AUTOMATED RESUME ANALYSIS AND SKILL SUGGESTING WEBSITE BY USING NLP

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Abstract: The most qualified applicant for a position must be found through careful consideration of job applications, which is done during the Automated Evaluation of Resumes Using NLP stage of the hiring process. [1] Automated resume screening is now a practical alternative to the manual screening procedure because to developments in deep learning and natural language processing (NLP) [7]. In this paper, we examine a few contemporary methods for screening automated resumes. To increase the precision and effectiveness of the screening process, these approaches employ a variety of methods including hybrid deep learning frameworks, transfer learning, genetic algorithms, and multisource data. Also, some research investigates the use of job descriptions to improve resume screening precision. These research' experimental findings show that the suggested strategies are more effective than conventional ones. The results of this study can help human resource managers and recruiters automate the hiring process and efficiently and impartially identify viable applicants.

Index Terms – *Natural Language Processing (NLP), Transfer Learning, Genetic Algorithms, Resume Analysis.*

1. INTRODUCTION

An essential step in the hiring process is the automatic review of resumes, which entails assessing job applications to find the applicant most suited for a given position. This procedure may take a long time and be prone to human mistake, which could lead to the loss of qualified individuals. Automated resume screening has grown in popularity recently as a solution to this problem. Automatic resume screening uses several methods to enhance accuracy and efficiency, including deep learning algorithms, machine learning, and natural language processing (NLP). Several studies have suggested various methods for automating the screening of resumes. Li et al. (2020) introduced a hybrid deep learning framework that makes use of long short-term memory (LSTM) networks and convolutional neural networks (CNNs) [6].

The main goal of using NLP algorithms for resume screening, such as cosine similarity and S-BERT, is to

ensure that the most qualified individuals are found and given further consideration while automating the hiring process. The specific goals of the recruiting process are to become more effective by automating the screening of job applications. to provide a more objective method to reduce the possibility of biases in manual screening by utilizing cutting-edge NLP algorithms such as cosine similarity and S-BERT to improve resume screening accuracy. to increase the number of resumes processed while saving time and money by eliminating the need for human screening. In order to improve the candidate experience, a faster and more effective screening procedure is offered. Improving the quality of the hiring process.

The creation of an automated system that can efficiently filter and score job applications based on their resemblance to a given job description is the main objective of the resume screening project that uses NLP techniques like cosine similarity and S-BERT [9]. The talents listed on the resumes are then ascertained. The essential information from the resume is extracted using the resume parser package.

Traditionally, sifting through a mountain of resumes to identify the most suitable candidates has been a time-consuming and resource-intensive task for recruiters. The emergence of technologies presents an opportunity to revolutionize this process, offering unprecedented efficiency and objectivity.

We delve into the intricacies of how machine learning algorithms analyze resumes, extract meaningful insights, and autonomously score candidates based on their qualifications.

By leveraging historical hiring data, these systems learn to identify patterns indicative of successful hires, providing a valuable tool for organizations seeking top talent.

The document navigates through the key components of this transformative approach, from data collection and preprocessing to the implementation of machine learning algorithms.

We'll examine the crucial role of feature extraction, the importance of a well-curated training dataset, and the continuous feedback loop that refines the model over time

2. LITERATURE SURVEY

In today's competitive job market, the process of resume screening is crucial for efficiently identifying potential candidates for various job positions. Traditional manual methods of resume screening are often time-consuming and prone to bias. To address these challenges, researchers have turned to automated techniques leveraging machine learning, natural language processing (NLP), and semantic similarity to streamline the resume screening process. This literature survey provides an overview of recent advancements in automated resume screening techniques, highlighting key studies and their contributions.

Singh and Shukla [1] proposed an automated resume screening and evaluation system based on machine learning techniques. They utilized features extracted from resumes and job descriptions to train classifiers for screening candidates. Their approach demonstrated promising results in accurately identifying suitable candidates based on predefined criteria.

Oh and Lee [2] conducted a study on extracting competencies from job postings and correlating them with resumes using NLP techniques. By analyzing the semantic similarity between job requirements and candidate resumes, they developed a framework for automated competency-based resume screening. Their work highlighted the importance of aligning candidate skills with job requirements for effective screening.

Xu et al. [3] explored deep learning and NLP methods for resume screening. They proposed a model that leverages word embeddings and neural networks to match candidate resumes with job descriptions. Their approach demonstrated improved performance compared to traditional methods, particularly in handling large volumes of resumes.

Several studies have focused on leveraging semantic similarity for automated resume screening. Bhowmik et al. [4] proposed a method based on semantic similarity and clustering algorithms to efficiently screen resumes. By measuring the similarity between candidate profiles and job descriptions, they achieved effective candidate filtering.

Elakkiya and Muthurajkumar [5] presented an automated resume screening system using semantic similarity. Their approach utilized semantic embeddings to compare resumes with job requirements, enabling accurate candidate ranking and selection.

Garg et al. [6] also explored semantic similarity-based sentence embeddings for automated resume screening. By representing resumes and job descriptions as vectors in a semantic space, they achieved robust matching and ranking of candidates.

Huang et al. [7] developed a resume screening and ranking system using NLP techniques. Their approach involved analyzing resume content and assigning relevance scores based on semantic similarity with job descriptions. This enabled efficient ranking of candidates according to job suitability.

Kang and Lee [8] proposed a resume analysis framework for job matchmaking using word embedding and ranking algorithms. By transforming resumes and job descriptions into word embeddings, they calculated similarity scores to identify suitable matches. Their approach facilitated accurate candidate-job matching while considering semantic similarities.

Li and Shen [9] introduced a resume ranking and classification method based on Sentence-BERT (SBERT). By encoding resumes and job descriptions into semantic embeddings, they performed ranking and classification tasks to identify the most suitable candidates for specific job roles.

In conclusion, automated resume screening techniques have witnessed significant advancements leveraging machine learning, NLP, and semantic similarity. These approaches offer efficient solutions for handling large volumes of resumes while ensuring fair and unbiased candidate selection. By aligning candidate skills with job requirements and utilizing semantic representations, automated systems can effectively match candidates to suitable job positions. Future research in this area may focus on enhancing the accuracy and scalability of automated resume screening systems, as well as addressing challenges related to bias and fairness in candidate selection processes.

3. METHODOLOGY

i) Proposed Work:

The system represents a pivotal advancement in the recruitment landscape, automating the initial screening process and liberating HR professionals from the time-consuming task of manually reviewing resumes. By alleviating this administrative burden, recruiters can redirect their efforts towards more strategic and value-added aspects of the hiring process, such as conducting in-depth interviews and cultivating candidate relationships. Moreover, the project is meticulously designed to evaluate candidates based on objective criteria, mitigating the

influence of unconscious biases that may inadvertently impact human decision-making. This commitment to fairness and consistency ensures that candidates are evaluated solely on their merits, irrespective of demographic or personal characteristics. Furthermore, the system harnesses the power of historical hiring data to identify patterns of success. This data-driven approach empowers decision-makers to make informed choices by considering factors that have historically proven to be reliable indicators of a candidate's suitability for a position. By leveraging this wealth of information, the system enhances decision-making accuracy and minimizes the risk of subjective judgments. Through its sophisticated analysis of resumes against specific job requirements, the system significantly enhances the likelihood of identifying candidates possessing the requisite skills and qualifications. This, in turn, leads to the creation of a higher quality pool of applicants, thereby elevating the overall effectiveness and efficiency of the recruitment process.

ii) System Architecture:

Fig 1 System Architecture

iii) Company Module:

The company module comprises critical sub-modules aimed at facilitating smooth interaction and management within the recruitment system:

Company Signup:

Through the Company Signup submodule, companies can initiate their registration process within the application. Companies provide essential details such as company name, contact information, and other pertinent information. Upon submission, an OTP (One-Time Password) is sent to the company's registered email address to verify the account. This step ensures the security and authenticity of the registration process, enhancing the overall integrity of the system.

Company Login:

Once registered, companies can access the system via the Company Login submodule. By providing their credentials, including username and password, companies gain entry into the application's interface. Upon logging in, companies can proceed to upload a folder containing resumes of potential candidates. Additionally, companies specify the required skills percentage and provide a list of skills deemed necessary for the job positions they seek to fill.

Resume Shortlisting:

The Resume Shortlisting submodule plays a pivotal role in the recruitment process. Companies upload a folder of resumes, along with specified skill percentages and required skills. The application then parses each resume, evaluating candidates based on the provided criteria. Resumes that meet the specified skills and attain a skills score greater than the given percentage are shortlisted for further consideration. This automated process streamlines resume screening, enabling companies to efficiently identify and select candidates who best match their job requirements.

In essence, these sub-modules empower companies to seamlessly navigate the recruitment process, from account registration to resume shortlisting. By leveraging automated functionalities and predefined criteria, companies can optimize their hiring processes, saving time and resources while ensuring the selection of qualified candidates.

iv) User Module:

Within the user module, several pivotal sub-modules are designed to streamline the user experience and enhance interaction with the application:

User Signup:

The User Signup submodule enables individuals to create accounts within the application. Users provide essential details for registration, including username, email, and password. Upon submission, an OTP (One-Time Password) is sent to the user's registered email address to verify the account. This verification step ensures the security and authenticity of the user's registration process, establishing a reliable foundation for subsequent interactions with the application.

User Login:

Upon successful registration, users can access the application through the User Login sub-module. By providing their login credentials, including username and password, users gain access to the application's features and functionalities. This login mechanism ensures secure access to user-specific data and facilitates personalized interactions within the application environment.

Analyse Resume:

The Analyse Resume submodule empowers users to evaluate their resumes against specific job requirements.

Users input the skills required for a particular job, and then upload their resumes. The application analyzes the uploaded resume, comparing it against the specified job skills. A score is calculated based on the degree of match between the resume and job requirements, providing users with valuable feedback on their suitability for the position.

Create Resume:

In the Create Resume submodule, users are provided with access to external resources offering resume templates. Users can explore various resume formats and designs, selecting templates that best align with their preferences and professional aspirations. This submodule offers users a convenient and user-friendly way to craft compelling resumes that effectively showcase their skills and qualifications to potential employers.

Together, these sub-modules empower users to navigate the job search process with ease and confidence. From account creation and login to resume analysis and creation, the user module offers a comprehensive suite of features designed to optimize the user experience and enhance the effectiveness of the application in facilitating successful career advancement.
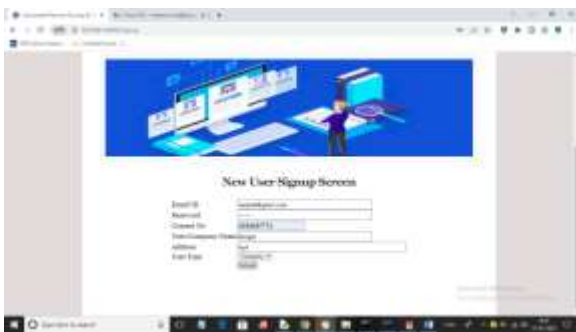
4. EXPERIMENTAL RESULTS

First double click on 'run.bat' file to start python DJANGO server and get below output

In above screen python server started and now open browser and enter URL as http://127.0.0.1:8000/index.html and press enter key to get below page

In above screen user can click on 'New User Signup' link to get below screen

In above screen company is signup and need to enter valid EMAIL to get OTP like below screen

In above screen we can see GOOGLE GMAIL is not sending as this services are down so we are allowing user for direct signup

In above screen we can see user signup completed and once GMAIL UP we can add OTP service also. Similarly you can add user also
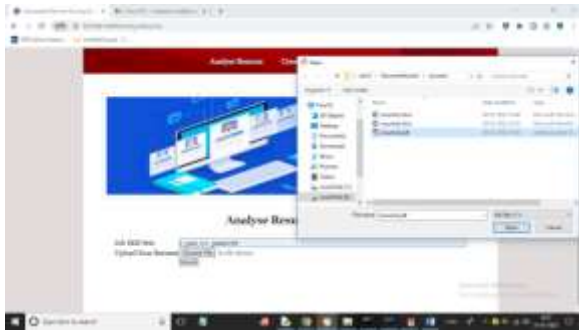

In above screen from last drop down box I selected signing user type as 'User' and then press button to get below output

In above screen user signup also completed and now click on 'Company Login' to get login as company

In above screen company is login and after login will get below page

In above screen company can click on 'Resume Short Listing' link to get below page

In above screen we have entered some skill details which company required and then entered percentage value as 20 and then uploading entire 'resumes' folder and then press 'Upload' and 'Submit' button to get below output

In above screen in first column we can see names of selected resumes and in second column we can see require skills and 3rd column contains required percentage and 4th column contains parse skills set from RESUME and 5th columns contains score calculated between require company skills and resume skills. Similarly company can upload any resume folder and get list of selected resumes. Now logout and login as user

In above screen user is login and after login will get below page

In above screen click on 'Analyse Resume' link to get below page

In above screen user can entered JOB require skills in first text field and then upload his resume and then application will analyse resume and calculate score and give below output

In above screen in blue colour text we can see calculated score is 75% and now user can click on 'Create resume' link to get website which is allowing to create resume by using their templates
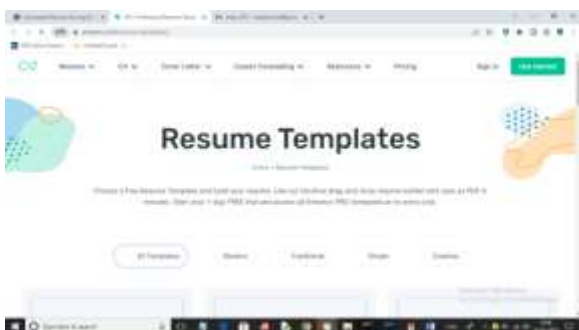
In above screen after clicking link user will reached to above page

5.   CONCLUSION

In conclusion, the fusion of Automated Resume Scoring and Application Selection using AI marks a significant advancement in recruitment practices. By leveraging machine learning algorithms to analyze resumes and autonomously score candidates, the recruitment process becomes more efficient and objective. This approach accelerates hiring timelines while introducing a data-driven dimension to candidate evaluation. However, it's imperative to prioritize ethical considerations, mitigate biases, and comply with privacy regulations. AI should complement human recruiters, enhancing their capabilities rather than replacing them entirely. Moving forward, the future of recruitment lies in a synergistic partnership between AI and human judgment. This collaboration ensures that organizations can effectively identify, assess, and select the right talent, ultimately driving success and innovation in the ever-evolving job market.

6.   FUTURE SCOPE

Following resume selection based on scores, chosen candidates receive direct access to company URLs or links along with interview requirements. This streamlined process expedites the interview stage, allowing candidates to proceed seamlessly with further steps. By providing direct access to company-specific information, candidates can better prepare for interviews and engage with the hiring process more effectively, fostering a smoother transition from resume selection to interview scheduling.

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