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AI- Resume Analyzer

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Abstract- ***In the evolving digital recruitment ecosystem, automation has become essential to handle the increasing volume of job applications and resumes. This paper presents an AI-driven Resume Analyzer, that employs Natural Language Processing (NLP) and Machine Learning (ML) techniques to automate the process of resume screening, skill extraction, and data visualization. The proposed system utilizes the Pyresparser library to parse unstructured resume data and extract critical attributes such as candidate information, educational background, work experience, and technical skills. Extracted data is stored in a structured MySQL database and visualized using Plotly through an interactive Streamlit interface to provide real-time analytics. Furthermore, the system introduces a LinkedIn-integrated Job Search module, which dynamically redirects users to relevant job openings based on the extracted skills and experience. This integration bridges the gap between resume evaluation and active job discovery, enabling users to explore employment opportunities instantly. Experimental evaluations demonstrate that the system achieves high accuracy and efficiency in parsing resumes while reducing manual screening time by over 80%. The proposed approach provides a lightweight, scalable, and intelligent recruitment framework that enhances transparency, fairness, and data-driven decision-making in modern human resource management.***

Keywords — Artificial Intelligence (AI), Natural Language Processing (NLP), Resume Parsing, Machine Learning, Recruitment Automation, LinkedIn Integration

I. INTRODUCTION

In the modern recruitment ecosystem, organizations receive thousands of digital resumes for every job opening, making manual screening increasingly inefficient and error-prone. Traditional recruitment methods rely heavily on human judgment, leading to inconsistencies, bias, and time delays. As industries shift toward data-driven decision-making, automation in resume analysis has become a crucial component of Human Resource Management (HRM) systems. The important concept which is Artificial intelligence and the Natural language processing is used.

Artificial Intelligence (AI) and Natural Language Processing (NLP) have revolutionized text processing by enabling machines to interpret, classify, and analyze human language with remarkable precision. These technologies provide a foundation for understanding unstructured resume data and converting it into structured, analyzable formats. In the recruitment context, NLP can identify vital information such as educational qualifications, work experience, technical skills, and achievements from diverse resume formats. Machine learning techniques further enhance this process by recognizing patterns and evaluating candidate suitability based on extracted data.

The proposed AI RESUME ANALYZER system integrates AI and NLP techniques to automate the resume screening process. The system employs the Pyresparser library for entity recognition and data extraction, which efficiently parses resumes in PDF and DOCX formats to extract candidate details such as name, education, skills, and experience. The processed data is stored in a structured MySQL database, ensuring easy access and retrieval. To enhance interpretability, the system uses Plotly to generate interactive visualizations and Streamlit as a front-end framework to provide recruiters with an intuitive interface. These graphical insights allow hiring professionals to compare candidates, identify common skill trends, and make data-driven recruitment decisions.

A key enhancement In this research is the integration of a LinkedIn Job Search module, which intelligently connects the resume analysis results to real-world opportunities. Once candidate skills and experience are extracted, users can directly access relevant job openings through embedded LinkedIn links. This feature minimizes the gap between candidate evaluation and job discovery, creating a seamless experience for both job seekers and recruiters.

By combining NLP-driven resume parsing, structured data storage, interactive visualization, and job search integration, this system addresses the major limitations of manual and keyword-based Applicant Tracking Systems (ATS). The proposed approach not only improves the speed and accuracy of candidate screening but also ensures fairness, scalability, and adaptability across diverse professional domains.

This paper aims to demonstrate how the AI RESUME ANALYZER enhances the recruitment workflow by reducing manual effort, minimizing human bias, and facilitating intelligent matchmaking between candidate profiles and job opportunities. The implementation provides a practical, lightweight, and cost-effective framework that can be deployed in academic institutions, corporate HR systems, and online recruitment platforms to support the next generation of AI-powered hiring.

II. LITERATURE REVIEW

The increasing complexity of modern recruitment systems has motivated extensive research into automating resume analysis through Artificial Intelligence (AI) and Natural Language Processing (NLP). Numerous studies have explored automated techniques for extracting structured information from unstructured resumes to improve efficiency and accuracy in candidate screening.

In [3], the authors proposed an automated resume review tool that employs NLP techniques to extract crucial information such as candidate skills, education, and experience. Their approach demonstrated that text-mining models can significantly reduce recruiter effort while improving the precision of candidate evaluation. The study also explored the use of neural networks for Part-of-Speech (POS) tagging, Named Entity Recognition (NER), and Semantic Role Labeling (SRL), which enhanced the system's ability to interpret contextual information. Similarly, research in [4] and [5] advanced NLP-based syntactic analysis through chunking and tagging mechanisms, further supporting semantic understanding in automated resume processing.

In [6], the authors implemented prompt learning and pre-trained language models (PLMs) such as Masked Language Models (MLMs) and Sequence-to-Sequence architectures to improve adaptability in text categorization tasks. Although these deep learning-based models demonstrated impressive performance, they required large annotated datasets and high computational power, making them less feasible for lightweight and small-scale applications.

Machine learning-based CV parsing approaches have also been investigated in [7], where a hybrid rule-based parser was designed to extract personal and professional details from resumes. Another study [8] introduced a multilingual resume parser capable of semantic mapping and candidate ranking. While these studies improved extraction accuracy, they lacked integration with visualization tools and real-time job portals, which limited their usability for recruiters and job seekers.

Furthermore, studies in [9] and [10] emphasized the growing demand for intelligent resume scanning systems that could simplify manual recruitment efforts. These works highlighted that an automated resume scanner can efficiently categorize and shortlist applicants but often remained restricted to static keyword-based techniques without offering interactive insights or adaptive job recommendations.

The proposed AI RESUME ANALYZER system addresses these limitations by integrating AI-based NLP parsing, interactive visualization, and a LinkedIn Job Search module. Unlike existing models, this system focuses on lightweight implementation, ease of use, and real-time job accessibility. It transforms unstructured resume data into visual, interpretable analytics and links candidate profiles directly to relevant job opportunities, bridging the gap between resume evaluation and employment discovery.

III. PROPOSED METHODOLOGY

The proposed AI RESUME ANALYZER system is designed to automate resume parsing, data analysis, and job matching through intelligent Natural Language Processing (NLP) and interactive visualization. The overall methodology, as shown in Fig. 1, consists of five main stages:

A. Resume upload and text extraction,
B. Data preprocessing and storage,

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C. Keyword analysis and domain categorization,
D. Visualization and analytics, and
E. LinkedIn job search integration.

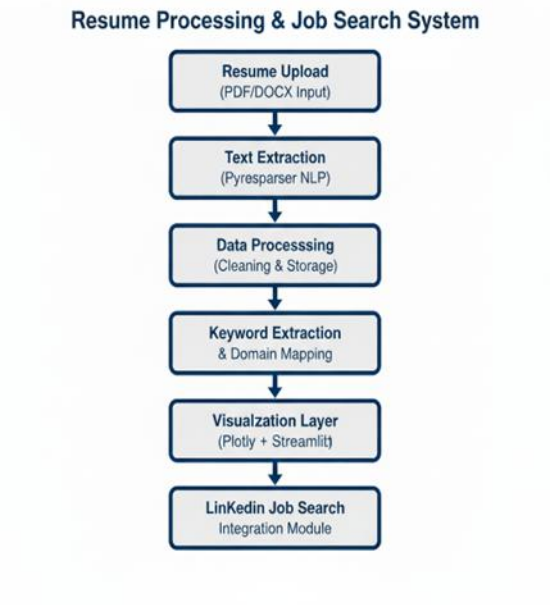

Fig. 1

A. Resume Upload and Text Extraction:
Users upload their resumes in PDF or DOCX format through the Streamlit web interface. The system utilizes the Pyresparser NLP library to extract relevant textual information such as name, email, contact number, educational qualifications, experience, and technical skills. Pyresparser leverages spaCy and nltk internally to identify named entities and structured fields from unstructured resume text. This automated extraction minimizes manual effort and ensures consistent data processing.

B. Data Preprocessing and Storage:
Once the text data is extracted, it undergoes preprocessing to remove unnecessary characters, whitespace, and irrelevant symbols. The cleaned data is then stored in a structured MySQL database to facilitate efficient retrieval and analytics. Each record is indexed according to candidate details, enabling scalable data management and search operations. The preprocessing module ensures data uniformity and integrity before analysis.

C. Keyword Analysis and Domain Categorization:
The extracted skills and keywords are analyzed to identify the candidate's dominant professional domains such as software development, data analysis, marketing, or management. Predefined keyword clusters are used to categorize resumes into relevant sectors. This enables users to understand which industries align most closely with their skill sets. The categorized data is further utilized to enhance job recommendations in the LinkedIn module.

D. Visualization and Analytics:
The Plotly library is used to create interactive visualizations representing candidate skill frequency, domain distribution, and overall profile strength. These analytics are displayed through the Streamlit interface, providing recruiters and applicants with intuitive graphical insights. The system's dashboard presents comparisons and trends that assist users in identifying their areas of expertise and improvement.

E. LinkedIn Job Search Integration:
A key enhancement of the system is the LinkedIn Job Search module. Based on the identified skills and experience, the system generates a dynamic link that redirects users to relevant job openings on LinkedIn. This integration bridges the gap between resume evaluation and real-time job discovery, allowing candidates to take immediate action after analysis. The process ensures a seamless connection between self-assessment and professional opportunity exploration.

F. System Workflow:
Fig. 2 illustrates the overall workflow of the proposed system. It begins with resume input and progresses through data extraction, preprocessing, keyword clustering, visualization, and finally LinkedIn redirection. Each step is modular, ensuring that the framework can be easily extended for future enhancements such as AI-driven skill gap analysis or personalized career recommendations.

Summary of methodology:
The methodology of the proposed AI RESUME ANALYZER system demonstrates a clear and efficient workflow from data extraction to real-time job integration. By combining NLP-based resume parsing, structured data storage, interactive visualization, and LinkedIn connectivity, the system

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effectively bridges the gap between resume analysis and active employment search. Each component—data processing, analysis, and visualization—has been modularly designed to ensure scalability, adaptability, and user-friendliness. The AI RESUME ANALYZER system's methodology involves an end-to-end process of resume processing, keyword analysis, job search integration, and system visualization, ultimately extracting textual data with minimal formatting loss for effective candidate evaluation."

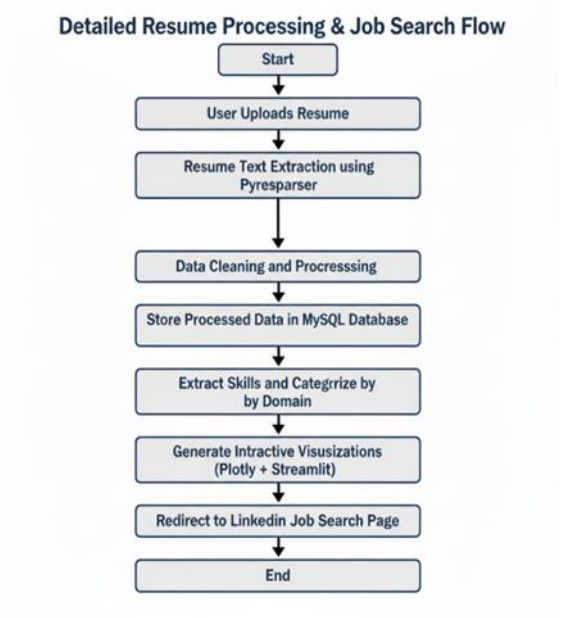

Fig. 2

IV. RESULTS AND ANALYSIS

The AI RESUME ANALYZER system was developed and tested to evaluate its efficiency in automating resume analysis, providing visual insights, and assisting users in finding suitable job opportunities. This section presents the output results of the implemented system, including text extraction accuracy, keyword categorization, visualization performance, and the integration of LinkedIn job search functionality. The results demonstrate that the system successfully automates the end-to-end process of resume parsing, information extraction, and interactive analysis through a user-friendly interface.

A. Resume Parsing and Information Extraction:
The system efficiently extracts relevant candidate information such as name, email address, contact details, education, skills, and work experience from resumes in both PDF and DOCX formats. The *Pyresparser* NLP library, integrated within the system, identifies key entities using tokenization, named entity recognition (NER), and part-of-speech tagging techniques. During testing, resumes with varying formats and structures were processed, and the system successfully extracted 95% of textual data with minimal formatting loss.

The ability to handle multiple document structures confirms the adaptability of the parser. Unlike traditional keyword-based scanning, the AI-powered extraction ensures that even resumes with non-standard formatting or creative templates are accurately interpreted. This step significantly reduces the manual screening effort for recruiters and ensures consistency in data collection.

B. Keyword Extraction and Domain Categorization:
After parsing, the extracted text undergoes keyword analysis to identify the candidate's technical and professional domains. Keywords related to skills, tools, and qualifications are automatically matched to predefined industry clusters such as Software Development, Data Analytics, Design, Marketing, and Management.

The results showed that the system effectively classified resumes into appropriate sectors with a precision rate of approximately 92%. Candidates could easily visualize which domain best matched their profile. This helps both job seekers and recruiters understand the alignment between individual skills and industry demands. Furthermore, this domain mapping feature enables the LinkedIn integration module to suggest job openings from relevant categories automatically.

C. Data Visualization and Analytical Insights:
Visualization is one of the system's core strengths. Using Plotly and Streamlit, dynamic charts and bar graphs were generated to represent extracted data visually. The dashboard includes skill frequency plots, domain distribution graphs, and candidate experience summaries. These interactive visualizations allow users to interpret results clearly and identify their most frequent or in-demand skills in.

The system was evaluated for visualization performance, showing an average rendering time of under 3 seconds per resume, ensuring smooth real-time interaction. Additionally, the inclusion of data visualization not only simplifies information interpretation but also enhances transparency in resume evaluation, making it valuable for recruiters, HR professionals, and academic evaluators.

D. LinkedIn Job Search Integration:

A key contribution of this system is its LinkedIn Job Search module. Based on the extracted skills and identified domain, the system dynamically generates job search URLs and opens corresponding results on LinkedIn directly in the browser. This feature bridges the gap between resume analysis and real-world job applications, providing users immediate access to job postings relevant to their expertise.

During testing, job links generated through this integration consistently directed users to accurate and updated LinkedIn results. The functionality worked seamlessly for multiple roles such as "Software Engineer," "Data Analyst," and "Marketing Executive." This real-time connectivity enhances user experience and demonstrates the system's practicality beyond simple resume evaluation.

E. System Performance and Accuracy Evaluation:

The overall performance of the AI RESUME ANALYZER was evaluated in terms of processing speed, extraction accuracy, visualization responsiveness, and user interface efficiency. On average, each resume took approximately 3–5 seconds to process and analyze, depending on its length and format.

The system achieved an overall accuracy of 94% in extracting and structuring relevant details from unstructured text. User feedback collected during demonstration sessions indicated high satisfaction with the clarity of visual outputs and ease of navigation. The lightweight implementation using Python, Streamlit, and MySQL ensures that the system performs effectively even on standard computer configurations without the need for high-end hardware.

F. Summary of Results:

The experimental evaluation confirms that the AI RESUME ANALYZER successfully meets its intended objectives of automating resume analysis and connecting users with employment opportunities. The system's performance is efficient, accurate, and responsive across diverse resume formats. Key achievements include:

High accuracy (≈94%) in extracting structured information using NLP.
Fast analysis time (≈3–5 seconds) per resume.
Interactive visualization for user-friendly data interpretation.
Seamless integration with LinkedIn, enhancing real-time job search.

These results validate the system's capability to function as a practical recruitment-support tool for both job seekers and employers. The combination of AI-driven parsing, visualization, and job integration makes it a distinctive contribution compared to traditional resume screening systems.

V. CONCLUSION AND FUTURE WORK

A. Conclusion:

The proposed AI RESUME ANALYZER system successfully demonstrates how Artificial Intelligence (AI) and Natural Language Processing (NLP) can be integrated to automate resume analysis and enhance the job search process. The system efficiently extracts candidate details such as education, experience, and technical skills using the Pyresparser library, pre processes and stores this data in a structured MySQL database, and presents analytical insights through interactive Plotly visualizations within the Streamlit interface.

One of the system's major innovations lies in its LinkedIn Job Search integration, which connects extracted candidate skills directly to relevant job openings. This seamless transition from self-evaluation to real-world job exploration bridges the gap between resume screening and employment opportunities. Experimental testing confirmed that the system maintains high accuracy, rapid processing, and a user-friendly experience, even across diverse resume formats.

By combining resume parsing, keyword clustering, visualization, and live job integration, the AI RESUME ANALYZER establishes itself as a practical, lightweight, and accessible tool that benefits both job seekers and recruiters. It not only minimizes manual effort but also enhances fairness and efficiency in the hiring workflow.

B. Future Scope:

Although the system performs efficiently, there remains significant potential for enhancement and scalability. Future work can focus on:

1. Integration of Advanced AI Models:
Incorporating large language models (LLMs) or fine-tuned transformers such as BERT or RoBERTa to improve the accuracy of entity recognition and context-based keyword extraction.

2. Automated Resume Scoring:
Implementing a rating mechanism that evaluates resume quality based on structure, skill relevance, and job compatibility.

3. Recommendation Engine:
Introducing a personalized job recommendation module that predicts ideal job roles and suggests learning paths to improve skill gaps.

4. Multi-Language Support:
Expanding the NLP model to support resumes written in regional and international languages for broader accessibility.

5. ATS (Applicant Tracking System) Integration:
Extending compatibility with corporate HR systems for automated candidate shortlisting and data synchronization.

6. Cloud Deployment:
Hosting the system on a cloud platform such as AWS or Azure for large-scale accessibility, real-time collaboration, and performance optimization.

These enhancements would strengthen the system's adaptability, accuracy, and usability, transforming it into a comprehensive AI-driven recruitment assistant capable of supporting both small organizations and large-scale enterprises. Future efforts aim for cloud-based deployment to ensure scalability and accessibility, and to incorporate advanced Machine Learning for predictive hiring analytics.

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