Resume Ranking Using ML and NLP

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Abstract: Using NLP(Natural Language Processing) and ML(Machine Learning) to rank the resumes according to the given constraint, this intelligent system ranks the resume of any format according to the given constraints or the following requirement provided by the client company. We will take the bulk of the input resume from the client company and that client company will also provide the requirements and the constraints according to which the resume should be ranked by our system. Besides the information provided by the resume, we are going to read the candidate's social profiles (like LinkedIn, Github, etc) which will give us more genuine information about that candidate.

Keywords: Resume, ML, NLP

I.   INTRODUCTION

In the present system, the candidate has to fill in all the information regarding their resume in a manual form which takes a large amount of time and then also the candidates are not satisfied by the job which the present system prefers according to their skills. Let me tell you a ratio of 5:1 means, If 5 people are getting a job then out of that 5, only a single guy will be satisfied by his/her job. Let me tell you an example: If I am a good python developer and a particular company hired me and they are making me work on Java, my python skills are pretty useless. And on the other hand, if there is a vacant place in a company so according to the owner of the company he/she will prefer the best possible candidate for that vacancy. So our system will act as a handshake between these two entities. The company prefers the best possible candidate and the candidate prefers the best possible job according to his or her skills and ability.

The problem is that the present is not very flexible, efficient and time-saving. It requires the candidate to fill the forms online then also you might not get the genuine information of the candidate. Besides, our system saves the time of the candidate by providing to upload their resume in any format preferable to the candidate which will give the best candidate for that particular job and the candidate will also be satisfied because he will get a job in that company which appreciates candidates' skill and ability. On the other hand, we are providing the same kind of flexibility to the client company.

The current recruitment process is more tedious and time-consuming which forces the candidates to fill in all their skills and information manually. And the HR team requires more manpower to scrutinize the resumes of the candidates. So that motivated me to build a solution that is more flexible and automated.

The major objective of our system is to take the current resume ranking system to another level and make it more flexible for both the entities.

1)   Candidates, who have been hired.
2)   Client company, who is hiring the candidates.

Candidates, who have been hired :
Candidates who are searching for jobs after they have graduated. Out of those, a major number of candidates are so desperate that they are ready to work on any post irrelevant to their skill-set and ability. The main reason behind this unemployment is like cancer to our society, if a guy does not get a place after being passed out for 1yr, society includes relatives starting blaming that guy. Despite this reason, the candidate is ready to work in any condition, on any post. So they don't have to face that situation.
Where our system helps such candidates to get hired by such a company or an organization that is worth their ability and their skill sets. Where our algorithm will work in such a way that with the help of the previous result and previous ranking constraints, it will try to optimize the current result, which we called Machine Learning.
This will make sure that the relevant candidate has been hired for that particular vacancy.
You can say the best possible candidate.

Client company, who is hiring the candidates:

Like I am the owner of a particular organization I would aim to create such a team which is the best team in the world. It is like there is a vacancy for a java developer in my organization. So, I won't prefer to hire a python developer and then make him learn Java. That will be pretty useless and time-consuming for both that candidate and for the organization too. Where our system helps the organization to make out the best possible candidates list according to their given constraints and requirements for that particular vacancy.

This kind of approach will help our hiring sector to improve like anything and make it more efficient as the relevant person is getting a relevant job. So there would be no regrets for both the entities, the client company, and that hired candidate. Hence satisfaction will be achieved.

As we know, the Indian I.T sector is the second-largest candidate recruiting sector in our country. It contributes about 7.5% to our Gross Domestic Product(G.D.P) . Our Proposed system is initially concerned with the I.T sector of our country. It is mainly going to deal with the Indian I.T industry but if you talk about the pro version of our system it can be extended to various other commercial sectors where intake and elimination are in bulk like for Government Jobs.

Purpose	Paper	Year of Publication	Description
Understanding specifically how machine learning helps in classification and recommendation systems.	A machine learning approach for automation of the Resume Recommendation system.	2020	The paper talks about how to implement machine learning for classification of resumes and also the limitations for the same.
Learning about the different types of approach for filtering of resumes and their accuracy based on their type.	A survey of Job Recommender Systems.	2012	The paper tells us the different types of approaches such as content-based or knowledge-based approaches to enlighten us about which would be better to use in our system.
Checking different approaches or machine learning algorithms for the purpose of deciding which algorithm to opt for.	Cluster based Ranking Index for Enhancing Recruitment Process using Text Mining and Machine Learning.	2017	It was about using individually the k-means cluster algorithm to rank and filter resumes based on their skill-set and keywords that are part of the job description.
Key factors that changed when online resume applications had started	An Automated Recommendation Approach to Selection in Personnel Recruitment	2003	It was a german study that researched on how people actually apply for the jobs online and what the software applications did for recruitment

II. LITERATURE SURVEY

There have been over 50000 online recruitment sites which ask job applicant candidates to submit their resumes on their website. In some of these websites, classification techniques for screening resumes are not even employed. It is the job of the company recruiter to go through all the candidate resumes manually. This task is unassumingly daunting for the recruiters to select the most capable candidates for the subsequent rounds of the hiring process. Meanwhile, some recruitment sites have implemented the intelligent concept of automatically rating or classifying the resumes given by the candidates for a particular job position. Some of these websites or web applications are Indeed, Monster.com, Adecco.com, Top resume, Ideal, etc. The description of some of these websites including their advantages and disadvantages has been given below in detail.

If we discuss one of the case study websites, Indeed, resumes can be uploaded by the job applicants on their profile. This opens up the avenue for prospective job seekers to apply to various job openings in various companies. Initially, this happened to be a good approach since the recruiters did not feel the pressure to manually go through each and every resume. This is mainly because the job applicants had a very skewed number as compared to today's vast number of job applicants. Going through the resumes of all the candidates has become a living nightmare for the already overburdened recruiters. They have to spend a lot of their energy and precious time going through each and every candidate's resume for selecting only the most appropriate candidates for the subsequent rounds. On top of this, the already frustrated recruiters learn that about 75% of the resumes submitted for the job opening have totally irrelevant skills for the given job description. Nevertheless, this website is still very popular where people post their resumes with the hope of getting selected for the subsequent rounds in the hiring process.

Coming to another case study, a website called Top Resume has employed the usage of techniques like Natural Language Processing to analyze a prospective job seeker's resume. Here, the task of the candidate is to only upload their resume on the portal. With the help of Natural language Processing, only the text data is extracted from the resume, and the strength of the candidate's profile is displayed in terms of percentage. Additional attributes, such as the percentage of the skills the candidate has according to the education, certifications, courses, and work experience of the candidate are also disclosed to the candidate itself. No provision has been made for any job applicant to apply for a particular job opening on this website, nor does this website have the provision of providing the recruiter with a rank list of all the resumes according to the relevant skills for the particular job position.

There are many other web applications available in the literature providing mostly similar feature

III. SYSTEM ARCHITECTURE

This system is used keeping different technologies in mind and also the user as our first priority. Our main aim is to build a system that is robust and that stands the test of time which also helps us in the scalability of the product and is also beneficial to the user.

We use flask for the UI of the application. The User Interface is robust and in fact quite simple so that any naive user without any prior knowledge can utilize it effectively.

This is then connected to our back-end of the application which is made purely with python where the ML and NLP components work on the scoring of technical as well as non-technical skills extracted from the candidate's resume or the details filled in on the website based on the job description provided by the headhunter or recruiter of the company.

The UI is simple and the layout is easy to use. The top of the landing page has a navigation bar with the options to signup/login for the website as a recruiter or candidate, every candidate and recruiter has a personal profile with details to fill accordingly. Once we login the menu pops out accordingly and navigation to jobs and details are provided in it.

IV. IMPLEMENTATION

The proposed system implementation aims to reduce the heavy and infinitely repetitive work of companies and their HR department and make it easier for candidates to present themselves as well. Since a grade cannot define the entirety of an employee's skill set. The system's working cannot be explained elaborately without diagrams and division which will be described below.
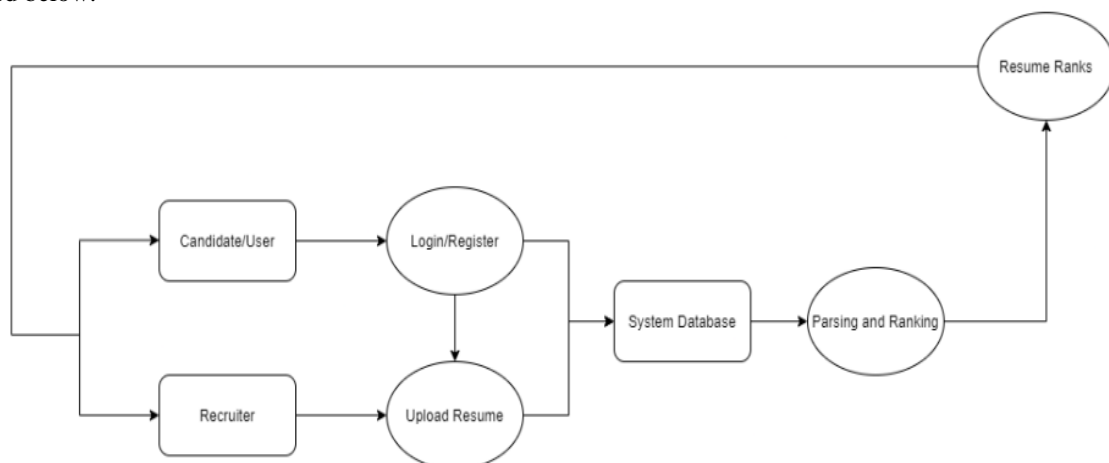

Fig. 1 DFD

We can login into the system either by candidate login or recruiter login.
1.   After logging in as a candidate, the candidate can upload or edit their uploaded resume.
2.   If logged in as a recruiter, they can view the candidate's resume under their names along with the parsed data
In either of the cases, the system database is accessed to either upload or edit the resume.

Once the resume is uploaded, it will be parsed and an appropriate rank will be given according to the predefined tags.

V.   SYSTEM ANALYSIS
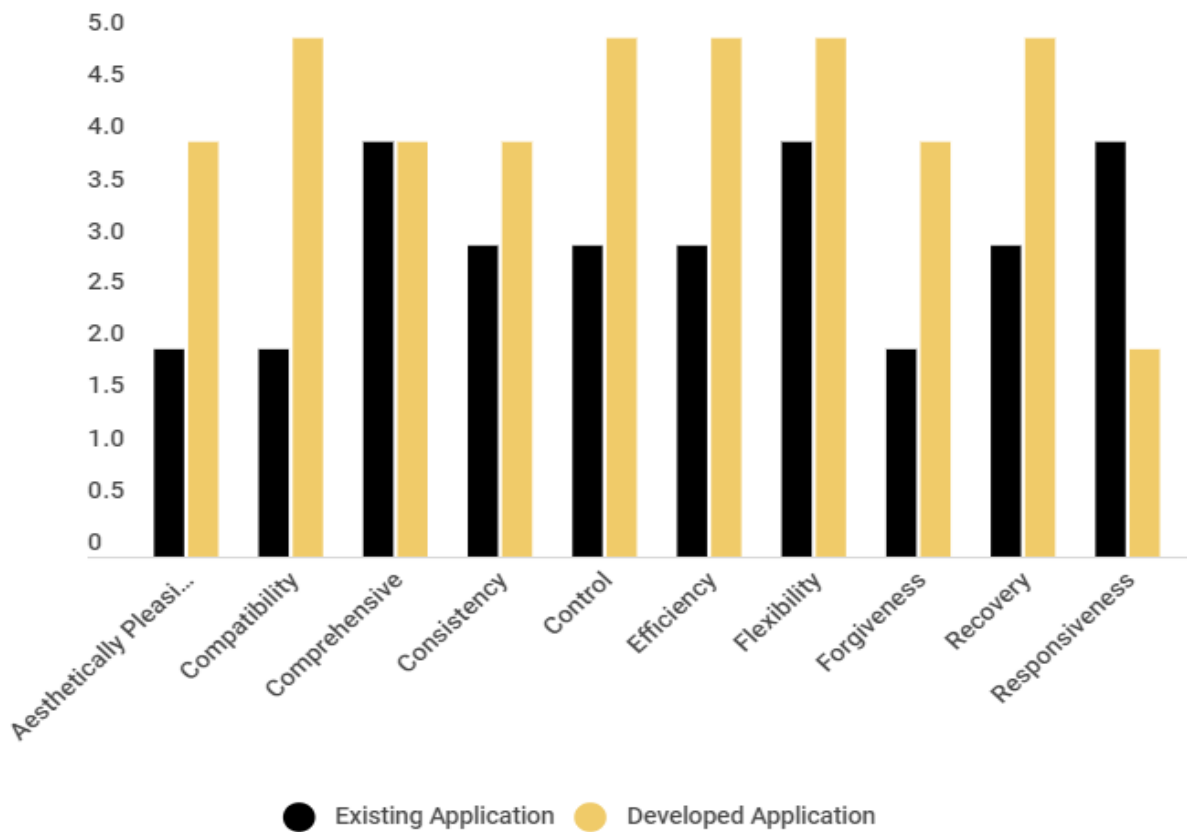
Fig. 2 Comparison b/w Existing application and Developed application
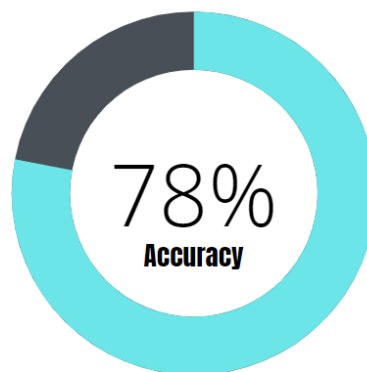
Fig. 3 Accuracy Rate

VI.   RESULTS
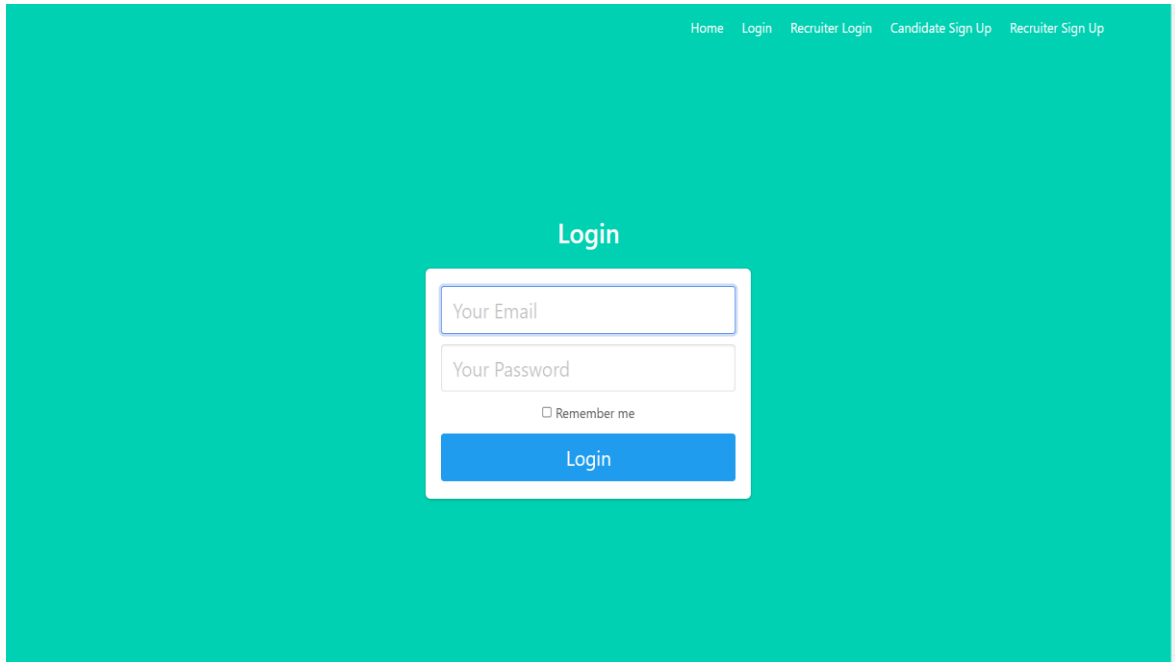
Fig 4 Candidate Login

Displayed here is the Candidate login page where the signed up candidate can login using their credentials. As shown the design is very basic and simple and provides knowledge to be entered in the text box.
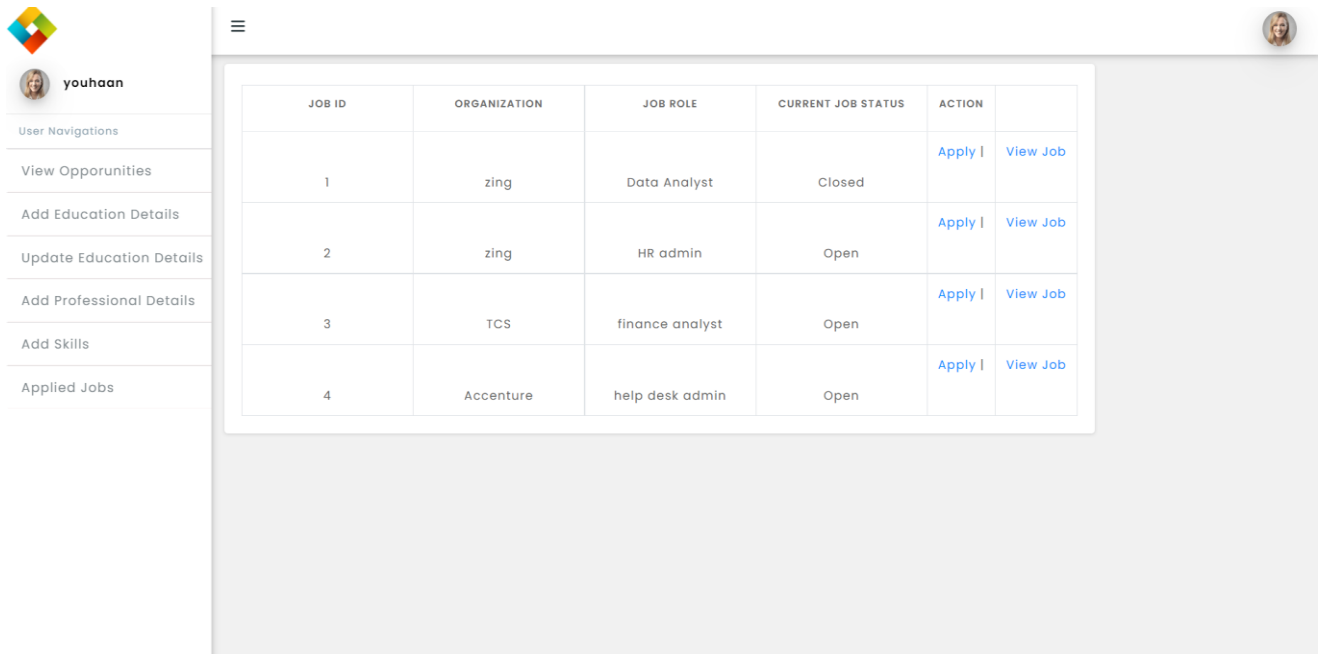

Fig. 5 Opportunities page

This page displays the jobs that have been uploaded on the website and allows the candidate to apply for it using their details and credentials filled in.

Fig. 6 Add Education Details

Page created to save the educational details about the candidate

Fig. 7 Update(verify) education details

Candidate can use this to update their education details and verification of those as well

Fig. 8 Add professional Details

Candidate has to use this to fill out the details of their previous or current employment

Fig. 9 Add skills

For the candidate to add their skill set be they technical or management skills to their profile

Fig. 10 Applied Jobs

For the user to know which jobs they have applied for and their status of hire.

Fig 11 Hiring portal

In recruiter login where the scores of the candidates are displayed on the basis of their technical and non technical skills and other details w.r.t the job description. Here the recruiter has the option to select or reject the respective candidate.

CONCLUSION

Our objectives were to take the current system and level it up such that our client company as well as candidates that want to apply to the company have a much better experience of finding what they are looking for. The main objective was to make it easier for both the entities while increasing the versatility and accuracy of our project. We have successfully implemented and explained the workflow of our project and completed both our objectives.

REFERENCES

1. A Machine Learning approach for automation of Resume Recommendation systems. Pradeep Kumar Roya, Sarabjeet Singh Chowdharyb, Rocky Bhatia, 2020.
2. A survey of job recommender systems Shaha T. Al-Otaibi and Mourad Ykhlef, 2012.
3. Cluster based Ranking Index for Enhancing Recruitment Process using Text Mining and Machine Learning Mayuri Verma, 2017.
4. "How Hiring Managers Make Decisions", Jessica Simko, 2014. Ranking Resumes using MachineLearning Vinayak Joglekar, 2014. Artificial Intelligence Recruiting. Peter Gold , 2015 .
5. Turborecruit ,"Automated Application Processing","Better candidate experience","Matching Job Descriptions to Resumes", 2016.
6. An automated recommendation approach to selection in personnel recruitment. Frank Faerber, Tim Weitzel, Tobias Keim, 2003.