

Resume Inflation System for Improvement of Employability among Graduates

Dr. R. Kaviarasan¹; Y. Neha²

¹Associate Professor; ²M.Tech Student

¹Department of Computer Science Engineering,
Rajeev Gandhi Memorial College of Engineering & Technology, Andhra Pradesh, India.

²Department of Computer Science Engineering,
Rajeev Gandhi Memorial College of Engineering & Technology, Andhra Pradesh, India.

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Abstract: A Resume Inflation System proposed in this research is a progressive, computer-based framework engineered to optimise the personnel recruitment cycle by facilitating hands-free operation and performance review of job seekers' resumes. In the recruitment cycle, hiring managers are often flooded with numerous resumes from applicants. This large volume of applicants can lead to difficulties in selecting candidates for various positions. However, there is no open-source application that assists in shortlisting resumes for a particular position directly using the job description. This inspires us to introduce a methodology for a resume Inflation system. The resume Inflation system mitigates these issues by introducing the initial review activity, which reduces the time spent on manual screening by up to 80%. This Inflation system employs machine learning models and NLP to proficiently inspect resumes, extract relevant skills, experiences, and qualifications, and match them against specific job descriptions with maximum accuracy. The procedure ensures that the most promising applicants are prioritised for further rounds of evaluation, which enhances the standards of shortlisted applicants and decreases the risk of mismatch. The Resume Inflation System ensures a fairer recruiting procedure and nurtures diversity in the hiring process. This latest application not only saves time but also increases the efficiency and accuracy of candidate selection.

Keywords: ML Models, NLP, AI, Performance Review, Inflation System, Computer-Based Framework, Application Tracking System (ATS).

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I. INTRODUCTION

The project is initiated to minimise the problems occurring in the recruitment process by hiring managers in large organisations like Microsoft. Such organisations are substantial, often resulting in a considerable number of job openings across various job profiles. Labelling the resumes received from job seekers for these profiles is a significant responsibility for hiring managers. Shortlisting these resumes for further review poses an additional challenge for recruiters.

Both recruiters and job seekers face challenges in these processes, as job seekers aim to optimise their resumes for a better chance of being shortlisted for the next rounds. Each applicant must write their resume to align with the job description for which they are applying. Job seekers also need an application that will guide them in creating their resumes and examining them against the job description corresponding to the job profile they are applying for.

Some hiring managers are looking through various platforms, such as "LinkedIn" and "Unstop," to find new, talented job seekers, but they find a lot of applications. This could make it time-consuming for the recruiters to manually review the resumes for the next steps of the recruitment process. As an applicant, he or she wants to know if the resume is sufficient. As a result, creating a solution that enhances resume quality is essential.

While some websites assess resumes for job seekers, they often lack detailed guidance on the modifications necessary for better results and shortlisting. Given the inadequacy of existing platforms to conduct thorough analyses on resume datasets, developing an effective and contemporary application that employs the latest advancements in artificial intelligence is essential. Taking this as a core problem, we have developed this resume inflation system that accurately shortlists the resumes that address the skills required in today's market.

II. LITERATURE SURVEY

➤ Existing System:

AI-based resume analysis systems usually automate screening through rule-based filtering and keyword matching, generally limited by pre-established templates, using machine learning and natural language processing techniques. Although sophisticated algorithms improve data extraction by analyzing resumes for education, experience, and abilities, they have trouble understanding semantic context and managing a variety of resume formats. Although deep learning methods require a lot of computer power and huge labelled datasets, they provide better semantic matching. Furthermore, real-time feedback features that would assist candidates in optimizing their resumes for applicant tracking systems (ATS) are absent from the majority of current systems.

➤ Disadvantages of the Existing System:

- Context Misinterpretation: Qualified candidates may be rejected as a result of keyword-based filtering that misinterprets context.
- Inflexibility: Unconventional profiles and various resume formats frequently cause problems for current systems.
- High Resource Demand: Small-scale applications of deep learning models are restricted due to their high processing power and large dataset requirements.
- Absence of Real-Time Feedback: Applicants do not get real-time feedback on how to improve their resumes for greater interoperability with applicant tracking systems.

➤ Proposed System:

By combining NLP approaches with machine learning models, the proposed AI Resume Analyzer aims to overcome the shortcomings of the existing resume screening systems. Its main function is to give candidates real-time feedback so they may successfully optimize their resumes for ATS compatibility. In contrast to conventional keyword-based techniques, the analyzer uses semantic analysis to precisely extract and comprehend important data from a range of resume formats, including education, experience, and abilities. This lowers the possibility of missing competent people with unusual backgrounds by ensuring a

more comprehensive and context-aware assessment of applicant profiles.

The system makes use of machine learning models that have been trained on a variety of industry-relevant datasets to increase its efficacy and enable it to adjust to various job positions and industries. The analyzer helps candidates customize their resumes for particular job descriptions by offering actionable information in addition to resume parsing, such as formatting and keyword optimization tips. The ultimate objective is to create a user-friendly, scalable platform that enhances the relationship between recruiters and job seekers by improving the efficiency, inclusivity, and accuracy of the resume evaluation process.

➤ Advantages of the Proposed System:

The system has been analyzed in terms of cost, processing speed, requirements, level of expertise, and availability of resources. Parameter Identified:

- Accurate extraction of skills, experience, and education details
- Semantic analysis for better matching with job descriptions
- Real-time feedback for resume optimization
- ATS compatibility analysis
- Handling of diverse and unconventional resume formats
- Identification of redundant or missing information
- Contextual keyword analysis
- Formatting recommendations for clarity and readability
- Scalability for large-scale resume analysis
- Secure handling of personal data and privacy compliance

III. METHODOLOGY

The system architecture of the Resume Inflation System is developed to address the problems of young graduates. As the primary round of the recruitment cycle is a resume shortlisting, they have to make effective resumes, for which they need guidance and suggestions. This architecture uses ML and NLP methods, which help the system produce efficient results. The system architecture can be seen in the following image:

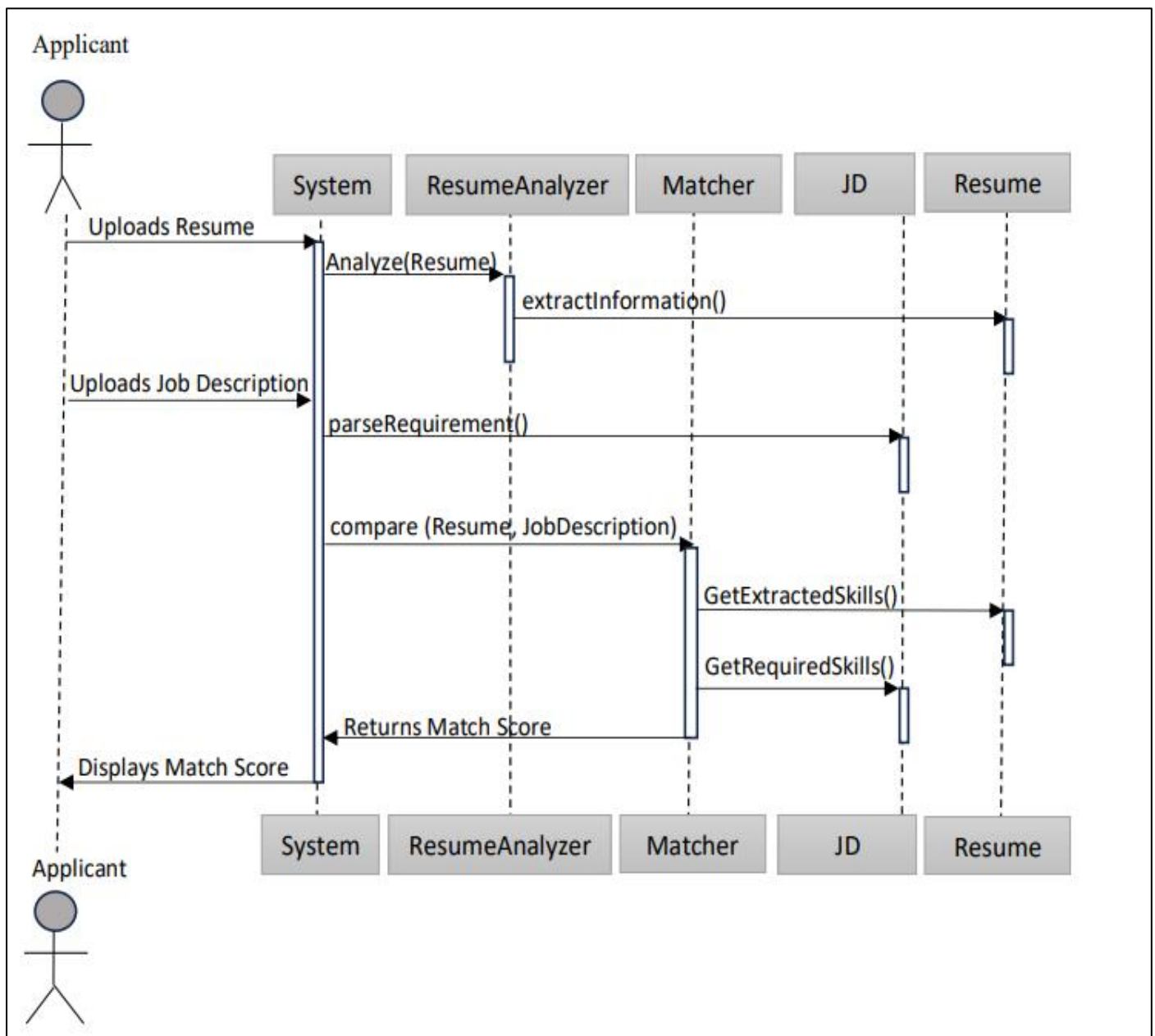


Fig 1 System Architecture of the Resume Inflation System

The system architecture has a few components which involved in developing our Resume Inflation System. These components have made it possible to go from having a simple resume and a job description to identifying which resumes match which job description and what drawbacks the resumes lack in fulfilling the demands of the job description. The final result of this architecture is a match score for each resume, which is displayed as the output on our application along with the suggestions provided to the resumes that lack scoring maximum score because of inefficient skills present in that particular resume. Each function present in the system architecture is explained in detail as follows:

➤ Application

The primary level is the application level in the architecture, which gives the input and receives the output. Here, the input can be a single resume or a group of resumes

and a job description. This level receives match scores of the resumes as the output and displays the match score of each resume corresponding to the job description, along with suggestions for each resume. The invalid document formats are also detected using our system, and the output for this would be “invalid document format”.

➤ System

The System component receives resumes and job descriptions from the application level. Here, the resume is parsed to extract important features using the parseRequirements() function. Extraction of these features is essential, as in the next step, we need to compare them with the job description to test if these extracted features match the job description or not. Using the compare(Resume, JobDescription) function, we have tested the resume against the job description.

➤ *Resume Analyzer*

The resume analyzer performs only the analysis of the resume using the `analyze(resume)` function and produces the important features. These features can be returned using the `extract information` function by using the `extractinformation()` function.

➤ *Matcher*

The Matcher component receives the results of the `compare(Resume, JobDescription)` function. Here, we have included two functions, such as `GetExtractedSkills()` and `GetRequiredSkills()`. The `GetExtractedSkills()` function is used to get the skills extracted from the resumes, and the `GetRequiredSkills()` function is used to get the required skills that are extracted from the job description. These skills are matched in this matcher component to generate the results.

➤ *Job Description (JD)*

The job description component is included in the architecture to provide the job description to the other components. These components require the job description to perform various functions. As we can observe, some of the functions like `parseRequirements()`, `compare(Resume, JobDescription)`, and `GetRequiredSkills()` need a job description to be executed.

➤ *Resume*

The resume component of the architecture is involved as it is the main part of the architecture. The resumes are the components with which we are working. This component gives access to use the resumes in a few other components to execute their functions. The functions that require the resumes are `Analyze(Resume)`, `extractinformation()`, `compare(Resume, JobDescription)`, and `GetExtractedSkills()`.

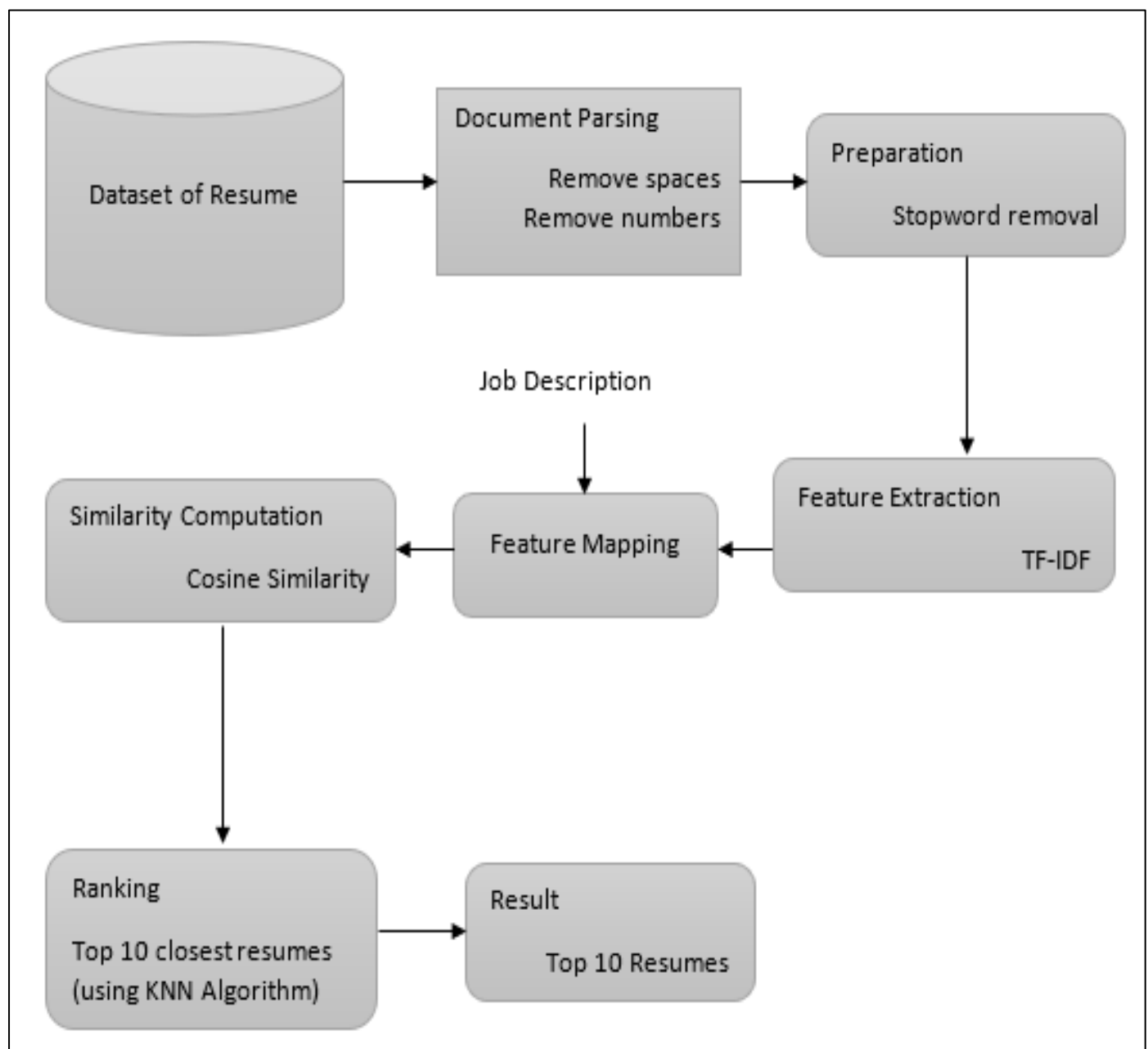


Fig 2 Activity Workflow of Resume Inflation System

Our project's workflow can be presented in the flowchart format, where each step in this flowchart explains the process of designing our project. Each step introduces various new technologies that help in finding effective results. We can express the details of our workflow by detailing the activities of this flowchart in the form of an algorithm. The actual algorithm is developed based on this activity workflow. The algorithm of our project can be represented as follows:

➤ *Activity Workflow/Algorithm*

• *Stage 1: Input Data*

The Input of our system would be a single resume or a group of resumes and a job description to match with.

- ✓ Case 1: A single resume is given when the user (job seeker) wants to test his/her resume against the job description for guidance in creating a better resume, as our application will provide suggestions.
- ✓ Case 2: A group of resumes is given when the user (recruiter) wants to find the best resumes that match the job descriptions.

• *Stage 2: Document Parsing*

The resume is parsed to extract important features like skills and the qualifications of the applicant, and remove irrelevant data.

• *Stage 3: Preparation*

In any document, there will be stop words. Here, we don't have any use for these stop words. So we will remove them in this stage to avoid spending time on this unnecessary data.

• *Stage 4: Feature Extraction*

To produce the match score of each resume, we need to match the features of the resumes with the job description. So, we have extracted the important features of each resume that represent the strength of the job seeker. Here, we have used one of the NLP measures to perform feature extraction.

- ✓ Functionality: NLP is a commonly used technology to extract important features from various types of documents.

Here, we have to extract features of a resume, so we have used the TD-IDF measure to perform this function.

This measure can be represented as follows:

$$TF - IDF(t, d) = TD(t, d) * IDF(t)$$

Where:

$$TF(t, d) = \frac{\text{Number of times term } t \text{ appears in document } d}{\text{Total number of terms in document } d}$$

$$IDF(t) = \log \frac{\text{Total number of documents}}{\text{Number of documents containing term } t}$$

• *Stage 5: Feature Mapping*

The term itself says that it is going to map the extracted feature of the resume with the job description to find the match score.

• *Stage 6: Similarity Computation*

To generate the result, we need to check the similarity of the resume with the job description. This can be done using the cosine similarity measure.

- ✓ Functionality: Cosine similarity measure used to find the similarity between two documents. Here, we consider on document as a resume and another as a job description. The cosine similarity can be represented as follows:

$$\text{Cosine Similarity} = \cos(\theta) = \frac{A \cdot B}{\|A\| \|B\|}$$

• *Stage 7: Ranking*

- ✓ Activity: Using the KNN (K-Nearest Neighbour) algorithm, rank the resumes according to the skill set listed in the job description. The top ten resumes most closely fitting the job description are selected here.
- ✓ Functionality: The KNN algorithm groups the resumes using a distance measure known as Euclidean distance. In this case, the resumes are viewed as data points, the distance between them is computed, and all of the resumes are grouped based on shared characteristics that correspond to the job description. The following is a representation of the Euclidean distance formula.

• *Euclidean Distance:*

$$d(p, q) = \sqrt{\sum_{i=1}^n (p_i - q_i)^2}$$

• *Phase 8: Outcome/Result*

- ✓ Activity: The top ten resumes that match are listed as the output.

IV. PERFORMANCE EVALUATION

➤ *In the Following Steps, you can Observe the Performance of the Resume Inflation System:*

- *The Login Page will Look like this once our Software has Run:*

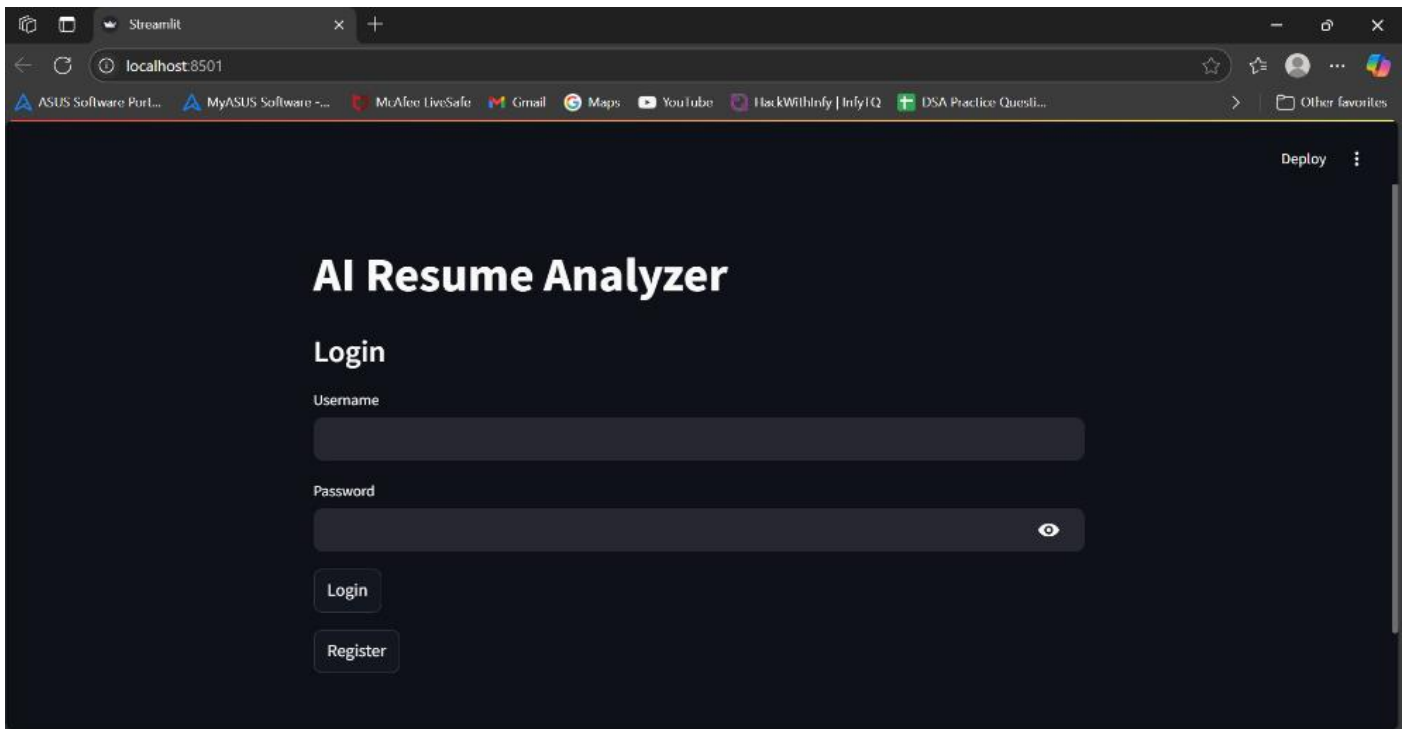


Fig 3 Login Page

- *To begin, we will click 'Register' on this login screen to create a user account, as we do not yet have one. The page for registration will then be shown.*

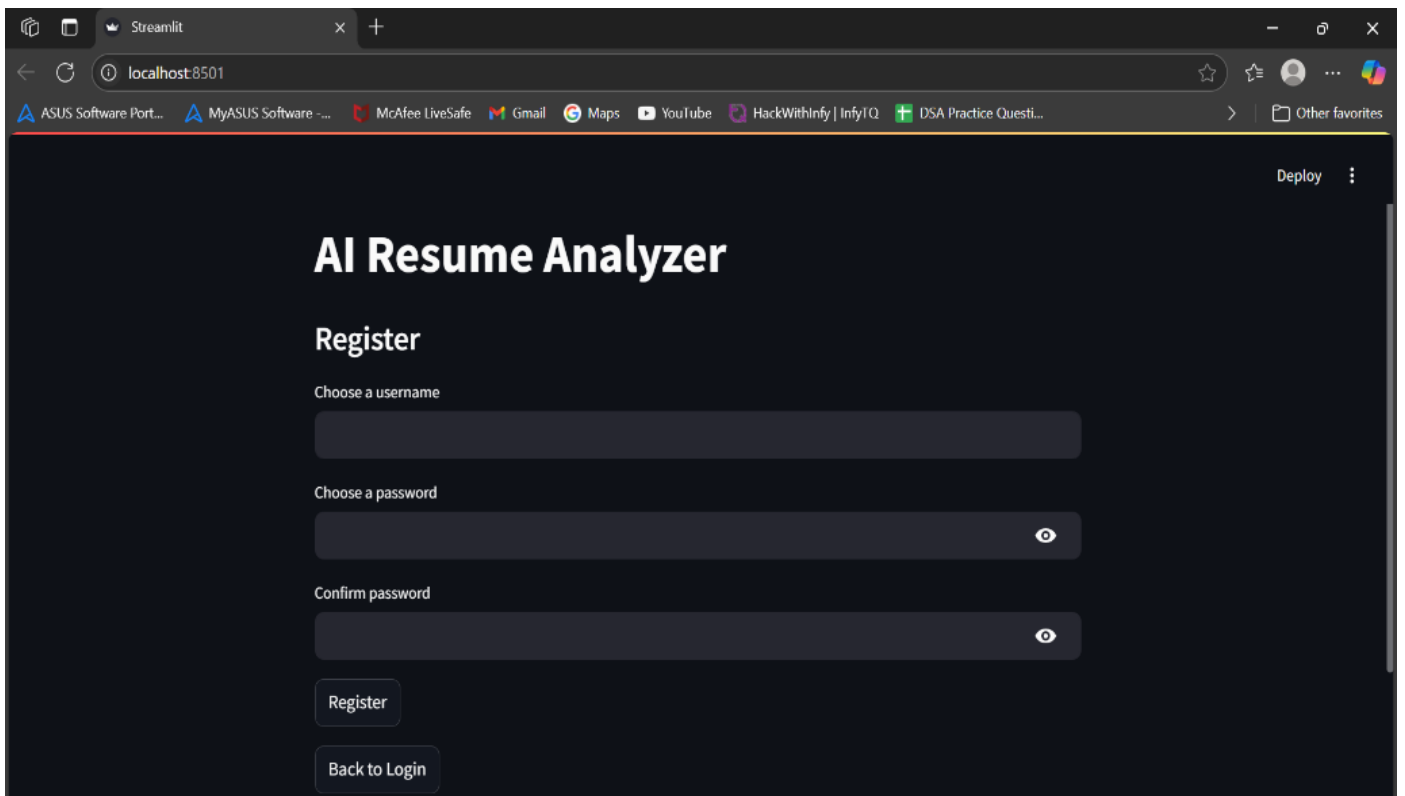


Fig 4 Registration Page

- *After Registering Successfully, we must Log in and Supply the Necessary input Files.*

The screenshot shows a web browser window with the URL 'localhost:8501'. The page title is 'AI Resume Analyzer'. Below the title, there is a section 'Enter Job Description'. Under this section, there is a 'Job Description' field containing the text: 'We are looking for a passionate and skilled Software Developer to join our growing team at TechNova Solutions Pvt. Ltd. The ideal candidate will have strong experience in full-stack development and will be responsible for designing, coding, testing, and deploying scalable applications.' Below this, there is an 'Enter Job Role' field containing the text 'software developer'. At the bottom, there is an 'Upload Resumes' section with a 'Drag and drop files here' area and a 'Browse files' button. The interface is dark-themed.

Fig 5 Giving Inputs to the Analyzer

- *Once the Input Files have been analysed, our System will Show the output along with Recommendations.*

The screenshot shows the same web browser window, but now displaying the output of the resume analysis. At the top, there is a list of uploaded files: 'Y. Neha.pdf' (129.7KB), 'MUNAGALA AKHIL KUMAR.pdf' (159.2KB), and '219X1A02B5.pdf' (67.1KB). Below this list is a 'Match Resumes' button. A message box states: 'Skipping 219X1A02B5.pdf - Not a valid resume file.' Below this, the analysis results are shown for the two valid files: 'MUNAGALA AKHIL KUMAR.pdf' with a 'Score: 100.0%' and 'Fake Check: Genuine', and 'Y. Neha.pdf' with a 'Score: 60.0%' and 'Fake Check: Genuine'. Below the results, there is a 'Suggestions for Improvement' section with a single suggestion: 'Mention Spring Boot for enterprise apps.' At the bottom, there is a 'Logout' button. The interface is dark-themed.

Fig 6 Output Page

V. CONCLUSION AND FUTURE SCOPE

The challenge of identifying the best employee through resume analysis has become increasingly difficult. Conversely, job seekers are encountering obstacles in finding a suitable job. The core issue lies in the initial stage of recruitment, which relies on resumes. At this primary recruitment stage, hiring managers select candidates by shortlisting resumes; thus, job seekers must focus on crafting effective resumes. This Resume Inflation system simplifies the process for job seekers by analysing their resumes against the job descriptions they are applying for and offering suggestions to enhance their resumes for better chances of being shortlisted. This system is also beneficial for hiring managers, as it can shortlist resumes based on the skillset outlined in the job description.

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