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# Resume Classification using Machine Learning

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**Abstract:** Recruitment in the IT sector has been on increased in recent times. Software companies are on the hunt to recruit raw talent right from the colleges through job fairs. And through job fairs, companies receive thousands of resumes from job seekers. It is difficult to identify the good match between the qualifications of the candidate and match the skill that a company seeks by examining each resume. The Resume Classifier 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. By using TF-IDF we can calculate the score of the particular resume based on the recruiter information and suggest lacking skills to the users and recommend top resume to recruiter.

## I. INTRODUCTION

As we know Indian I.T sector [8] is second largest candidate recruiting area of our country, it gives about 7.5% to our Gross Domestic Product . The recruitment in the Information Technology sector has seen an exponential increase in recent times. Companies recruit thousands of young talent, right from the college every year through campus fairs it is difficult to identify the good match between the qualifications of the candidate and match the skill that a company seeks by examining each resume for HR department [1] in any organization.

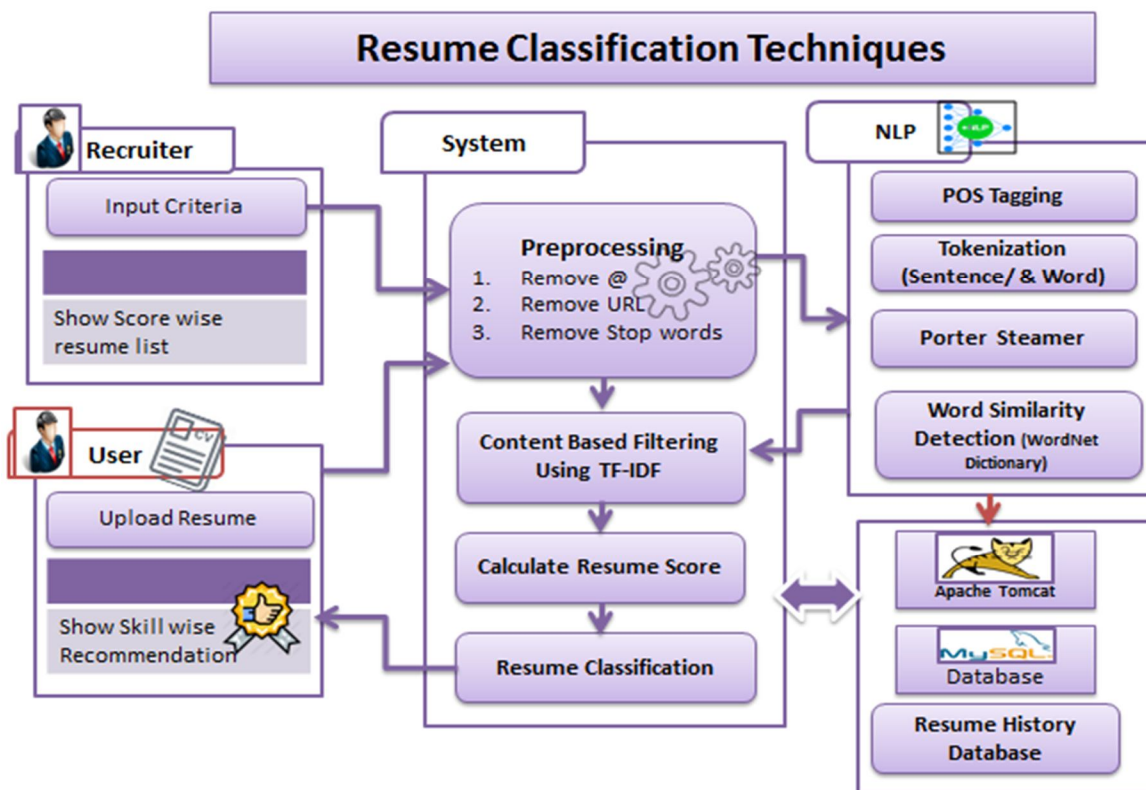
To address this challenge, many companies have shifted for using e-recruiting platforms. These platforms decrease the cost, time and effort required for physically processing and screening candidate resumes. [2]These systems employ different approaches to talk the challenges associated with screening, matching, and classifying candidate resumes. The different that made to make the process easy Although these approaches produce high precision ratios in finding candidates to fill a vacancy , they give less attention to the run time complexity of the corresponding process i.e. every job offer will be matched with every resume in the corpus instead of matching resumes that are only related to their occupational category.[3] The proposed resume Classifier 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) [1] technologies are used for parsing, tokenizing, stemming and filtering the content of the data. By using TF-IDF we can calculate the score of the particular resume based on the recruiter information and suggest lacking skills to the users and recommend top resume to recruiter.

## II. LITERATURE SURVEY

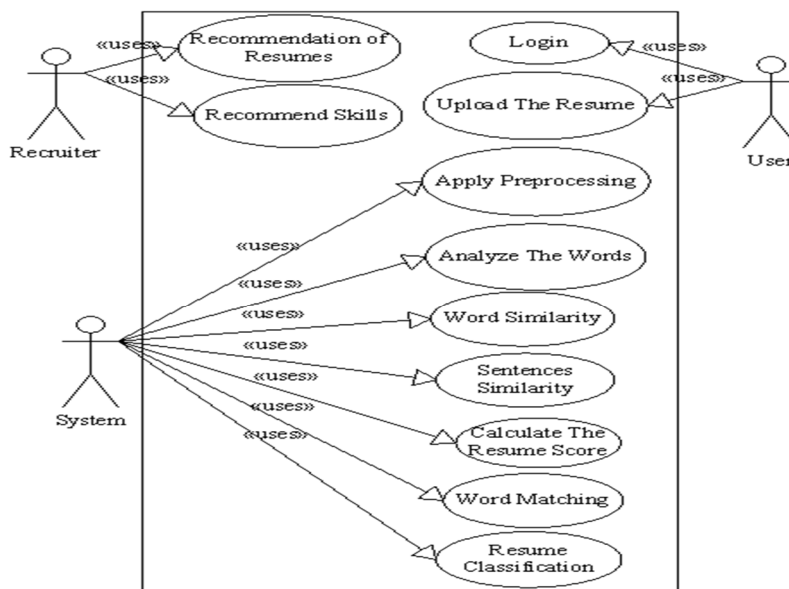
- A. Vishnunarayanan. R, Shreekrishna Prasad, Krishnan. A.N, Palanivel.S; Resume Classification Using Analytical Hierarchy Process And Keyword Extraction; IJPAM 2017.In this paper process of resume screening is performed in order to qualify and disqualify the candidates according to the requirements of company .As during the hiring process various rounds are performed for filtering the deserving candidates in every round .In resume screening various filtration algorithms are used to do the same. this mainly aim in reducing the number of resumes in corresponding/subsequent rounds of hiring they explored the importance of making the process as cost effective as possible .the study also says that this process should be like an investment ,inst of expense.The primary difficulty that was faced in automating the hiring process is that a resume does not clearly specify how prolific the candidate may be.This can be determined only through human intervention which can be done through an interview. Thus it can be said that there is a need for automation of the hiring process that is robust but there is a trade-off involved. means the resumes should be classified and filtered and after that the selected candidates should be interviewed personally so that the candidates are not eliminated completely.
- B. Juan Zhang, Yi Niu, Huabei Nie; WEB DOCUMENT CLASSIFICATION BASED ON FUZZY k-NN ALGORITHM ;IEEE 2017 explains With an increasing amount of datasets, it has become very important to retrieve the relevant data from huge web data. Web document classification is important part of web mining. web pages classification he been studied since internet has become huge dataset . Many algorithms have been adapted for classifying this huge data ,for example support vector machine(SVM) ,KNN ,decision tree etc.most of web document classification techniques considered classes of mutually

- exclusive concepts. few took the concept of overlap of classes so the classification result wasn't very good in this algorithm of fuzzy KNN was used for classification of web document. some experimental results illustrated that classification performance of fuzzy KNN is better than k-NN and SVM, but the speed of classification for their work has a bit slow than k-NN. They also plan to design scientific measures to select vector seize and the value of k in k-NN dynamically according to the characteristic of source web documents.
- C. Swapil Sonar, Bhagwan Bankar; RESUME PARSING WITH NAMED ENTITY CLUSTERING ALGORITHM; IJRASET 2018 explains Recent improvements in information technology have provided many changes in conversion of raw information into structured data. Resume classification allows parsing and conversion of unstructured data into structured format. Although there are many commercial products present for resume parsing such as sovren cv parser. There are four methods in information extraction named entity based, rule based ,statistical and rule based. these methods are usually used in many applications in combinations. In order to parse the resumes efficiently system should not depend on the form of data provided in the document. An assumption was made that resumes have three level hierchical structure where top most level contains segments, where segment contains blocks which contains information.
  - D. Suhas Tangadle Gopalakrishna ,Vijayaraghavan Varadharajan; Automated Tool For Resume Classification using Sementic Analysis In paper system is developed using two modules 1.Natural Language Processing Pipeline , 2.Classification module. First step includes 4 steps Tokenization, Stop Word Deletion, POS Tagging, Named Entity Recognition . After completion of these steps tokens for classification get generated. And in second step by applying classification algorithm system can classify resumes according to criteria. This system classifies resumes according to interest of candidates in different systems. So it is easy to HR or concerned authority to allocate projects to candidates according to their interests.
  - E. Mr.Yadav A.B, Pooja Bhosale, Bhumika Gardi, Sajid Pawaskar; Resume Generation System. In this system resumes are generated from portal provided to student. Candidates have to provide information that is asked in form. In this system there are two modules 1. Generate Resume 2.Sorting. When candidates provide information the resumes get generated in structured manner. Then they get sorted according to scores of candidates or required criteria to company.

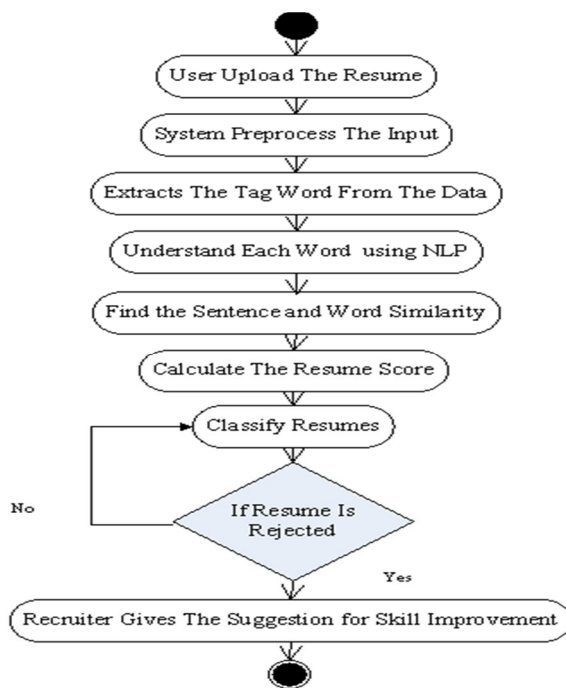
### III. SYSTEM ARCHITECTURE



#### IV. USE CASE DIAGRAM



#### V. ACTIVITY DIAGRAM



#### VI. METHODOLOGY

The process of allotment of projects to the new recruits is a manual affair, usually carried out by the Human Resources department of the organization. Here an attempt is made to automate the process of resume classification. Figure 1 gives the system architecture of the proposed system.

- 1) *Upload Resume:* User can upload the resume to the system. The system preprocess the input to Remove@, Remove URL Remove Stop words to get the fine data and extracts the tag word from the data. The resume should have the skill mentioned.
- 2) *Preprocessing:* The system can Understand Each Word from all the resumes using Natural Language Processing (NLP). It can apply different techniques for understanding the sentence and word. They can analyze the words using two different ways like Sentence & Word Understanding

- a) *Sentence Tokenization*: In this techniques system can divides the sentence into several tokens. It split the large raw text into several sentence to get more meaningful information out. For eg. "All work and no play make jack a dull boy, all work and no play".The above sentence is divide into sentence like,{All work and no play make jack dull boy}All work and no play makes jack a dull boy.
- b) *POS Tagging*: This algorithm is used for detects if the word token is noun, verb, adjective POS Tagging in which a word is assigned in accordance with its syntactic functions. In English the main parts of speech are noun, pronoun, adjective, determiner, verb, preposition, adverb, conjunction, and interjection
- c) *Word Tokenization*: This technique the sentence or data can split into several words. For eg. "All work and no play makes jack a dull boy, all work and no play" This sentence split into word like,[All, work, and, no].
- d) *Word Lemmatization*: Lemmatization is a more methodical way of converting all the grammatical/inflected forms of the root of the word. Lemmatization uses context and part of speech to determine the inflected form of the word and applies different normalization rules for each part of speech to get the root word (lemma).
- e) *Word Similarity*: By using this technique the system can find the similar words. We use the WordNet dictionary for finding the synonyms.
- f) *Sentence Similarity*: By using this technique the system can find the similar sentence.
- i) *Content Based Filtering using TF-IDF*: TF-IDF techniques are used to Calculate The Resume Score for classification of the resume based on the data of previously selected and rejected candidates and current resume.\\
  1. Searching data is divided into several attributes example Item U may be having attributes A1, A2, A3, and A4...An.
  2. We have several items in the database may be U1, U2, U3...UN.
  3. Each item's attributes are compared to rest of the items in the database and a cumulative score is calculated based on their similarities.Hence an algorithm is used to match these attributes example if U1 has A1 as A,B,C and U2 has A1 as B,C then their matching score would be  $U1(A1) \cap U2(A1) / \# \text{of } U1(A1)$ .TF IDF s used for testing data according to the frequency and relevance of the words in the resumes of selected and rejected candidates.
- ii) *Recommend Resumes*: The score is calculated for each of the resume and recruiters show all the shortlisted resumes score-wise.
- iii) *Recommend Skills*: Based on the rejected resumes, which skill the particular user needs to improve according to the market condition.

## VII. CONCLUSION

Our system will provide better and efficient solution to current hiring process. This will decrease the hard work and valuable time of the concern authorities required for classifying resumes into specific format.

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