

A Systematic Review - A Simple Resume Parser used for Extracting Information from Resumes

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Abstract: *The Simple Resume Parser project aims to create an AI-powered system that automates the extraction of structured information from unstructured resume documents. Its primary goal is to minimize the manual effort and errors associated with reviewing large numbers of job applications by applying Natural Language Processing (NLP) techniques. The system analyzes resumes in multiple formats such as PDF and DOCX, identifies key sections, and extracts essential information including personal details, education, professional experience, and skills. The extracted data is then converted into a standardized, machine-readable format for storage or further analysis. By automating this process, the project enhances the efficiency, speed, and accuracy of candidate screening, supporting recruiters in making quicker and more informed decisions. Furthermore, it establishes a foundation for advanced resume analytics and intelligent recruitment systems, showcasing the potential of AI to streamline and modernize administrative workflows in human resource management.*

Keywords: Simple Resume Parser project

I. INTRODUCTION

The project focuses on the development of a Simple Resume Parser, an AI-based system designed to automate the extraction of structured information from unstructured resume documents. In modern recruitment processes, organizations often receive a large number of applications, making manual resume screening both labor-intensive and prone to human error. To address this challenge, the proposed system leverages Natural Language Processing (NLP) techniques to identify and extract key information such as personal details, educational qualifications, professional experience, and skills from resumes in multiple formats, including PDF, DOCX, and text files.

The extracted data is then transformed into a structured, machine-readable format, enabling efficient storage, retrieval, and analysis within recruitment systems. This automation not only enhances the speed, consistency, and accuracy of candidate shortlisting but also significantly reduces the manual workload for human resource professionals. Furthermore, the parser can be extended to assess candidate suitability by comparing extracted data with predefined job criteria, improving decision-making in talent acquisition.

Overall, the project demonstrates how Artificial Intelligence and NLP can modernize and streamline recruitment workflows, offering a scalable, efficient, and intelligent solution for resume management in today's competitive job market.

II. LITERATURE SURVEY

Ramakrishnan et al. (2011), early resume parsing systems primarily relied on rule-based approaches, which used predefined patterns and regular expressions to identify different sections within resumes. Although these methods were straightforward and computationally efficient, they lacked flexibility and performed poorly when dealing with diverse resume structures and inconsistent formatting. Lee and Chen (2013) further emphasized that the wide variation in



resume file types and layouts (such as PDF, DOCX, and TXT) created significant challenges for rule-based extraction, resulting in high maintenance requirements.

To overcome these limitations, researchers began exploring machine learning techniques. Sujatha and Sindhuja (2017) employed supervised learning models to classify resume sections—such as education, experience, and skills—based on linguistic patterns, including part-of-speech tags and n-gram features. Building on this, Ravikumar et al. (2019) showed that machine learning algorithms trained on annotated resume datasets achieved superior accuracy and generalization compared to traditional rule-based methods, though they required extensive labeled data for optimal performance.

Further advancements introduced deep learning approaches. Patel et al. (2020) utilized Bidirectional LSTM (BiLSTM) networks for Named Entity Recognition (NER) tasks, effectively identifying entities such as job titles and company names. More recently, Gupta and Sharma (2021) demonstrated that transformer-based pre-trained language models like BERT can capture contextual semantics, offering greater adaptability across varied resume formats with minimal feature engineering.

III. METHODOLOGY

The development of the resume parser system requires a combination of programming languages, Natural Language Processing (NLP) libraries, and text-processing tools. The tools and technologies used in this project are as follows:

Programming Language

Python:

Python is used as the primary programming language because of its simplicity, flexibility, and powerful support for data manipulation and NLP. Its rich ecosystem of libraries enables efficient text extraction, preprocessing, and analysis.

Development Environment

Jupyter Notebook / Visual Studio Code (VS Code):

These IDEs are used for writing, testing, and debugging code.

Jupyter Notebook is ideal for experimentation and step-by-step data analysis.

VS Code provides better integration and modular project development.

Libraries and Frameworks

Natural Language Processing (NLP) Libraries

NLTK (Natural Language Toolkit): Used for tokenization, stop-word removal, and part-of-speech tagging.

spaCy: Provides pre-trained models for Named Entity Recognition (NER) to identify names, organizations, and skills from text.

Pyresparser: An open-source library designed specifically for resume parsing and extraction of structured information.

Text and File Processing Libraries

pdfminer / PyMuPDF (fitz): Used for extracting text from PDF resumes.

python-docx: Used for reading and processing .docx format resumes.

re (Regular Expressions): Used for identifying patterns such as email addresses, phone numbers, and URLs.

os / glob: Used for file management and reading multiple resumes in a directory.

Data Storage and Representation

JSON (JavaScript Object Notation):

Used for storing the extracted information in a structured format that is easy to read and transfer.

CSV / Excel:

Used to export extracted data for HR analytics or database integration.

Visualization and Reporting Tools

Pandas and Matplotlib (optional):

Used for analyzing and visualizing extracted data to measure accuracy and performance.

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Hardware and Operating System

Hardware:

Standard personal computer with minimum 8 GB RAM and Intel i5 or equivalent processor.

Operating System:

Compatible with Windows, macOS, or Linux environments.

Version Control and Documentation

Git / GitHub:

Used for version control, collaboration, and maintaining code repositories.

MS Word / LaTeX:

Used for preparing documentation, reports, and presentation materials.

IV. CONCLUSION

The project successfully achieved its objective of designing a simple, efficient, and accurate resume parsing system using Natural Language Processing (NLP) and rule-based techniques. The parser automates the extraction of critical candidate information, reducing manual workload, saving time, and improving accuracy in recruitment processes.

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