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AI-Powered Resume Parsing for Efficient Recruitment

Niranjan Kulkarni[1]
Department of Computer Science& Design Engineering
New Horizon Institute of Technology & Management, Thane, India
niranjankulkarni@nhitm.ac.in

Swati Patil[2]
Department of Computer Science& Design Engineering
New Horizon Institute of Technology & Management, Thane, India
swatipatil@nhitm.ac.in

Shahbaz Khan[3]
Department of Computer Science& Design Engineering
New Horizon Institute of Technology & Management, Thane, India
shahbazkhan8452@gmail.com

Shahbaz Shaikh[4]
Department of Computer Science& Design Engineering
New Horizon Institute of Technology & Management, Thane, India
shahbazsk2003@gmail.com

Aditya Khandagale[5]
Department of Computer Science& Design Engineering
New Horizon Institute of Technology & Management, Thane, India
adityakhandagale639@gmail.com

Mubashshir Khan[6]
Department of Computer Science& Design Engineering
New Horizon Institute of Technology & Management, Thane, India
khanmubashshir08@gmail.com

Abstract - The incorporation of Artificial Intelligence (AI) into Business Process Management Systems (BPMS) has significantly transformed multiple industries, particularly human resource management. A notable innovation in this domain is the AI-driven Resume Parser, which enhances the recruitment process by automating resume evaluation and candidate selection. Conventional hiring methods can be inefficient, requiring extensive time and effort while being susceptible to human bias, making it challenging to identify the best candidates effectively. The proposed system utilizes Natural Language Processing (NLP) and Machine Learning (ML) to extract, classify, and organize essential resume details, allowing recruiters to make informed, data-driven hiring decisions.

This research explores the implementation of AI-driven resume parsing, highlighting its role in enhancing efficiency, accuracy, and fairness in recruitment. The system can process resumes in multiple formats, handle large-scale applicant pools. However, challenges such as contextual ambiguity, data privacy concerns, and algorithmic bias necessitate human oversight to ensure ethical and reliable decision-making. As organizations increasingly adopt AI-driven automation to optimize business processes, the AI Resume Parser represents a transformative solution that enhances recruitment efficiency while reducing operational workload.

Key Words: Artificial Intelligence, Business Process Management, AI in Recruitment, Resume Parsing, Natural Language Processing, Machine Learning, HR Automation, Data Extraction, Applicant Tracking System, Recruitment Optimization.

1.INTRODUCTION

The Recruiters play a vital role in the hiring process by selecting the most suitable candidates for job openings. However, during recruitment drives, they receive an overwhelming number of resumes, making manual screening a tedious and time-consuming task. Additionally, resumes are often submitted in various formats, such as PDF, DOCX, and TXT, further complicating the extraction and organization of relevant information. Traditional resume screening methods are not only inefficient but also prone to human errors and biases, which can impact the fairness and accuracy of candidate selection. To address these challenges, an AI-powered Resume Parser has been developed to automate and streamline the recruitment process.

The AI Resume Parser leverages Natural Language Processing (NLP) and Regular Expressions to extract key details from resumes, including personal information, educational background, work experience, skills, certifications, and achievements. Using SpaCy, a powerful NLP library, the system analyzes text, identifies named entities, and categorizes information into structured formats. The parser is designed to handle large volumes of resumes efficiently by implementing multiprocessing, enabling it to process multiple resumes in parallel and significantly reduce screening time. By converting unstructured resume data into an organized format, the system allows recruiters to quickly search, filter, and compare candidates based on predefined criteria.

2. Proposed System

2.1 Methodology

The resume parser is implemented using Natural Language Processing (NLP) techniques, particularly leveraging the spaCy library for Named Entity Recognition (NER) and text processing. The system follows a structured pipeline to extract key information such as name, email, phone number, skills, and educational qualifications from resumes in various formats (PDF, DOCX, etc.).

Data Collection and Preprocessing

The system first collects resume files from a designated directory (resumes/). The **utils** module is used to extract raw text from these documents, ensuring

compatibility with different file extensions. The extracted text undergoes preprocessing steps such as:

- **Stopword Filtering:** Removing frequently used words that do not contribute significant meaning to the text.
- **Text Standardization:** Converting all characters to lowercase and eliminating unnecessary special symbols.
- **Grammatical Labeling (POS Tagging):** Categorizing words based on their grammatical roles to enhance entity identification.
- **Entity Recognition (NER):** Detecting and extracting specific named entities from the text for structured information processing.

Named Entity Recognition (NER) for Information Extraction

The system utilizes spaCy's pre-trained NER model (en_core_web_sm) along with a custom-trained model for enhanced accuracy. It extracts key entities such as:

- **Name**: Using a custom NER model and rule-based pattern matching.
- **Email**: Extracted using regex-based pattern matching.
- **Phone Number**: Identified through a predefined regular expression.
- **Skills**: Extracted by analyzing noun chunks and cross-referencing them with a predefined skills list.
- **Degree/Education**: Recognized using entity extraction functions.

Information Structuring and Categorization

Extracted details are structured into a dictionary with the following fields:

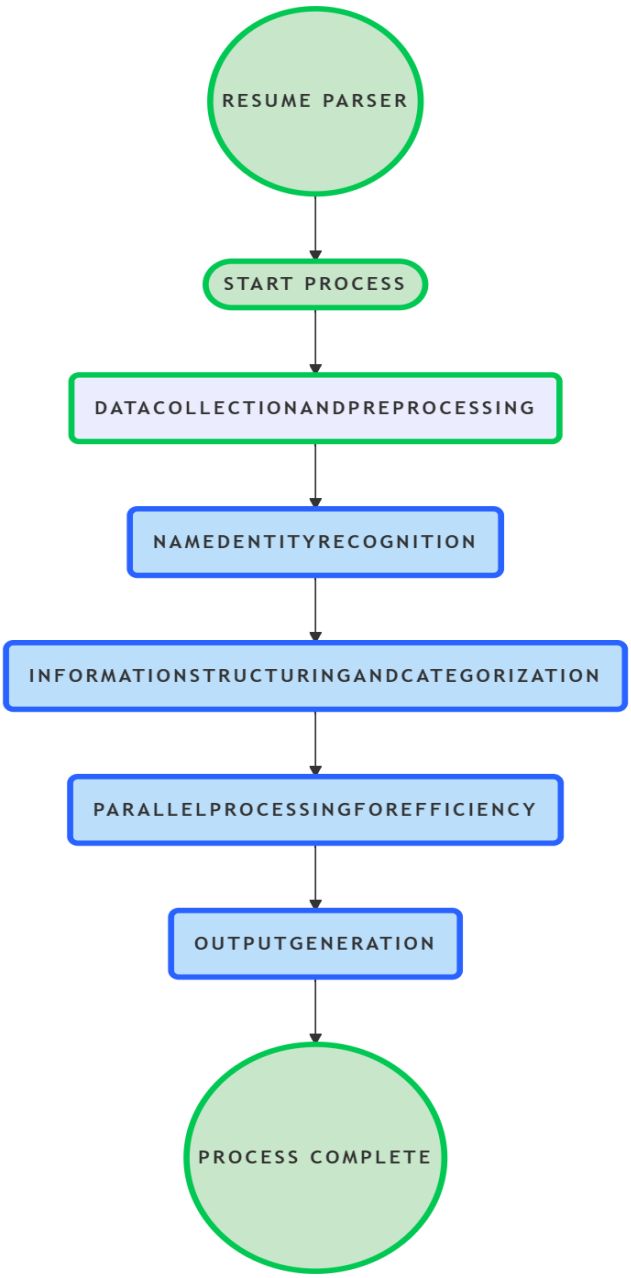
- name
- email
- mobile number
- skills
- degree
- no. of pages

Parallel Processing for Efficiency

To process multiple resumes efficiently, multiprocessing is employed. The mp.Pool function creates parallel workers to process multiple resume files concurrently, significantly reducing execution time.

Output Generation

The extracted information is returned in JSON format and printed using pprint, making it easily readable and storable for further analysis.



2.2 Result Analysis

The Resume Parser follows a structured workflow to extract and analyze information from resumes. It begins with the user input stage, where users can either upload their resumes or manually enter basic details such as their name. Once a resume is uploaded, the data extraction process begins, where key details like name, email,

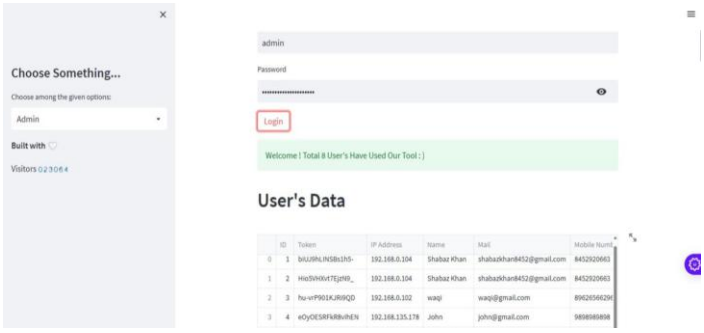
mobile number, skills, experience level, and education are retrieved and stored in a database.

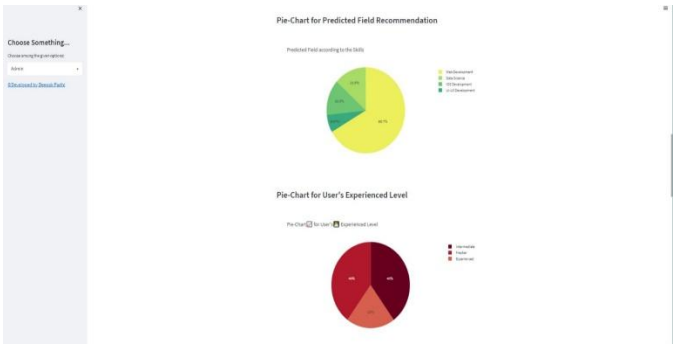
Following this, the data analysis and prediction phase takes place, where the system evaluates the extracted skills and experience to generate predicted career fields, such as Web Development or Data Science. A pie chart visualization is also created to represent the user's experience level distribution and predicted career path.

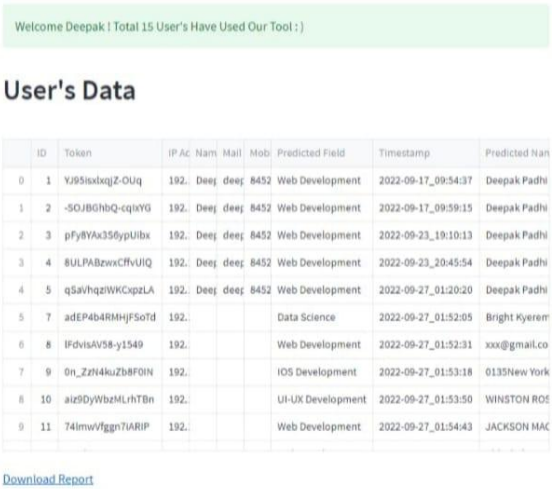
The project also includes an admin dashboard that allows tracking of total users, monitoring of user activity, and managing stored authentication token IDs. Additionally, the system provides an option for report generation, enabling users to download reports with timestamps for reference.

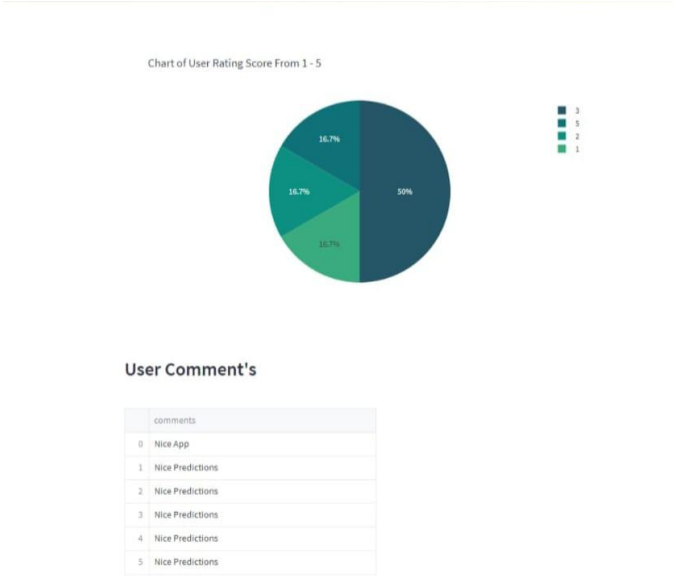
To improve user engagement, the system incorporates a feedback collection feature, where users can rate the predictions on a scale of 1 to 5 and leave comments. A chart displaying user ratings helps in assessing the system's performance based on feedback, with remarks such as "Nice Predictions" stored for future analysis.

This structured approach ensures efficient resume parsing, skill evaluation, and career prediction, making the project highly useful for both users and administrators. Let me know if you need any refinements!









3. CONCLUSIONS

The AI-powered Resume Parser represents a significant advancement in modern recruitment, offering a highly efficient, accurate, and scalable solution for automating the resume screening process. Traditional recruitment methods often involve manually reviewing hundreds or even thousands of resumes, making the hiring process time-consuming, error-prone, and susceptible to bias. By leveraging machine learning, natural language processing (NLP), and text mining, the Resume Parser extracts key information such as skills, experience, education, and

achievements, ensuring faster, more precise, and unbiased hiring decisions.

One of the primary benefits of this system is its ability to reduce recruitment time and operational costs, allowing recruiters to focus on engaging with top talent rather than manually screening applications. Moreover, by offering impartial assessments, it reduces human biases, fostering a more equitable and inclusive recruitment process.. The system not only benefits recruiters but also empowers job seekers by identifying weaknesses in their resumes and providing data-driven recommendations for improvement.

Beyond corporate recruitment, this technology has applications in career counseling, job portals, and academic institutions, helping candidates optimize their resumes for better job prospects. Future enhancements could include personalized resume optimization, predictive analytics for job matching, real-time feedback on resume content, and blockchain-based verification of credentials, further strengthening its capabilities.

With the continuous advancement of AI, the Smart Resume Parser holds the capability to transform talent acquisition by enhancing efficiency, accuracy, and data-driven decision-making.. By embracing such innovations, organizations can streamline hiring, improve candidate experience, and build a diverse, high-quality workforce. Incorporating AI into recruitment is more than just a passing trend; it is an essential advancement toward creating a more intelligent, fair, and future-oriented job market.

REFERENCES

1.NIp Based Extraction Of Relevant Resume Using Machine Learning. Author: Nirali Bhaliya, Jay Gandhi, Dheeraj Kumar Singh. Published In International Journal Of Innovative Technology And Exploring Engineering (Ijitee) Issn: 2278-3075 (Online), Volume-9 Issue-7, May 2020.
2. Review Paper On Resume Scanning Using Python. Author: Panil Luqman. Published In International Research Journal Of Engineering And Technology (Irjet), Volume: 09 Issue: 04 Apr 2022.
3. Resume Recommendation Using Machine Learning. Author: Ramba S Naik, Shrinivas R Dho International Journal Of Creative Research Thoughts (Ijcrt), Volume 10, Issue 7 July 2022.
4. Resume Screening Using Lstm. Author: Navale Sakshi, Doke Samiksha, Mule Divya3, Prof. Said S. K.Published In International Journal Of Research Publication And Reviews, April 2022.
5. F. Ciravegna, “Adaptive information extraction from text by rule induction and generalisation,” in Proceedings of the 17th International Joint Conference on Artificial Intelligence (IJCAI2001), 2019.
6. A. Chandel, P. Nagesh, and S. Sarawagi, “Efficient batch top-k search for dictionary-based entity recognition,” in Proceedings of the 22nd IEEE International Conference on Data Engineering (ICDE), 2020.
7. Mujtaba, Dena F., and Nihar R. Mahapatra. "Ethical Considerations in AI-Based Recruitment." 2019 IEEE International Symposium on Technology and Society (ISTAS). IEEE, 2019.