

# Automated Recruitment Process

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**Abstract:** Recruitment of employees is an important process in the human resource management of a company. Currently, most of the recruitment process is done manually in many companies. This manual process may be time-consuming and possibly may be erroneous in employing inappropriate individuals. This may result in the loss of time, money, and efficiency of a company. As a solution to the above problem, we are considering developing an automated process for recruitment. The scope of the system is to cover not only the recruitment process but also to provide job seekers a platform to identify their current skills, help them identify the current skill trends that are required by companies, and provide the ability to automatically generate their resumes through the system. On the other hand, employers will save a lot of time and money since the system will automate the processes such as skill matching of the employee and the company, short listing of resumes, and scheduling interviews. The platform involves features such as online mock interview hosting, automated scheduling, and a pre-interview quiz with a monitoring background. To achieve the above components, machine learning algorithms are used along with other technologies such as web scraping.

## I. INTRODUCTION

Talent acquisition is an important, complex, and time-consuming function within Human Resources (HR). The sheer scale of Indians market is overwhelming. Not only is there a staggering one million people coming into the job market every month, but there is also huge turnover. As per LinkedIn, India has the highest percentage of the workforce that is “actively seeking a new job” Clearly, this is an extremely liquid, massive market but one that also has many frustrating inefficiencies. The most challenging part is the lack of a standard structure and format for resume which makes short listing of desired profiles for required roles very tedious and time-consuming .

Effective screening of resumes requires domain knowledge, to be able to understand the relevance and applicability of a profile for the job role. With a huge number of different job roles existing today

along with the typically large number of applications received, short-listing poses a challenge for the human resource department. Which is only further worsened by the lack of diverse skill and domain knowledge within the HR department, required for effective screening? Being able to weed out non-relevant profiles as early as possible in the pipeline results in cost savings, both in terms of time as well as money .



Fig.1.1 Steps of automatic recruitment process

### 1.1 Objective of the project:

Recruitment of employees is an important process in the human resource management of a company. Currently, most of the recruitment process is done manually in many companies. This manual process may be time-consuming and possibly may be erroneous in employing inappropriate individuals. This may result in the loss of time, money, and efficiency of a company. As a solution to the above problem, we are considering developing an automated process for recruitment. The scope of the system is to cover not only the recruitment process but also to provide job seekers a platform to identify their current skills, help them identify the current skill trends that are required by companies, and provide the ability to automatically generate their resumes through the system.

On the other hand, employers will save a lot of time and money since the system will automate the processes such as skill matching of the employee and the company, short listing of resumes, and scheduling interviews. The platform involves

features such as online mock interview hosting, automated scheduling, and a pre-interview quiz with a monitoring background. To achieve the above components, machine learning algorithms are used along with other technologies such as web scraping.

## II. LITERATURE SURVEY

### "A Machine Learning approach for automation of Resume Recommendation system",

Finding suitable candidates for an open role could be a daunting task, especially when there are many applicants. It can impede team progress for getting the right person on the right time. An automated way of "Resume Classification and Matching" could really ease the tedious process of fair screening and short listing, it would certainly expedite the candidate selection and decision making process. This system could work with a large number of resumes for first classifying the right categories using different classifier, once classification has been done then as per the job description, top candidates could be ranked using Content-based Recommendation, using cosine similarity and by using k-NN to identify the CVs that are nearest to the provided job description.

### "Analyzing CV/Resume using Natural Language Processing and Machine Learning"

This paper proposes a model of extracting important information from the semi-structured text format in a curriculum vitae or resume and ranking it according to the preference of the associated company and requirements. In order to achieve the desired goal, the entire process has been divided into 3 basic segments. The first segment consists of segmenting the entire CV / Resume based on the topic of each part, the second segment consists of extracting data in structured form from the unstructured data and the final segment consists of evaluating the structured data by decision tree algorithm and training the system. The structured data extraction process is done by segmenting the entire CV / Resume by converting it to HTML. After the conversion to structured data, decision tree algorithm techniques are used to classify the input into different categories based on qualifications and then the data with positive weight is used to train the system for future benefit. Finally, classifier algorithm apart from decision

tree such as logistic regression is used to compare the classification result.

### "Resume Classification System using Natural Language Processing and Machine Learning Techniques"

The selection of a suitable job applicant from the pool of thousands applications is often daunting job for an employer. The categorization of job applications submitted in form of Resumes against available vacancy(s) takes significant time and efforts of an employer. Thus, Resume Classification System (RCS) using the Natural Language Processing (NLP) and Machine Learning (ML) techniques could automate this tedious process. Moreover, the automation of this process can significantly expedite and transparent the applicants' screening process with mere human involvement. This experimental study presents an automated NLP and ML-based RCS that classifies the Resumes according to job categories with performance guarantees. This study employs various ML algorithms and NLP techniques to measure the accuracy of RCS and proposes a solution with better accuracy and reliability in different settings. To demonstrate the significance of NLP and ML techniques for RCS, the extracted features were evaluated on nine ML classification models namely Support Vector Machine - SVM (Linear, SGD, SVC and NuSVC), Naïve Bayes (Bernoulli, Multinomial & Gaussian), K-Nearest Neighbor (KNN), and Logistic Regression (LR). The Term-Frequency-Inverse-Document-Frequency (TF-IDF) feature representation scheme was proved suitable for RCS. The developed models were evaluated using the Confusion Matrix, F-Score, Recall, Precision, and overall Accuracy. The experimental results indicate that using the One-Vs-Rest-Classification strategy for this multi-class Resume classification task, the SVM class of Machine Learning classifiers performed better on the study dataset of over nine hundred sixty plus parsed resumes with more than 96% accuracy. The promising results suggest that NLP and ML techniques employed in this study could be used for developing an efficient RCS.

### "Exploring Automated Methods for Supporting Worker Re-skilling",

This study dives into the intricate landscape of the

aerospace and aviation job market. While these two markets are often conflated as being similar, if not the same, we propose that the differences are important to recent graduates of educational institutions and career programs. The research utilized a custom-written Natural Language Processing (NLP) software tool to distinguish the differences in 6,000 job offerings between the two industries with the hope of illuminating nuances to those in positions involved in placing professionals into careers. This research not only reveals the dynamic employment landscape of aerospace and aviation but also highlights the power of NLP in more clearly discerning emerging trends in job data.

### "A Survey of e-Commerce Recommender Systems",

Various personal services in business play important roles in the success of current marketing field. The personalized recommendation technique in recommender systems, one of the most important tools of personal service in websites, makes great significance in Internet marketing activities of e-Commerce. Through summarizing and analyzing personalized recommendation research, this paper presents an overview of personalized recommendation technique and proposes future research topics. The research content of this paper mainly includes the following three aspects, (1) the input of recommender systems, such as the acquisition and presentation of customers' interest profile as well as items profiles; (2) the typical methods of various recommendation techniques; and (3) based on current research and application situations, we finally discuss the future research hot topics and give some suggestions for the research on future recommendation technique.

### "Automatic Cover Letter Generator System from CVs",

The proposed system comes to overcome the problem of writing a C.V. Cover letter which requires some linguistic skills and a lot of experience in this domain in addition to its cost in term of time and money. The ACLGS solved the problem by developing an auto generated cover letter based on the user C.V. regardless its format. The ACLGS takes the user C.V. and the carrier announcement that contains the job requirements

and the skills needed as input. The system solved the problem by building a template as a frame of slots each slot contains a required skill for the job; the system extracted the required information from the user CV and fills the slots in an automatic fashion. The ACLGS applies the Information retrieval methodologies to extract information with intelligence trends to mine the user C.V. in terms of part of speech tags and some of indicator words that the system used to recognize the proper data and required information. In addition, the system specifies a set of features for each slot in the form. The user C.V. clustered into a number of categories (e.g. Personal information, Qualifications, Experience, Skill, Rewards, and Publications). These categories are used as additional features for the extracted information and data. The system took into account the problem of sentence coherence and improves the output document through using pre-specified sentences that inserted into the output document based on the extracted information discovered from the user C.V.

### III. PROPOSED SYSTEM

In this project we are automating recruitment process where admin or companies will post JOBS with requirements and can add questions for assessment. Admin can view all uploaded resumes and candidate details with requirements and skills matching score and can view assessment score. Admin can view feedbacks given by users. Job seekers can sign up with the application and then can login and can view list of jobs with requirements. Job seeker can upload resume to desired position and then application will automatically scan resume and then generate requirements and resume skills score. If resume scanning score > 50% then job seeker will be allowed to write assessment test. Both admin and job seekers can view assessment scores online.

Advantages:

High Accuracy

Takes less time

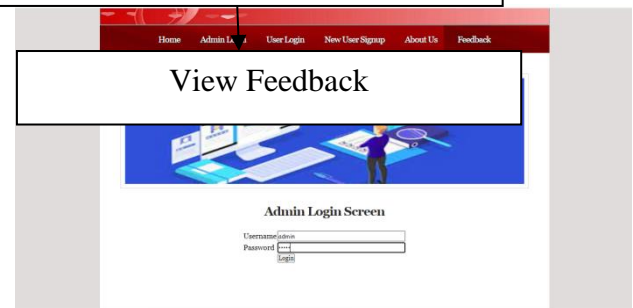
To implement this project we have designed two modules called Admin and user/job seekers

Admin module consist of following sub-modules

Post Jobs: using this module admin can post jobs with requirements

Add Questions: using this module admin can add questions for assessments

Login: can login to application



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

```
[root@localhost ~]# python manage.py runserver
/usr/bin/python(ActivePythonPrograms\Python\Python27\Lib/site-packages\__init__.py)
/usr/bin/python(ActivePythonPrograms\Python\Python27\Lib/site-packages\__init__.py)
Performing system checks...

System check identified no issues (0 silenced).

You have 15 unapplied migration(s). Your project may not work properly until you apply the migrations for app(s): admin, auth, con
tenttypes.
Run 'python manage.py migrate' to apply them.
Fri Jul 29, 2016 - 11:44:31 AM
Using Django version 1.7.7, using settings 'BDP.settings'.
Installing development database at http://127.0.0.1:8000/
Hit the server with CTRL-C to stop.
```

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



In above screen click on 'Admin Login' link to get



In above home page admin can click on 'Post Jobs' link to post jobs like below screen



In above screen admin can post job details and can select job requirements from list box and then press button to get below output





Fig.7.6 job details posted

In above screen job details posted and now admin can click on 'Add Questions' link to add question for assessment



Fig.7.7 add questions to assessment bank

In above screen admin can add questions to assessment bank and press button to get below output



Fig.7.8 question added to question bank

In above screen question added to question bank and now click on 'Resume Score' to view score of previous applicant like below screen

Job ID	Username	Resume Name	Upload Date	Resume JSON Data	Assessment Score	Resume Score	Contact No	Email ID
1	user	Resume.docx	2023-07-20	<pre>{   "user": "Jonathan John",   "email": "jonathan.john@gmail.com",   "mobile_number": "666 666 6666",   "skills": [     "programming",     "startup"   ],   "certification": [     "aws",     "html"   ],   "languages": [     "python",     "java"   ],   "experience": [     "5 years"   ],   "education": [     "Bachelor Degree in Computer Science"   ],   "designation": [     "Data Analyst"   ],   "experience": [     "5 years"   ],   "resume": [     "Resume.docx"   ] }</pre>	5	666		

Fig.7.9 all resume details with resume

In above screen admin can view all resume details with resume and assessment score and by using mail ID or contact no admin can contact applicant. Now click on Assessment Score link to get below output



Job ID	Username	Assessment Score	Assessment Date
1	user	5	2023-07-20

Fig.7.10 individual assessment score for each person

In above screen admin can view individual assessment score for each person and now click on 'View Feedback' link to view feedback from applicant like below screen

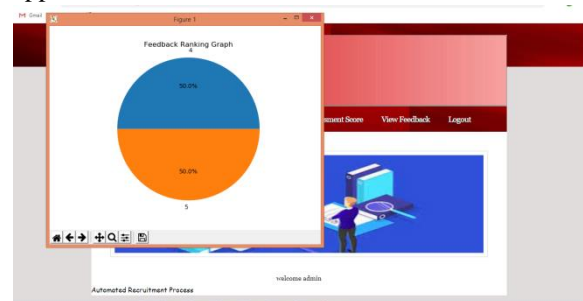


Fig.7.11 Feedback Ratings graph

In above screen admin can view Feedback Ratings graph and now close above graph to get below details



Feedback	Feedback Date	Feedback Rank
very helpful	2023-07-20	5
good site to improve for assessment	2023-07-20	4

Fig.7.12 feedbacks from users

In above screen admin can view feedbacks from users and now logout and signup as applicant to view and apply jobs

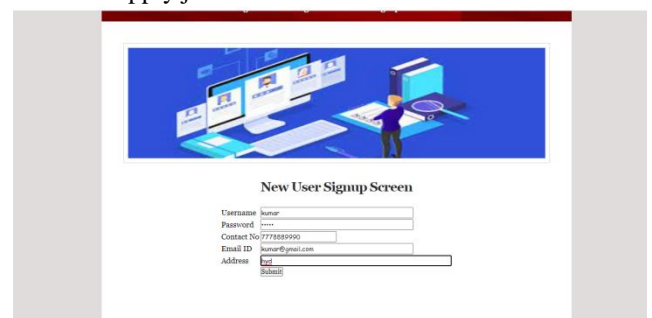


Fig.7.13 applicant is sign up

In above screen applicant is sign up and now press button to complete registration process



Fig.7.14 sign up task completed

In above screen sign up task completed and now click on 'User Login' link to get below page



Fig.7.15 user is login

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



Fig.7.16 View Job List

In above screen user can click on 'View Job List' link to get below list of jobs

Job ID	Job Name	Job Details	Suggested Skills	Posted Date	Company Name	Salary	Tips	Upload Resume
1	C++ Programmer	Must be proficient in System C++ Programming and Web	C++, Database, HTML, CSS, JavaScript	2023-07-19	Infocys	1000000	Must be proficient	<a href="#">Click Here to Upload Resume</a>
2	Web Developer	Must be good in web development	Oracle, Java, Database, HTML, CSS, JavaScript	2023-07-20	NYZ	100000	Must be proficient	<a href="#">Click Here to Upload Resume</a>

Fig.7.17 available list of jobs

In above screen user can view available list of jobs and can click on 'Click Here to Upload Resume' link on desired job row to upload resume and get below output

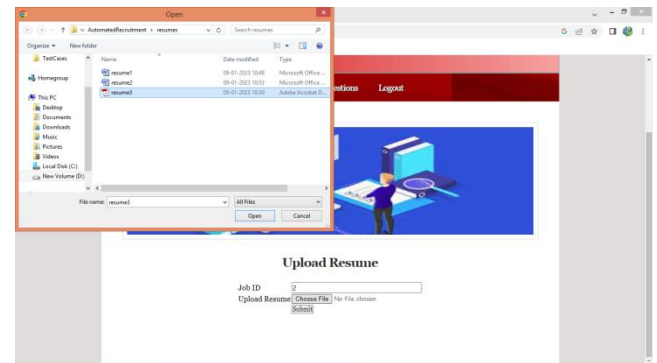


Fig.7.18 user is uploading resume

In above screen user is uploading resume and then press button to get below output



Fig.7.19 50% matching requirement

In above screen user resume got only 50% matching requirement and not greater than 50% so he is not qualified and now we will try with other resume

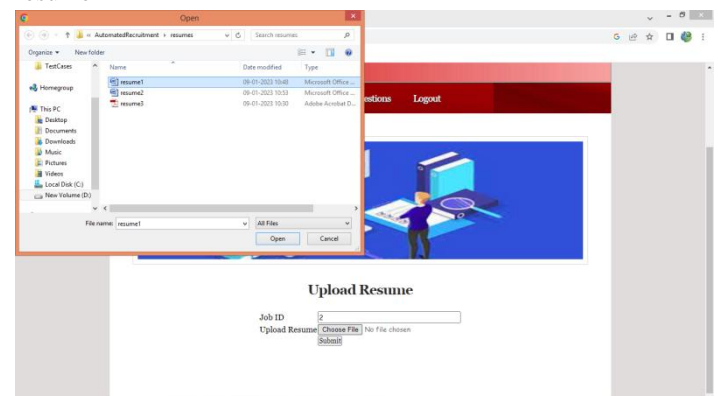
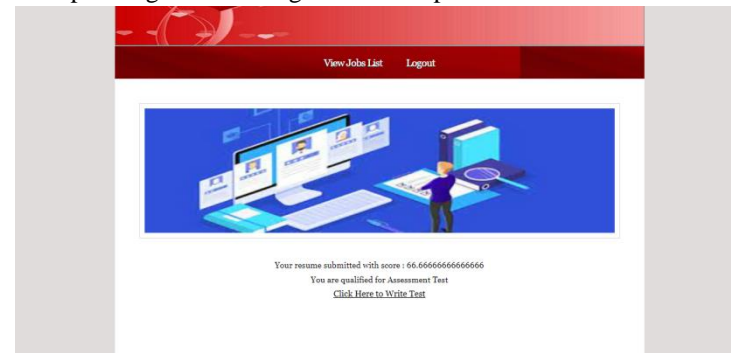


Fig.7.20 another resume got 66% resume score



In above screen another resume got 66% resume score

score and now he can allow to write assessment test so click on 'Click Here to Write Test' link to get below question page

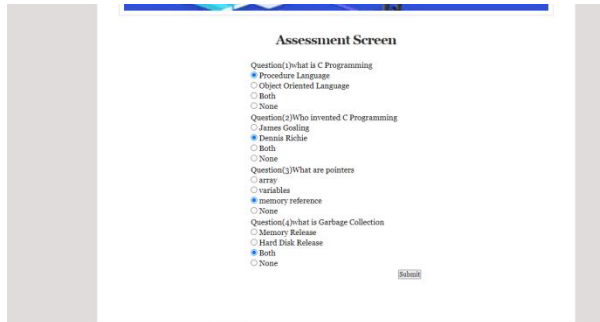


Fig.7.21 Selection of radio button with correct answer

In above screen applicant can select radio button with correct answer and then press submit button to get below output



Fig.7.22 75% score from the assessment test

In above screen in blue colour text applicant got 75% score from the assessment test.

Similarly by following above screens you can upload jobs and then can upload resumes and write assessment to get scores. Admin user can view all applicants resume and assessment scores

#### IV. CONCLSUION

Huge number of applications received by the organization for every job post. Finding the relevant candidate's application from the pool of resumes is a tedious task for any organization nowadays. The process of classifying the candidate's resume is manual, time consuming, and waste of resources. To overcome this issue, we have proposed an automated machine learning based model which recommends suitable candidate's resume to the HR based on given job description. The proposed model worked in two phases: first, classify the resume into different categories. Second, recommends resume based on the similarity index with the given job description.

The proposed approach effectively captures the resume insights, their semantics and yielded an accuracy of 78.53% with Linear SVM classifier. The performance of the model may enhance by utilizing the deep learning models like: Convolutional Neural Network, Recurrent Neural Network, or Long-Short Term Memory and others. If an Industry provides a large number of resume, then Industry specific model can be developed by utilizing the proposed approach. By involving the domain experts like HR professional would help to build a more accurate model, feedback of the HR professional helps to improve the model iteratively

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