize the resume for certain jobs.

Figure 2. System Architecture

V. BENEFITS

5 1. Personalized Resume Enhancement

The system offers customized feedback against the individual content of each resume. Rather than boilerplate advice, it points out certain strengths and weaknesses, which enables users to know precisely where their resume is lacking and how to enhance it. Such a personalized response is likely to maximize the chances of producing a resume that appeals to recruiters and hiring managers.

5.2. Time-Saving for Job Seekers

It can be tedious to write a good resume, particularly when attempting to synchronize it with various job postings. Much of the process is automated through the system by analyzing the resume quickly, flagging missing skills, and even providing recommendations for improvement. This saves users from having to concentrate their efforts on searching for and applying for work instead of constantly guessing and editing away.

5 3. Improved Matching with Industry Requirements

By screening resumes against actual job descriptions and industry benchmarks, the system enables users to bring their profiles up-to-date with the current market demands. This update enhances the chances of getting past automated screening devices such as Applicant Tracking Systems (ATS) and presents the candidate in a more desirable manner to potential employers.

5 4. Increases Confidence and Employability

Having clear, actionable recommendations provides job applicants with the assurance that their resumes accurately represent their full potential. Being aware of what skills to include or emphasize, and viewing their resume critiqued objectively, encourages users to optimize their profiles and spend money on skill acquisition. This eventually results in improved career opportunities and job matches.

6. CHALLENGES AND LIMITATIONS

6.1 Resume Format and Style Diversity: One of the main difficulties is the great diversity of resume layouts and formats applied by job candidates. Resumes can vary considerably in form, wording, and appearance, and it is not always possible for the system to extract and correctly interpret the information accurately every time. Parsing resumes that have a nonstandard or innovatively designed layout can result in omissions or wrong analysis.

6.2 Context Understanding and Nuance: Though natural language processing has improved, the system can sometimes fail to capture fully the context of some phrases or experiences. For instance, it could misunderstand the importance of a work role or miss transferable skills, resulting in less precise suggestions or missing strengths

6.3 Relying on Updated Skill: Databases The success of skill recommendations relies significantly on having a current knowledge base of industry-related skills and job specifications. Fast-changing job markets imply that stale or incomplete skill lists would lead to inconsequential recommendations, diminishing the usefulness of the system over time.

6.4 Privacy and Data Security Concerns: Because resumes hold personal information that may be sensitive, users may resist submitting their files to an online system because of privacy issues. Strong measures to protect data are essential, but it may be difficult to absolutely ensure security when the system is scaled for several users or institutions.

VII. FUTURE TREND

7.1 Integration with Job Portals and Recruitment Platforms: In the future, this system can be integrated directly with job search websites and hiring platforms. This way, users can automatically match their resumes with available job openings, get instant feedback, and even be matched with positions that best align with their newly updated skill set making the job application process smoother.

7.2 AI-Based Interview Preparation Support: In addition to resume review, the system might extend to interview preparation by providing users with potential questions that can be derived from resume content and the job posting. This would make the tool an end-to-end career preparation tool, providing a more integrated user experience.

7.3 Learning Path Recommendations: Once identified are the missing skills, the system may offer recommendations for learning resources in the form of online courses, certifications, or tutorials such that users will not only be aware of how to fix their skill gaps but actually have a clear, seamless path forward.

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