Resume Analyser and Career Recommendation System using NLP

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Abstract--- Every Massive volumes of resumes may cause a challenge in the recruitment process since recruiters spend lots of time and effort manually assessing applicants. Besides, some applicants are not well advised on how to optimize their resumes for applicant tracking systems, nor do they get ideas about which careers would suit them. This project solves such challenges by automating and advancing traditional resume analysis methods with efficient and accurate candidate review and personalized career recommendations. This solution not only reduces the workload of the recruiter but also empowers the applicants to align their profiles with market requirements by automating resume parsing, job-role matching, and career recommendations. It fosters an efficient, scalable, and fair hiring process while helping individuals enhance their employability and achieve their professional goals.

Keywords---Applicant tracking systems (ATS), Career optimization, Resume parsing, Job- role matching

I INTRODUCTION

Corporate firms and recruitment agencies process hundreds of resumes on a day to day basis. This is no work for humans. An automated intelligent system is needed that can extract all the critical information from the unstructured resumes and convert all of them into a standard structured format which can then be ranked for a specific job position.

Resumes are a bit structured unlike other unstructured data (ex: email body, web page contents, etc.). Information is stored in discrete sets. Each set contains data about the person's contact, work experience or education information. Despite this, resumes are tough to parse. This is because they vary in types of data, order, and writing style, etc. In order to effectively and efficiently parse the data from a variety of resumes, there should be no reliance on the order and type of data.

To solve this tedious process our tool comes into action that makes the process fast, easy and reliable. Through the application of NLP Techniques, it extracts keywords from the resume and applies them for predictions, recommendations, and analytical representation.

Limitations in Existing system

- User Experience: The interface was not be user-friendly, which could hinder accessibility for job seekers.
- Limited Dataset Diversity: The system relies on resumes from specific sources, which may not represent all industries, limiting its generalizability and effectiveness across various job markets.
- Real-time Adaptation: The systems lack the capability to adapt in real-time to changing job market trends, potentially making its feedback less relevant over time.
- Lack of Specific Datasets: The project does not specify the datasets used for training and testing, which raises concerns about the model's robustness and generalizability. Without clear data sources, it's challenging to evaluate the effectiveness of the automated screening system.

II PROPOSED SOLUTION

Our proposed solution is to enhance the traditional methods of resume analysis and job matching by leveraging Natural Language Processing (NLP) . The system uses NLP techniques to extract data such as personal information, education, work experience, and skills from resumes. It ensures full data capture, providing structured information for further analysis. The application compares the extracted data against job descriptions and matches candidates to job profiles based on their skills and experiences. It also provides skill and certification recommendations to improve job suitability. This solution aims to increase the accuracy and relevance of resume screening while providing valuable recommendations for both job seekers and recruiters.

The system would extract structured data from the resumes - personal details, skills, education, and experience and match this against job descriptions. It recommends skills and certifications to candidates to better fit them for an opportunity, while providing a more efficient and accurate screening mechanism for the recruiter. This solution by leveraging NLP enables adding scalability, relevance, and user experience in making recruitment more reliable and suited for all concerned stakeholders

III METHODOLOGY

- **Modules**

1. Client Module

This module ensures that the process of registration friendly to users, and role-specific to improve usability and ease in

accessing features within the system. This module consists of user interface where users can see the recommendations and also can be directed to pages where they can apply for jobs based on their resume.

Features:

- Fetching Location and Miscellaneous Data
- Using Parsing Techniques to fetch
  - Basic Info
  - Skills
  - Keywords
- Using logical programs, it will recommend
  - Skills that can be added
  - Predicted job role
  - Course and certificates
  - Resume tips and ideas
  - Overall score

2. Admin Module

This module gets all applicants data into tabular format and download users data and give analysis.

Features:

- Get all applicant's data into tabular format
- Download user's data into csv fil
- View all saved uploaded pdf in Uploaded Resume folder
- Pie Charts for:
- Predicted field roles
- Experience level
- Resume score
- User count
- The Resume Analyzer and Career Recommendation System Using NLP would be developed as per a structured approach in order to achieve an efficient user-friendly reliable platform.

- **Methodologies include the following**

Requirement Gathering and Analysis

1. Objective:
   Identify system objectives, target user groups (applicants, recruiters, and educational institutions), and key functionalities.
   Activities:
   Identify the different types of resumes (e.g., PDF, DOCX) and homogenize the parsing requirements. System Design
   nd Architecture Target: Develop a robust and scalable architecture for the parsing and processing and storage of data.
2. Activities: Frontend Design: Application of HTML5, CSS3, JavaScript, and Streamlit in creating an intuitive interface for resume uploading and analytics view.
   - Backend Framework: Development of server-side logic in Python with integration of NLP libraries such as SpaCy and NLTK for text parsing and analysis.
   - Database Schema: Relational DB in MySQL designed to store parsed resume data in structured format for easy extraction, retrieval, and subsequent analysis.
3. NLP Implementation
   Goal: Provide strong text processing capabilities to parse out or extract meaningful information based on unstructured data from resumes. Activities:
   - Perform keyword matching for skills and job roles with tokenization, named entity recognition (NER), and lemmatization.
   - Analyze job descriptions and map them against resume data to generate career recommendations.
4. Data Storage and Management Goal: Safeguard, structure, and efficiently store resume data along with the analytic output.
   Activities:
   - Establish secure database connection
   - Store processed data in a structured format that can be used by analytics and visualization for recruiters and applicants.

IV System Architecture

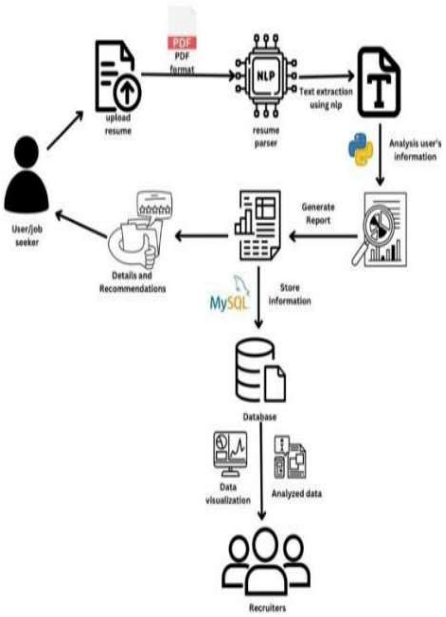


Fig.1.System Architecture diagram

V UML Diagrams

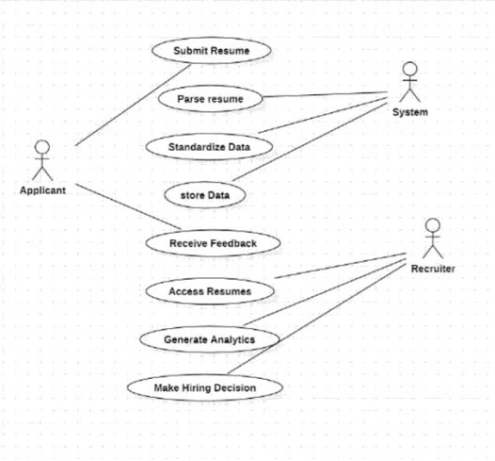


Fig.2.Use case diagram

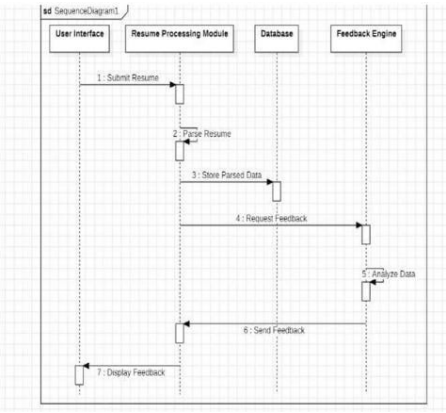


Fig.3.Sequence diagram

VI LITERATURE SURVEY

The paper [1] A summarized application for a typical posting on the internet, hundreds, if not thousands, of people apply within hours shortly after any advertised job. None but the most limited companies can afford to keep hiring experts engaged in an unending task of sifting through piles of applications for positions. Fairness would also be an issue: with many valuable resumes shoved aside at the time they get received, there is much less chance of finding the top hits from only one small step into the pile. It is possible to lose some of the best fit candidates or select those with no aptitudes to fill in the position. In this work, we outline such a strategy that can suffice these issues of searching, automatically suggesting the best-suited candidates to the job description based on a given job text. The proposed model utilizes Natural Language Processing method, which crawled the unstructured resumes to extract relevant information skills, education, experience, etc., build a summarized format for each application, and screen the affiliated resumes with what is not-important information. This enables recruiters to analyze 4 every résumé in lesser time. Once the text mining process has been accomplished, the proposed method takes up a vectorization model and employs cosine similarity to match every résumé with the job description. Hence, the computed rank scores would then help to conclude which candidates are best suited for that specific job opening.

The research paper [2] the researchers developed a online recruiting system which has advanced, a large number of resumes were submitted. As a result, hiring new employees and reviewing a large number of resumes is a challenge for the human resource department or employer. Therefore, this system has helped employers by using an automated intelligent system based on natural language processing. This system can take different formats of resumes into the text format and can extract some important information. Some can also compare the applicant's resume with the job description in order to see the percentage of similarity as well. The system can assist the human resource department or employer by screening resumes before interviews, thus finding the best candidate for the job position.

In paper [3] developed a system to Analyze the data available in each and every resume in order to shortlist the candidate can be a challenging job. The objectives of this project are to extract details from a person's resume and analyze them. This application uses a few Natural Language Processing techniques to parse through the data in a resume and utilize this parsed data to assess certain features that are present in any resume of any person related to Information Technology. Skills is the most critical feature of any resume, concerning the domain of Information Technology. Based on the skills extracted from the resume of the person, the recommended career field is provided. Further analysis of all the resumes are done by storing them along with their scores and recommended career fields to make the shortlisting process easy for the recruiter (here admin).

Paper [4], the authors introduced a Resume Classifier which tries to find the resumes for any job/university interview more robust by doing information extraction approach based on the data of previously selected and rejected candidates. The System extracts the information from the resume. Then Natural language processing (NLP) technologies are used for parsing, tokenizing, stemming and filtering the content of the data. We can make a score of that resume, using the Phrase Matcher based on recruiter information; and we can also indicate missing skills to users and the best resume to recruiter.

The paper [5] outlines a Smart Resume Analyzer that uses Natural Language Processing (NLP) to extract essential information from resumes, such as skills and contact details. It employs Python libraries like SpaCy and pandas for efficient data processing and analysis. The tool offers personalized recommendations to job seekers, helping them optimize their resumes and improve their chances of securing job interviews. Overall, it aims to enhance the recruitment process by providing actionable insights for career development.

The paper [6], the document presents the Intelligent Resume Analyzer, an AI-driven tool designed to assist job seekers in creating effective resumes that can successfully navigate the job application process. By employing machine learning and natural language processing techniques, the system analyzes resumes and provides personalized feedback to enhance their content and presentation. This technology aims to give candidates a competitive edge in a challenging job market by improving their chances of being noticed by recruiters

Paper [7] has discussed the development of an automated resume screening system using Artificial Intelligence and Natural Language Processing to enhance the recruitment process. It addresses the challenges of manual resume screening, such as time consumption and bias, by proposing a web application that sorts resumes based on relevant keywords. This system aims to improve efficiency and accuracy in identifying suitable candidates for job positions, ultimately easing the burden on recruiters.

The paper [8] discussed a machine learning-based approach to automate the resume screening process, utilizing Natural Language Processing (NLP) techniques to extract key information from resumes. It outlines a methodology that employs various classifiers, such as K-Nearest Neighbor (KNN), Support Vector Machine (SVM), Multi-Layer Perceptron (MLP), and Logistic Regression (LR), to match candidates with suitable job roles. The system aims to enhance efficiency and accuracy in recruitment, addressing the challenges posed by diverse resume formats and high applicant volumes.

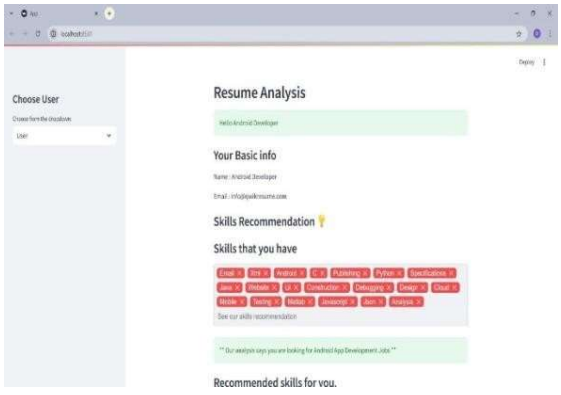
The research paper [9] is an attempt to automate the extraction and organization of information from resumes using NLP techniques like NLTK and SpaCy, supplemented by regex for pattern matching. It uses datasets from Kaggle and public sources, comprising thousands of resumes in diverse formats (PDF, DOCX). Key extracted features include personal and professional details like name, contact information, skills, education, and experience. It integrates rule-based approaches with machine learning models, which are assessed using metrics such as Precision, Recall, F1-score, and Accuracy. The goal is to obtain a high F1- score. The challenges include variability in resume formats, limited availability of labeled data, and complexity in language, resulting in lower evaluation metrics. Future work includes the application of advanced deep learning models like Transformers, increasing the diversity of the dataset, offering real-time feedback, detecting bias, and enhancing user interface.

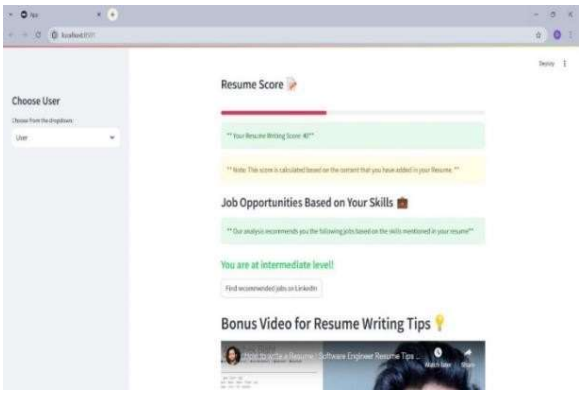
VII FUTURE SCOPE

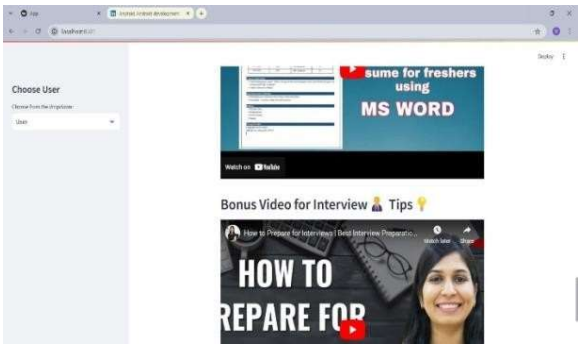
Future system improvements are to include the expansion of fields of analysis to accommodate different varied roles as well as offering role-based recommendations. The tool may support ranking resumes against a comprehensive scoring model, hence making it easier to compare between candidates. Other capabilities such as detailed insights for individual users and enhanced algorithms for more accurate decision-making can be developed based on the assessment of candidate suitability for the job roles. Further, all these changes will improve the accuracy, usability, and impact of the tool to the recruitment landscape.

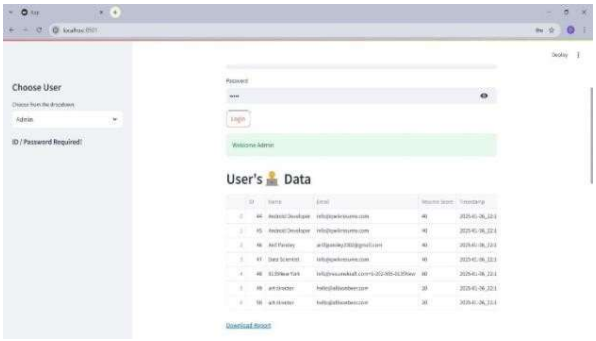
VIII RESULTS

The "Resume Analyzer and Career Recommendation System Using NLP" simplifies the resume screening process by using sophisticated NLP methods to pull out and scrutinize vital information from resumes, including personal information, education, skills, and work history. The system produces customized career recommendations, including proposed job titles, skills, certifications, and a resume score, assisting candidates in enhancing their profiles. It also gives recruiters a systematic, data-driven method of evaluating resumes more effectively through analytics and visual insights, including forecasted roles and levels of experience. With a secure MySQL database for storing data and an accessible interface created using HTML5, CSS3, JavaScript, and Streamlit, the system supports better decision-making for the applicant and the recruiter, providing an automatic and informative method of resume analysis and career









IX CONCLUSION

The "Resume Analyzer and Career Recommendation System Using NLP" will act as an efficient and user-friendly application for the users' side, both applicants and recruiters. It will automatically draw out and organize data from resumes and convert that information into a more machine-readable format. This enables applicants to have recommendations, predictions, and analytics in order to perfect their resume and career paths. Meanwhile, for recruiters, it assists them with real-time resume storage, organization, and analysis in accelerated times. This tool can also be used by organisations, educational institutions, and recruitment agencies to gain valuable insights into their operation to improve the efficiency of their recruitment processes..

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