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RecruitMatch (RM): An Intelligent Candidate Selection Algorithm for Modern Recruitment

Sahithi Venkata Pokuri[1], Samiksha Racha[2], Karishma M[3], Sruthi Sree N[4], Mamlesh VA[5], Karthikeyan D[6]
SCORE, VIT, Vellore

Abstract: ***It is a challenge for recruiters in the current competitive job market to sift through a large number of applications against each of the vacancies available. This process may take a lot of time and in most cases, deserving candidates get turned away. To mitigate this challenge, we have created the RecruitMatch (RM) algorithm, which lets users select the candidates depending on the user information they have submitted. Using RM, recruiters are able to Search and Filter out the applicants by their qualification, experience, and competencies quickly. RM algorithm makes it easier for the recruiters to get the best candidates for a specific job which makes the hiring process more effective. Recruiters are able to make the best hiring sourcing decisions for their organisation as well as cut down on the time and costs involved.***

I. INTRODUCTION

In the present fast-paced environment, the recruitment process has become much more complex and long-drawn. Highly specialised tools for job recruitment have, however, not been able to help reduce the pressing problem of a single job advertisement attracting too many applicants. It becomes a painful task and times' consuming for the recruiters to sift through a great deal of CVs and job applications, which makes it hard to pick out the best candidates within a short time. The need for an effective solution is not faced by corporations alone.

At colleges and startup incubators, the demand for talented individuals to join innovative ventures is on the rise. Traditionally, organisations would rely on students to fill out application forms, leading to a flood of submissions for each available position. This flood of applications makes it difficult for recruiters to discover the best-suited candidates for the job.

The RM algorithm bridges the gap between organisations and students seeking for employment opportunities by providing employment. It allows the RM algorithm to recruit to centralise students and job employees by allowing them to give out all the relevant information, making it easier to look for the best candidate for a particular position. It saves time on the part of the recruiters and also helps all deserving candidates.

II. LITERATURE REVIEW

The development of a job portal aimed at enhancing automation in recruitment leverages advancements in web technology to streamline candidate selection and improve recruitment efficiency. This literature review examines existing research in the field and aligns it with our project objectives, which seek to transform recruitment practices, particularly within educational institutions and startup incubator environments. Weber and Mahringer (2008) highlight the importance of efficient recruitment methods, to streamline candidate selection and enhance overall recruitment efficiency through a web application that targets these environments [3].The studies emphasise a competence-based approach, integrating competency mapping to match candidates' skills with employer requirements, thus improving job matching efficiency [7]. The study extends its focus to the history of online employment portals and what user experience can bring as a consequence of adding to the usability of the system [9]. Feedback from users is key in ensuring that significant iterative design changes are made to create a functional interface for both employers and job seekers [1]. The online recruitment fairs gained tremendous relevance during the COVID-19, making recruitment endeavors more flexible and creative [5]. The development of recruitment portals also has embraced technologies like react.js and MongoDB that has enabled the process of automation eliminating manual tasks [8]. Further, the introduction of meta-search mechanisms is aimed at enhancing the system to include a job search engine which serves the customers better by saving their time and effort in looking for jobs [6].

Features such as virtual and augmented reality are added to these online recruitment fairs providing an added value of affordable high-quality experiences for both employers and job seekers [10]. As is usually the case with all such portals it is important to note that constant update of technology in terms of the platform is important in helping keep the user active as well as the relevance of the portal [2]. The objectives of our project are determined by the studies that are aimed at the creation of effective, easy to use and flexible recruiting systems [4].

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III. PROPOSED SYSTEM

The RecruitMatch follows a multi-tiered architecture to support the functionalities required for managing user details and communication with external organisations.

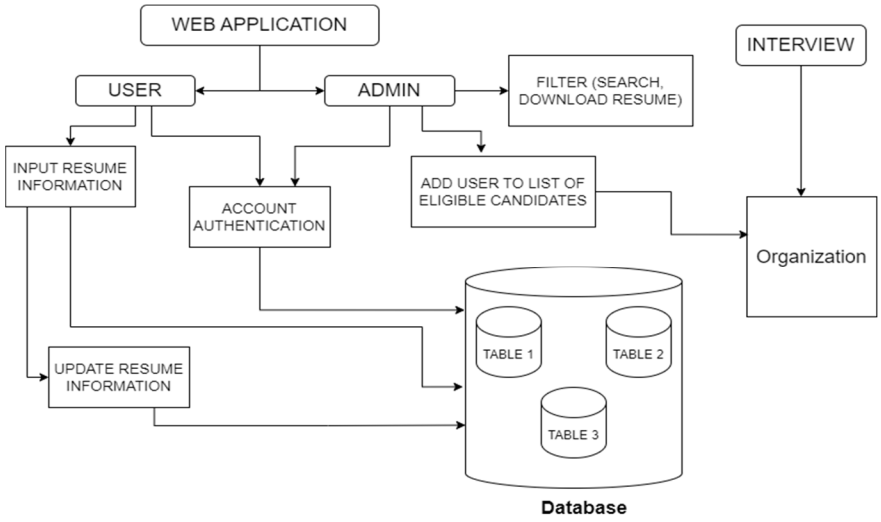


Fig 1: Architecture of Candidate selection model flow

In Fig 1 Model flow is presented like a data management system with a cloud hosted database containing all the users' individual information, such as their names, education, work history and any other resumes' specifics. To ensure the integrity of the user data a two tiered system was designed containing the end users and admin access privileges. The admin is able to authenticate and share relevant resume information with other organizations outside as per their specifications The RM Algorithm facilitates the interaction between job seekers, employing organizations, and the administrator of the web application.

Table 1. RecruitMatch Candidate Selection Workflow

Process	Description
Candidate Profile Creation	Candidates upload resumes and fill in personal, academic, and skill details.
Data Filtering	RM algorithm filters candidates based on qualifications and experience.
Match Scoring	RM calculates match scores for each candidate based on predefined criteria.
Shortlist Generation	Top candidates are shortlisted based on the match score.
Recruiter Review	Recruiters review shortlisted candidates for interviews.
Final Selection	Final candidates are selected based on interview results.

In our proposed RM, the core functionalities are articulated through a series of well-defined processes, each contributing to the overall efficiency and user experience of the platform.

$$\text{Login_Success} = f(\text{Username}, \text{Password}) \Rightarrow \begin{cases} \text{Access Level} = \text{User}, & \text{if valid user credentials} \\ \text{Access Level} = \text{Admin}, & \text{if valid admin credentials} \\ \text{Access Denied}, & \text{if invalid credentials} \end{cases} \quad (1)$$

This equation 1 ensures that users are granted appropriate access based on their credentials, segregating functionalities for regular users and administrative personnel to maintain security.

Once authenticated, users interact with the resume management system.

$$\text{Resume_Storage} = f(\text{User Input}) \Rightarrow \text{MongoDB Collection (Resume Data)} \quad (2)$$

The user inputs are processed and saved within a dedicated MongoDB collection for resume data, facilitating efficient data management and retrieval.

The RecruitMatch (RM) algorithm plays a critical role in candidate filtering and selection.

$$\text{Match_Score} = f(\text{Qualifications}, \text{Experience}, \text{Skills}) \quad (3)$$

$$\text{Shortlist_Candidates} = \max(\text{Match_Score}) \quad (4)$$

The algorithm computes a match score for each candidate based on their qualifications, experience, and skills. Candidates with the highest match scores are shortlisted, the most suitable candidates are highlighted for recruiters.

Data retrieval from the MongoDB database is driven by search operations.

$$\text{Query_Result} = f(\text{Search Keywords}, \text{MongoDB Indexes}) \quad (5)$$

This equation 2 describes how search queries are executed using MongoDB's indexing capabilities to efficiently retrieve relevant candidate profiles based on user-specified keywords.

The effectiveness of data filtering and search operations is measured.

$$\text{Search_Result} = f(\text{User Query}, \text{Candidate Profiles}) \Rightarrow \max(\text{Relevance}) \quad (6)$$

This process ensures that the search results returned are the most relevant to the user's query, optimising the relevance and accuracy of the information presented.

$$\text{Account_Activation} = f(\text{Email Verification}) \quad (7)$$

New user accounts are activated only after email verification, ensuring that the system maintains a secure and validated user base.

The RM algorithm minimises time involved in the hiring process of an organization, college or a start up, by searching the available pool of candidates for a specific project or role. The participants don't post job offers-they search the candidates who possess needed qualifications and experience and consider the activity level of the searched users. Users are also sorted through the algorithm per their relevancy, thus making it possible to search for candidates even among the active users who have joined the site from 1 week to 6 months ago. On the user's part, they will submit their resume lines and some important information and the system will look for appropriate jobs for them. The Fill Jobs process is done only when the skill requirement is thereby accurate to the skills that are required by the members in hiring.

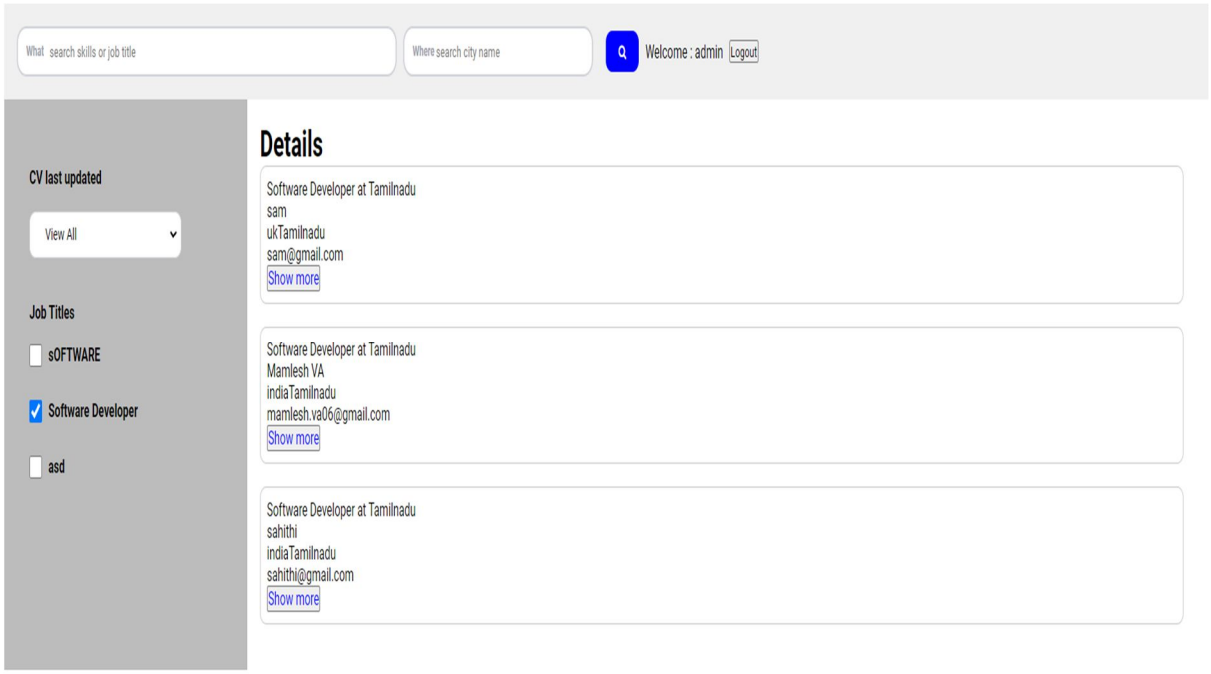
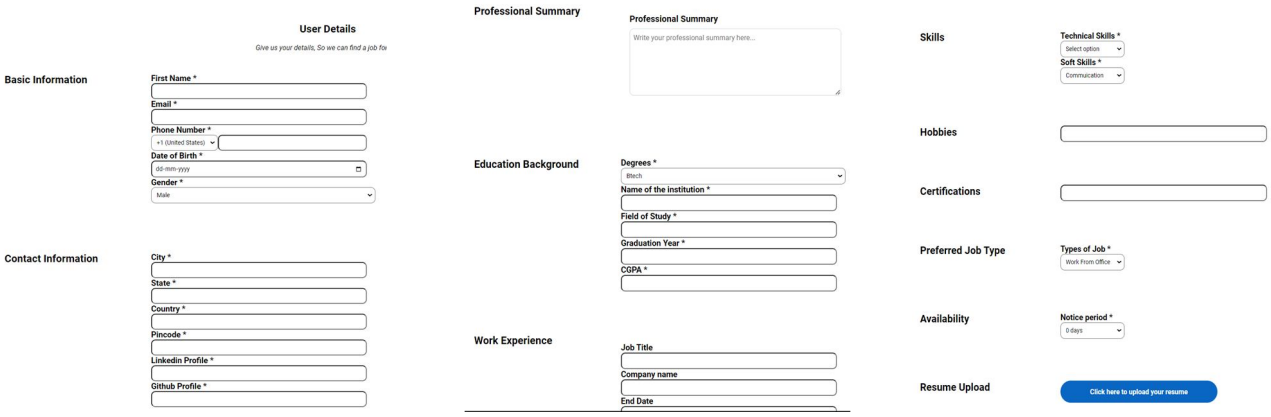


Fig 2. Displays the candidate based on Job Titles Selected



Figures 3a, 3b, and 3c show the user details we are collecting from the users.

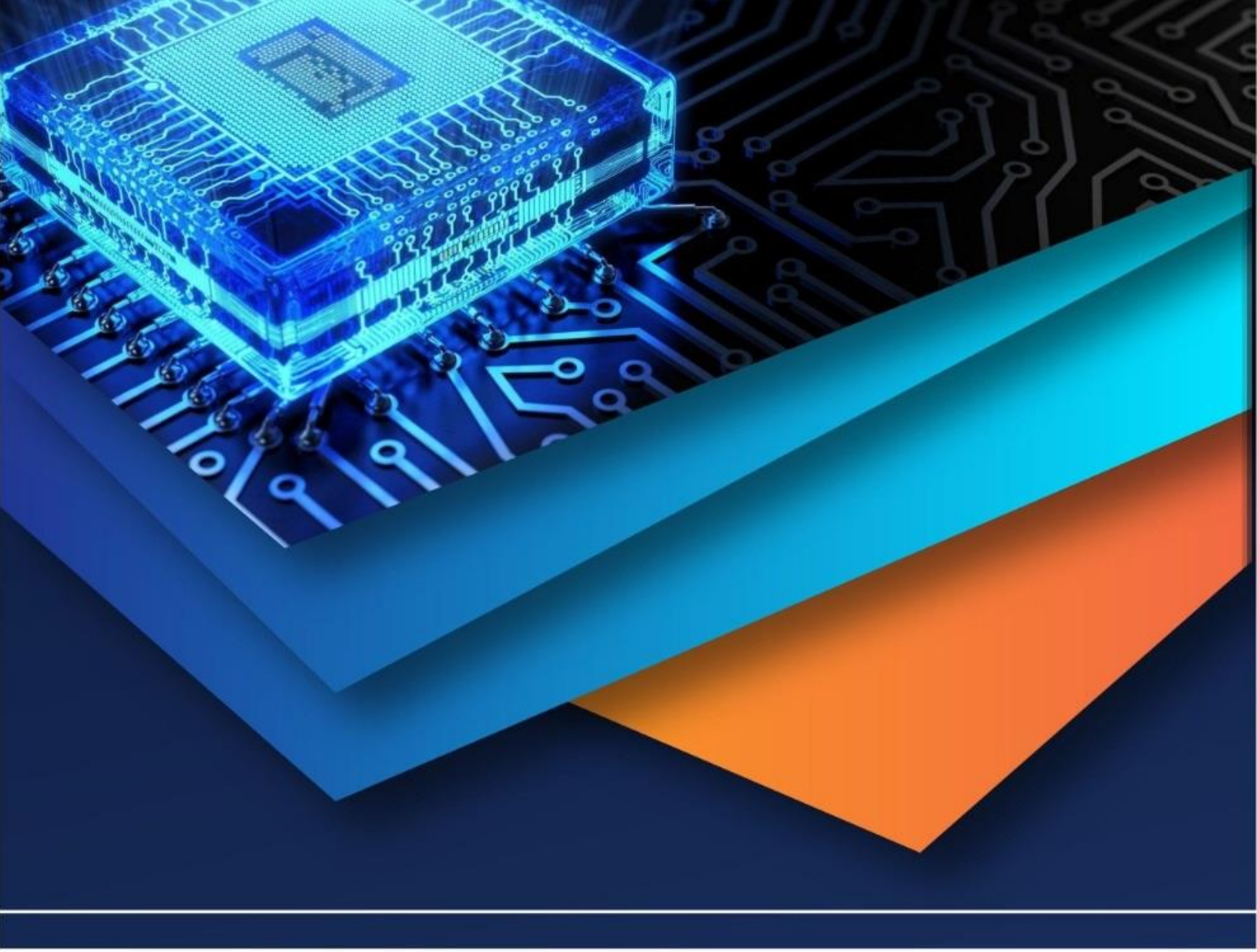
IV. CONCLUSION

The RecruitMatch (RM) approach offers a high-performing platform which is simple and safe for use to solve the main problems faced by job finders, educational institutions, and startup incubators when in need of qualified people. Through improving how candidates apply for positions and how they get shortlisted, the RM algorithm helps organisations in seeking and placing the right talent faster for the right purpose. Our tool saves organisations from the challenge of dealing with the bulk of applications to find the most appropriate candidates that include time and resources. The system matches applicants with prospective positions accurately so as to improve the productivity and efficiency of the overall recruitment processes.

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