Employee Hiring: NLP Based Job Profile Recommendation System

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Abstract

Now the world is becoming more dependent on the internet and other facilities for most of the important things to do. This project mainly aims to develop a system which has functionalities to provide the opportunity to the job seekers to find the best job according to their qualifications. In India, there are various platforms for the employees or the job seekers to provide but there is no single platform for the startup companies to post the jobs at very less time to increase their employees' ratios. So, this project acts as a mediator for both the job seekers and companies to search the jobs and post the jobs respectively. A hiring portal website simplifies the hiring process, making it more efficient and effective for both employers and job seekers, and ultimately helps match the right candidates with the right job opportunities. Hiring the right candidate is a very lengthy and time-consuming process so we automate the process of selecting the right candidate for a job. We have developed an algorithm that can calculate the percentage of matching skill sets. In addition, we have also developed a module that automatically sends an email to the perfect match applicants. This reduces manual intervention and human effort, ultimately saving recruiters a lot of time. By using our portal, hiring becomes easier and more effective.

Keywords: JD (job Description), Recruitment, Skill Sets, NLP (Natural Language Processing).

Nomenclature

$P_{(A)}$	probability
A	a particular job profile
F	number of skills of user
N	Total required skills for JD

1. Introduction

The Employee Hiring Portal is an efficient online platform for job seekers, company owners, and administrators. It simplifies the hiring process and makes it more accessible to all parties involved. Job seekers can post their profiles and apply for various job positions available on the website [1]. Companies can register themselves and post job positions according to their requirements. Companies can review the status of any particular job and view how many candidates have registered for that job profile. Moreover, the companies can assign tasks to the candidates according to the job positions and domain. They can verify the candidate's details to check their eligibility for the job. Based on the candidate's performance in the assigned tasks, companies can decide whether to select them or not [2]. The administrator acts as a mediator between the candidates and the companies, ensuring a verified and secure platform for candidates. For employers, the website offers tools such as creating job listings, searching for candidates, screening, shortlisting, scheduling interviews, and managing job offers. The website also offers additional features such as background checks and skills assessments to make informed hiring decisions. Job seekers can search for job openings, submit their resumes, and track the progress of their applications [3]. The website also provides job alerts and notifications to keep them updated on new job opportunities. Additionally, the website provides career advice, tips on job hunting, and information on salary trends and market conditions to help job seekers improve their job search skills. The website includes key features such as a powerful job search engine, a resume database for job seekers, an applicant tracking system for employers, communication tools for both parties, and analytics and reporting features for tracking key hiring metrics. Overall, the Employee Hiring Portal is an excellent online platform that connects employers with job seekers [5]. It simplifies the hiring process and communication offers tools and features that make it more efficient and effective for both parties. Natural Language Processing (NLP) is a branch of Artificial Intelligence (AI) that focuses on enabling machines to understand and analyses human language. In the context of employee hiring, NLP can be used to develop a profile recommendation system that can help companies identify and hire the best candidates for a job. By analyzing the language used in job descriptions and candidate resumes, NLP algorithms

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can match candidates with the most relevant job opportunities based on their skills, experience, and qualifications. This paper will explore the use of NLP in developing a profile recommendation system for employee hiring and its potential benefits for companies and job seekers.

2. Literature Survey

[1] In a recent study, a team of researchers presented Job Portal, an innovative online recruitment platform that allows employers from different locations to post job listings that can be viewed by job seekers. The software is specifically designed to collect job specifications based on industry standards and to pair them with qualified applicants. In this research paper authors discussed about the design and development of a web application called Job Portal, which is designed to help geographically distributed clients (such as recruiters and job seekers) connect with each other. The authors of the paper highlight the challenges of building a job portal that can handle multiple clients from different locations, and they describe the architecture and features of the web application they developed. The authors also discuss the technologies used to build the web application, including Java, HTML, and MySQL, and they provide a detailed description of the system's database design and user interface. They also describe the testing and evaluation process used to assess the performance and usability of the web application. Overall, this research paper provides valuable insights into the design and implementation of a job portal that can support geographically distributed clients, and it highlights the importance of using appropriate technologies and testing methods to ensure the functionality and usability of such a system.

[2] ONLINE JOB PORTAL In this paper the authors Mustafa Pinjari, Nishit De, Rutvij Kokne, Aamir Siddiqui, Dnyanoba Chitre discuss the designing phase of a web application using.net platform for real time learning experience. This research paper describes the design and development of an online job portal, which is designed to help job seekers and employers connect with each other. The authors of the paper highlight the importance of creating a user-friendly and efficient job portal to help streamline the job search process and increase the chances of successful job placement. The authors discuss the features and functionality of the online job portal, including job search, job posting, and applicant tracking. They also described the technologies used to build the web application, including PHP and MySQL, and they provide a detailed explanation of the system's database design and user interface. The authors also discuss the testing and evaluation process used to assess the performance and usability of the online job portal. They describe the various testing methods used, including functional testing and user testing, and they provide a detailed analysis of the results. Overall, this research paper provides valuable insights into the design and development of an online job portal, and it highlights the importance of creating a user-friendly and efficient system to help job seekers and employers connect with each other.

[3] In this paper -A Online Job portal management system published by Keethana Kopuri, Gulam Mujtaba Hussain Aqueel, Azbar Sadiqa Jabeen, Dr.T.K. Shaik Shavali proposed a system which provides a technical application for managing the online job system. The research paper titled "An Online Job Portal Management System" describes the development of a web-based job portal system that facilitates the process of job search and recruitment. The purpose of this system development is, provide a platform for job applicants to easily find and apply for the job vacancies posted by employers, while employers can easily search for qualified candidates and manage job postings. The system was developed using PHP and MySQL, and it includes various features such as job search and filtering options, job posting and management, resume upload and management, and candidate profile creation and management. The system also includes a messaging system that allows job seekers and employers to communicate with each other. The paper discusses the various challenges faced during the development process, including issues related to security and data privacy. To address these challenges, the system was designed with various security features such as user authentication and authorization, data encryption, and role based access control. Overall, the online job portal management system provides a user-friendly platform for both job seekers and employers to efficiently manage the job search and recruitment process. The system can be customized to meet the specific needs of different organizations and can be used to streamline the hiring process, reduce costs, and improve efficiency.

[4] In this paper the authors Marjan-Mansourvar and Norizan binti Mohd Yasin describes online recruitment system for the students to provide a way to search online IT jobs. According to the study, a job web portal is suggested to enhance the quality of education by linking students to potential job openings. The portal is designed to provide a platform for students to search and apply for job opportunities that match their skills and interests. The paper discusses the importance of job portals in improving education quality, as they can help students gain practical knowledge, develop skills, and gain valuable work experience. The proposed portal has several features, such as a job search engine, a resume builder, and a career advice section. The job search engine allows students to search for job opportunities based on their skills and preferences, while the resume builder helps students create a professional resume. The career advice section provides students with guidance on various career-related topics, such as interview skills and career development. The paper also describes the detailed information about the steps of

implementation that are followed by the authors to design the proposed portal, which involves the functionalities of various web technologies and programming languages. The portal is designed to be user-friendly and accessible to students from different backgrounds. Overall, the research paper suggests that the development of a job web portal can improve education quality by providing students with practical knowledge and work experience. The portal can also help students make informed decisions about their careers and prepare them for the workforce.

[5] In this paper titled as Job Portal - A Web Application for Geographically Distributed Multiple Clients of authors Vivek Kumar Sehgal, Akshay Jagtiani, and Meha Shah, aimed to improve technological knowledge while designing their project and address some of the issues that currently exist within the employment system. The research paper discusses the development of a web application called "Job Portal" that is designed to connect job seekers with potential employers. The web application is designed to be accessible to multiple clients across different geographic locations. The authors of the paper discuss the challenges associated with developing a job portal that can serve multiple clients in different locations. They explain how they used various technologies such as PHP, MySQL, and JavaScript to create the web application. The authors also discuss the features of the Job Portal application, such as a search engine that allows job seekers to find relevant job listings, and an interface for employers to post job openings and review job applications. The research paper concludes by discussing the benefits of using a web-based job portal, such as improved efficiency in the job search process, increased accessibility to job opportunities, and reduced costs associated with traditional job search methods. Overall, the research paper provides valuable insights into the development of a web-based job portal that can serve multiple clients in different geographic locations.

[6] This paper “REVIEW OF JOB PORTAL IN RECRUITMENT PROCESS LIFE CYCLE “the authors describe the overview of an employee Management system and the need and their move towards the fields are given. The research paper provides a comprehensive review of the use of job portals in the recruitment process life cycle. The authors analyze the various stages of the recruitment process, including job posting, applicant screening, and candidate selection, and examine the ways in which job portals can be used to improve efficiency and effectiveness at each stage. The paper discusses the advantages of job portals, such as increased access to job listings, improved visibility for job postings, and reduced time and cost associated with traditional recruitment methods. The authors also examine the challenges associated with using job portals, such as the potential for fraudulent job postings and the need for effective screening and filtering mechanisms to ensure the quality of candidates. The research paper reviews various job portals currently in use, such as Monster, indeed, and LinkedIn, and provides insights into their features and functionalities. The authors also discuss emerging trends in the use of job portals, such as the use of artificial intelligence and machine learning to improve candidate matching and recruitment analytics. Overall, the research paper provides a valuable review of the use of job portals in the recruitment process life cycle, highlighting their advantages and challenges and providing insights into current and emerging trends in the field.

3. Implementation Details

3.1 Proposed System

In this paper the employee’s hiring system is proposed which is helpful for the most of the job seekers and its less time consuming than the traditional system of hiring process as everything is being online and also some time there is no possibility of taking all the employees on record every time so this platform provides this functionality to the candidates. It is a web-based platform for the easy and fast responder for the users.

Modules Includes:

- User/Employee Dashboard
- Company/Recruiter Dashboard
- Administrator Dashboard

3.2 Methodology

User Dashboard: - In this system any one can register with the system who are seeking for the jobs they can login with and search for different job profiles which are posted by the companies with this system, they also have to verify their details every time when they visit the dashboard. It also contains the information about the companies for which they are applied and what is the status of that job application. There is another functionality added where the applicant can check the task or work allocated to them and within that time span, they have to complete that task so only from that task basis the applicant can selected by the companies. They can also check their progress of every application coming from the companies. Applicant can also check the job posted by companies not only this but also, they can visit to the official website of the company for security concern for

confirmation of the company profiles. Applicant can also visit the companies' details page before applying for that job this is designed because the applicant can also verify the companies are registered have been officially approved by government by visiting their official websites and also verify the opening in the companies.

Administrator Dashboard: - In this system the administrator plays a vital role for this web application the administrator acts as a mediator between the user and companies' dashboard. Administrators have the responsibility to verify the company's profiles. Companies also have to be verified from the administrator. After complete verification, administrators allow companies to post the hiring job details with the portal.

Company Dashboard: - In this system the companies can register themselves with the portal. Once the company is registered with the administrator the id is assigned to the company so that they can post their job with their id. Companies can post more than one job at a time. They also have the rights to check how many candidates are registered for that particular job profile and review as per their criteria. The preferences are decided according to only companies' rules and conditions as same as official website of that company. In this portal new functionality is added i.e., the tasks are allocated for the applicant according the job positions and the companies record this so that they can check the performance of candidates if they are satisfied from the task which have been done by the applicant then they can either schedule their interview of give them redeem status that they have been hired by companies for that job. The notifications are given through the various platforms like mail, SMS system to the applicant.

3.3. Flowchart

The diagram illustrates the flow of the System Architecture, which comprises three primary modules: the User module, Admin module, and Recruiters module. The hiring portal serves as the central module of the system, enabling both companies and users to register and facilitating communication between them. It serves as the primary interface for the hiring process. The admin module is responsible for verifying the accuracy and genuineness of data provided by users and companies before forwarding the applications to respective companies. The user and recruiter dashboards are two separate modules that offer different functionalities to their respective users. The user dashboard enables job seekers to apply for multiple job opportunities and monitor the progress of their applications. The recruiter dashboard provides companies with a platform to post job openings and manage applications from job seekers. In essence, the diagram depicts a standard hiring process that consists of a central portal for job seekers and companies, an admin module for verification, and separate dashboards for users and recruiters to manage their tasks.

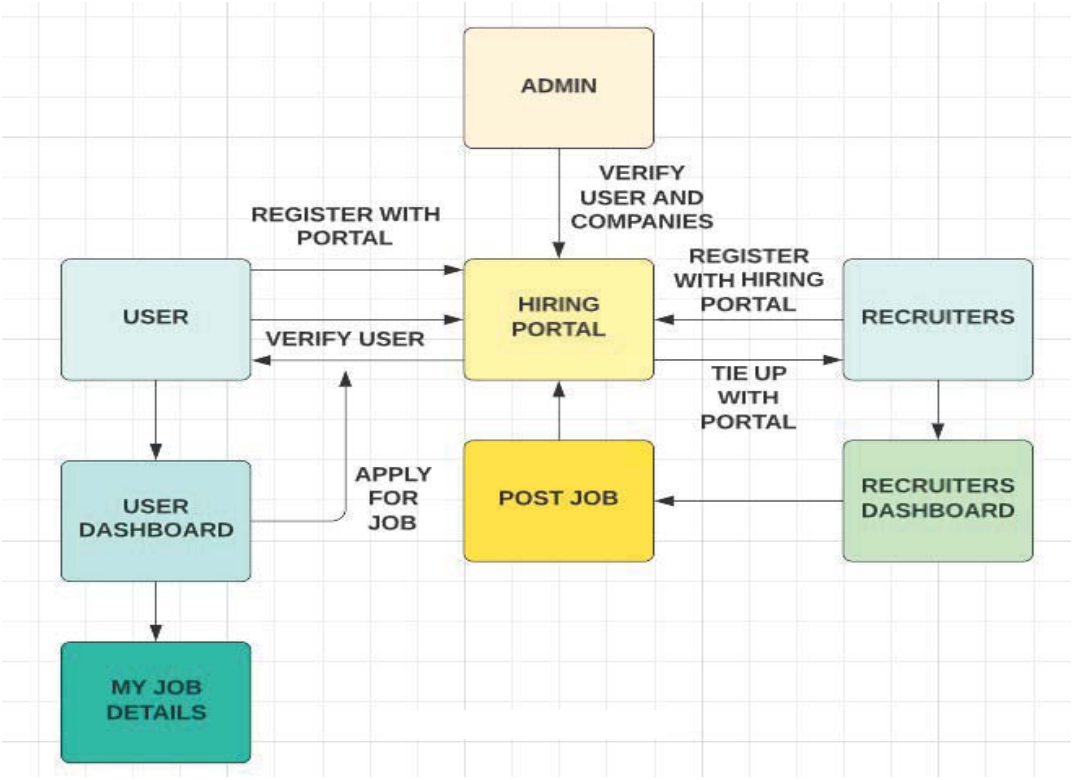

Fig. 1. System Architecture.

The Following diagram features two APIs - one for users and another for job descriptions. The user API provides information about the user's job description and skill set values, while the job description API contains details about the job and its required skill set.

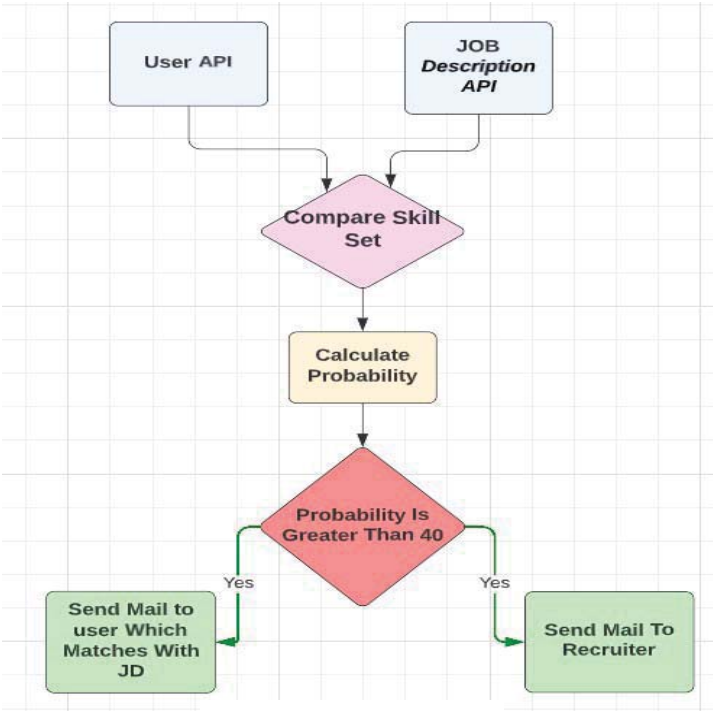

Fig. 2. System Flow Diagram.

listed for the job. Overall, this diagram represents a job hiring system that leverages APIs to match users with job requirements. The system calculates the probability of a match and subsequently notifies the user and recruiter about the shortlisting.

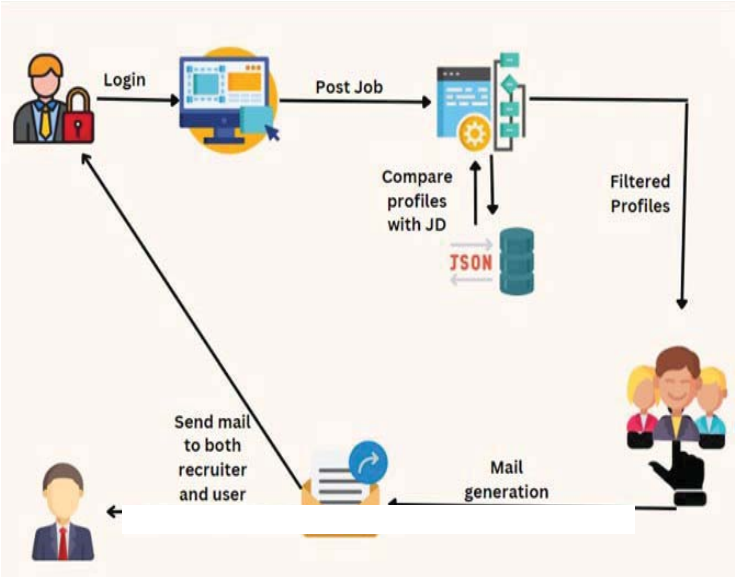

Fig. 3. System Configuration for Sending the Mail.

3.4. Equations and formulae

Probability Formula:

$$Probability = \frac{\text{Number of skills of user}}{Total\ Reqired\ Skills\ For\ JD}$$

$$P(A) = \frac{F}{N}$$

Where:

- P(A)= Probability of user profile skills match with the recruiters posted job
- F= Number of skills set user have for that particular job profile.
- N=Total / All skill set values required to match with that job profile.

4. Limitations

The current hiring or employment systems have some of the dysfunctionalities as follow:
1. The system does not have any criteria to separate out the particular candidate with greater impact rate for any particular work.

2. There may be modifications can be done in such way that this hiring system can automate and schedule interviews also on this platform only like the tasks are assigned.

5. Future Scope

This system provides online platform for the employees and the companies for easy functionality and makes the hiring process efficient but there must be some system in the future like the interview processing of levels can be included so that this hiring process becomes totally compatible for hiring with small to large scale as well as small scale hiring process and the time and security factors also considered.

6. Conclusion

In this project the hiring system and its functionality are defined in all the ways every dashboard system has its own functionalities. The use of web-based technologies is like the MERN stack. For the database the Mongo DB is used it has advantages as ease of use to the user's easy registration process for the companies with a portal. System administrators are also involved to ensure the proper functioning of the system and also, they provide the security concern regarding the only validating and verified companies that can be viewed and registered. Hiring process mainly focuses on data about users. It is kept private only for that company's portal and designation of the tasks for each applicant can be different and designed by that company only. Administrator didn't interfere with the process; it makes the hiring process more valuable. A hiring portal website is an essential tool for employers and job seekers alike. It provides a central hub for job postings, resumes, and other relevant information, and offers various features and tools to streamline the hiring process. Employers can use the platform to create job listings, screen and shortlist candidates, schedule interviews, and manage job offers. Job seekers, on the other hand, can search for job openings, submit their resumes, and track the progress of their applications. Additionally, the website may offer additional resources such as career advice, tips on job hunting and information on salary trends and market conditions to help job seekers improve their job search skills. Overall, a hiring portal website simplifies the hiring process, making it more efficient and effective for both employers and job seekers, and ultimately helps match the right candidates with the right job opportunities. Hiring a right candidate is very lengthy and time-consuming process so we automate a process of selecting a right candidate for a job we developed a algorithm that can be calculate the matching skillset percentage and we also developed one module which sends an automatic mail to the perfect matched application we reduce manual interruption and human efforts and through the use of our portal we save a lot of time of recruiters and makes hiring easy and effective.

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