Optimizing Job Search through a User-Centric Job Recommender System

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***Abstract*—This project designs and develops a Job Recommender system to improve job opportunities in the Philippines. The objective is to define the challenges faced by jobseekers and the strategies and best practices for landing a job opportunity. Based on these challenges, various design considerations are evaluated to create a user-centric design that meets user needs. The enhanced strategies in the developed Job Recommender System provide a user-friendly interface that allows users to navigate, search, and find job opportunities based on their preferences. Implementing this system improves job search and addresses the challenges faced by jobseekers. The system incorporates features such as location-based job search, application tracking, employer reviews, and a resume builder. This project addresses the existing challenges in job search for potential users like jobseekers and contributes to the overall productivity of the job search process.**

***Index Terms*—Job Recommender, Job Opportunity Strategy, Challenges, User-Centric Design, Philippines Job**

I. INTRODUCTION

Job seekers are becoming more determined and persistent in their search for employment opportunities that complement their skills and backgrounds. However, searching for a new job is a difficult and time-consuming process (Heap et al., 2014). Employers, aiming to hire these individuals, often struggle to assess their skill levels and provide appropriate career suggestions (Jeevankrishna, 2020). In the Philippines, this challenge has recently intensified. According to the Philippine Statistics Authority (PSA), 2.38 million Filipinos were unemployed in July 2024, a sharp increase from 1.62 million in June. Notably, fresh graduates contributed 43% of the total unemployed, as many were unable to find employment after graduating from college or senior high school (Cordero, 2024). The youth unemployment rate reached 14.8%, highlighting a significant gap between educational outcomes and labor market absorption.

This persistent issue underscores the pressing need for better job-matching systems that can support new entrants into the workforce and reduce underemployment and unemployment.

Recommender systems, such as those for itineraries, diets, and jobs, help users find the most suitable information amidst a vast array of options. These systems have become essential due to the overwhelming amount of information available online, offering valuable assistance in information retrieval (Al-Otaibi et al., 2016). In the recruitment sector, internet job boards are a crucial component (W. Shalaby et al., 2017). With millions of applicants browsing job advertisements daily, it is increasingly important to provide employment recommendations that are accurate, efficient, useful, and transparent. Despite advancements in recommendation systems across various online domains, the employment suggestion area remains relatively underexplored. Job seekers meticulously review many opportunities to identify those most suitable for application (Laumer et al., 2018). While job recommendation systems have been explored in various online platforms, their application remains limited in the Philippine context, especially in addressing localized employment challenges.

The use of intelligent job recommenders can also promote equally accessible quality education institutions and job opportunities through public data sources and/or user-provided information. The systems indirectly support social and economic growth by lowering underemployment and unemployment by giving learners precise and customized job recommendations (Restrepo, 2015). In today's extremely competitive employment market, it is becoming increasingly crucial for businesses to hire

individuals who are the best match for the job and then keep these employees in the long run (Appadoo et. al., 2020).

II. RESEARCH OBJECTIVES

The general objective of the research is to design and develop a job-recommending system for enhancing job opportunities. Specifically, this study aims to fulfill the following objectives:

- Identify the challenges in finding a job;
- Identify the strategies and best practices in recommending a job;
- Determine the design considerations in developing the system.
- Evaluate the developed system in terms of: Functional Suitability, Usability, and Satisfaction.

III. SIGNIFICANCE OF THE STUDY

This research has potential to substantially enhance the job opportunities, offering benefits to job seekers, employers, and the broader labor market. By addressing the following objectives, this research aims to contribute to the advancement of job recommender systems and their practical applications. Specifically, this study would be beneficial to the following:

Job seekers. By identifying effective strategies and best practices, the research will help develop job recommender systems that offer more precise and relevant job suggestions. Employers. By evaluating and integrating appropriate technologies, the study will help create systems that efficiently filter and match candidates, reducing the time and cost associated with hiring.

Future Researchers. This study may serve as a valuable reference for future researchers in developing improved job recommendation systems and related applications.

IV. SCOPE AND LIMITATION

The scope of this study encompasses the evaluation of strategies, technologies, and design considerations for developing a Job Recommender System. It involves identifying effective job recommendation strategies through a review of existing literature and industry practices, evaluating suitable technologies through comparative analysis, and design considerations.

V. REVIEW OF RELATED LITERATURE

A. Challenges by Job Seekers

According to Moore, people's job search frustrations included being forced to apply for jobs that did not fit with their career goals, employers' expectations that they had relevant work experience in their preferred field, and the effect of personal factors on their ability to confidently present themselves to potential employers (Moore, 2019).

Knowing what to do and where to look is often the first obstacle that people encounter when they begin their job search. Many individuals believe that in order to learn about careers, they must visit a university or career center. But an individual must know how to look for a job properly if they want to land a decent one. Being informed of the many job categories is another obstacle that people encounter when they start their job hunt. Numerous employment types exist, such as contract, freelance, temporary, full-time, part-time, and seasonal work (Global, 2022).

B. Strategies and Best Practices

In most businesses, online recruiting platforms have taken the lead in hiring new employees. Although these platforms shorten the time it takes to hire employees and save advertising costs, they have an inappropriateness of conventional methods for retrieving information, such as Boolean search strategies (Zhang et.al., 2021). Recently, job recommendations have attracted a lot of research attention and have played an important role on the online recruiting website (Portugal et.al., 2018). Online recruiting platforms, also known as e-recruitment platforms, are among the most effective business innovations that have transformed the hiring process for job seekers by firms.

In order to enhance prediction accuracy while addressing lack of data as well as cold start issues, artificial intelligence (AI), in particular computational intelligence and machine learning techniques and algorithms, has been naturally used in the creation of recommender systems (Zhang et.al., 2021). Some of the companies which have done remarkable work in the field of Artificial Intelligence (AI) are Facebook, Google, Microsoft, IBM, etc. which are investing

millions and billions in this very field of AI development and research.

Algorithms are used by recommender systems to make recommendations for goods and services to users. These systems have been using artificial intelligence machine learning techniques recently (Portugal et.al., 2018). One of the most widely used uses of artificial intelligence that draws attention from researchers worldwide is the recommendation system across the world (Sahu et.al., 2017).

C. Design Considerations

Comparative analysis is a vital method for understanding complex subjects by examining similarities and differences. This analysis focuses evaluating existing job recommending systems, exploring key features and functionalities. This study will compare each entity's background and evaluate them across several parameters, providing insights and implications for future research and practice.

JobsStreet

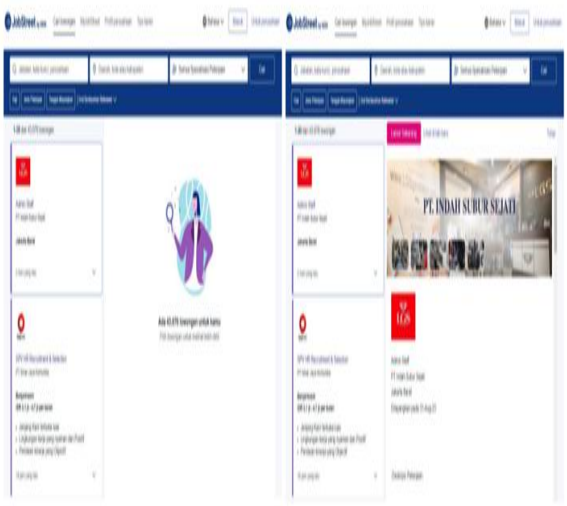


Fig. 1. Screenshot of Jobstreet

Jobstreet is well-regarded for its diverse job listings, which cover a wide range of industries and job types. Key features such as company reviews, salary insights, and job application tracking add significant value to users. JobStreet also offers a mobile app, enhancing accessibility for job seekers on the go. However, some users have noted issues with outdated job postings, suggesting a need for improved updating mechanisms to ensure listings remain current.

Indeed

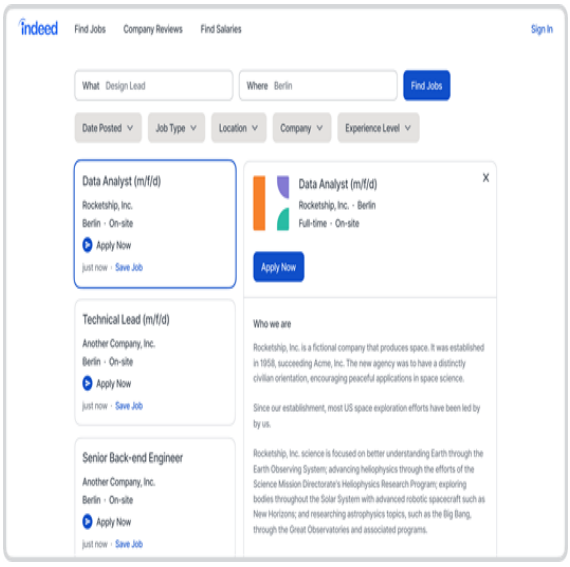


Fig. 2 Screenshot of Indeed

Indeed, is known for its vast array of job listings across all industries and job types. Indeed, allows users to filter job searches by type, salary, location, and more. It offers numerous features such as resume building tools, company reviews, salary information, job alert emails, and application tracking, all of which contribute to a robust job-seeking experience. The mobile app further enhances user convenience.

Jobayan

Fig. 3 Screenshot of Jobayan

Jobayan is a job portal focused on the Philippine job market. It offers a modern and intuitive interface, making it easy for users to navigate and find job opportunities. One of its standout features is the integration with social media, which facilitates job sharing and networking, crucial for the local job-seeking culture. However, Jobayan's job listings are more limited, which may restrict opportunities for some users. It does not provide features like job alerts, application tracking, or detailed company reviews and salary information, which could be areas for improvement.

Boss Job

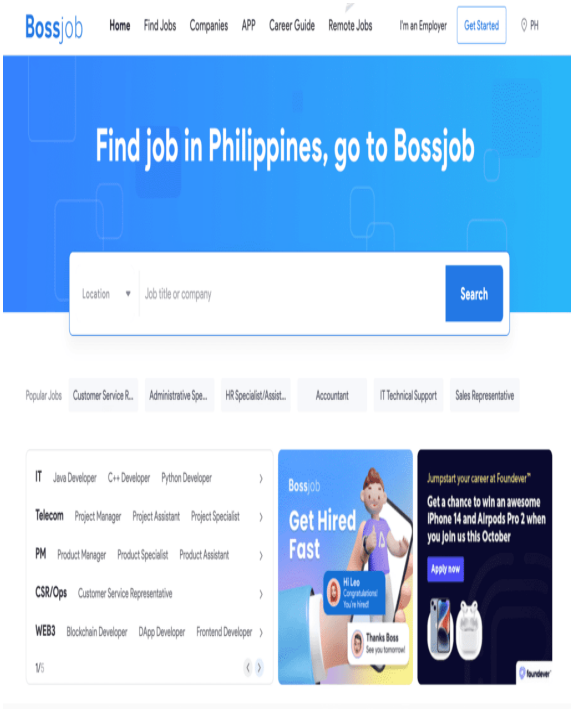


Fig. 4 Screenshot of Boss Job

Boss Job is a job portal tailored to the Southeast Asian market, with a particular focus on the Philippines. Its direct messaging feature is particularly notable, allowing for quick and easy communication between job seekers and employers. This can significantly speed up the job application process and enhance user engagement. Boss Job offers a wide range of job types, from internships to executive positions, catering to various career stages. However, while it does provide company reviews and job application tracking, it lacks some of the advanced features found on larger platforms, such as detailed salary insights and job alerts.

Jobyoda

Fig. 5 Screenshot of Jobyoda

JobYoda primarily targets the Philippine job market. Its standout feature is the use of video job listings and interviews, providing a modern and engaging way for employers and job seekers to connect. The platform's modern design is user-friendly, and it also offers career advice and resources to help users improve their job search skills. While JobYoda lacks some features such as job alerts, application tracking, and detailed company reviews and salary information, its unique video focus sets it apart from other job portals.

D. Comparative Analysis

When comparing JobStreet, indeed, Jobayan, Boss Job, and JobYoda, each platform showcases distinct strengths and features tailored to various user needs and geographical markets. JobStreet and indeed stand out for their extensive job. JobStreet, primarily strong in Southeast Asia, offers comprehensive company reviews and salary insights, making it ideal for regional job seekers

TABLE I. Comparative Analysis of Existing Systems

Feature	Jobstreet	Indeed	Job Ayan	Boss Job	Job Yoda
Geographical	Southeast Asia	Global	Philippines	Southeast Asia	Philippines
User Interface	Clean	Simple	Modern	Clean	Modern
Job Alerts	YES	YES	NO	NO	YES
Resume Upload	YES	YES	YES	YES	YES
Company Review	YES	YES	NO	YES	NO
Salary Information	YES	YES	NO	NO	NO
Application Tracking	YES	YES	NO	YES	NO
Messaging	NO	NO	NO	YES	NO
Social Media Integration	NO	NO	YES	NO	NO
Career Resources	YES	YES	NO	YES	YES

Indeed, with its global reach and vast array of job listings, it is a top choice for users seeking international opportunities. Both platforms also provide job alerts, resume upload, and application tracking features. Jobayan, Boss Job, and JobYoda, while more specialized in the Philippine and Southeast Asian markets, offer unique functionalities. Jobayan integrates social media for networking, though it lacks some advanced features like job alerts and application tracking. Boss Job is notable for its direct messaging feature, allowing quick communication between job seekers and employers, enhancing its user-friendly interface. Overall, users should choose based on their specific needs, geographical focus, and desired features, with JobStreet and Indeed providing comprehensive global options and Jobayan, Boss Job, and JobYoda offering targeted, region-specific solutions.

E. User Acceptance Testing

According to Leung, H.K. et. al. The last testing phase in the creation of application software is the user acceptance test (UAT). The software system can be made available for operational use once the testing results meet the acceptance criteria. To emphasize the distinctiveness of UAT in comparison to the other testing phases, this paper first compares the key testing elements of the various software development testing phases, such as unit, integration, system, and UAT tests (Leung et.al., 1997).

In determining the level of acceptability of the proposed contact tracing application, the researcher will follow the descriptive research design. In evaluating the application, the ISO 25010 software quality evaluation tool was used by the researchers. The ISO 25010 is a quality model that defines which quality characteristics will be considered when evaluating a software product's attributes. It comprises eight quality characteristics which include: functional suitability; performance efficiency; compatibility, usability, reliability, security, maintainability, and portability (Britton, 2021).

The conceptual framework for developing a Job Recommender System (JRS) integrates key elements that guide the researcher in its design and implementation.

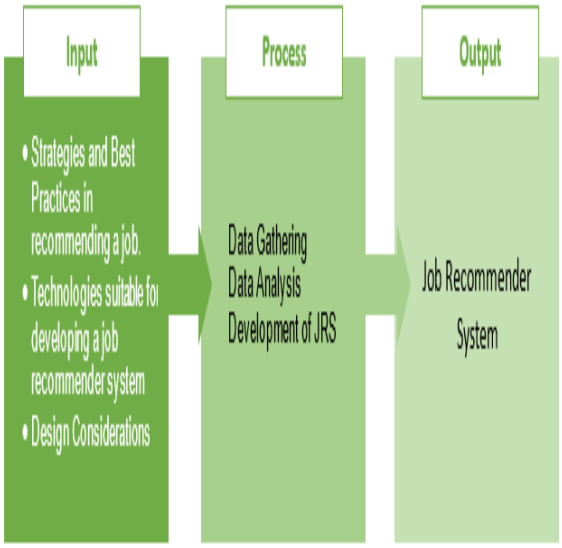


Fig. 6. Conceptual Framework of the study

Input involves gathering essential information needed in this study. These include strategies and best practices for job recommendations, such as using structured hiring processes and leveraging digital trends. Technologies suitable for JRS development are also considered, encompassing machine learning algorithms, use of AI and natural language processing. Process details the practical steps required to build the JRS. Data needed will then be gathered by conducting survey and interview, which then be analyzed to identify the functionalities of the system to be developed.

Output is the Job Recommender System itself, which aims to provide accurate job recommendations by matching job seekers with suitable opportunities based on their skills and preferences while aligning employers with the right candidates.

VI. METHODOLOGY

Research Design

In gathering the information needed for the development of the system, a descriptive-developmental research design was used. The descriptive research design, as defined by Saunders et al. (2012), is the general plan about what the researchers did to answer the research question. A descriptive research design sought data to methodically characterize a phenomenon, circumstance, or population. More specifically, it

assisted in providing answers to the research problem's what, when, where, and how questions rather than it's why. Descriptive studies were often described as studies that were concerned with finding out "what is."
Software Development Lifecycle
In the development of the system, the researcher used the Rapid Application model as methodology. The figure below shows the phases of the Spiral Software Process Model.

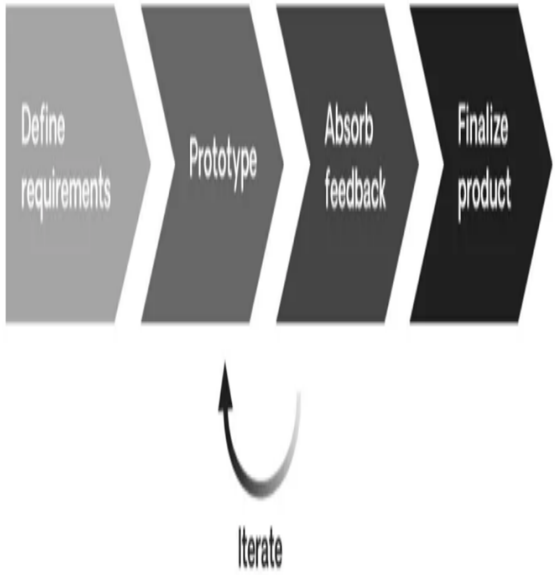


Fig. 7. Rapid Application Development

As presented in Figure 7, the researcher developed the application in phases, iterating on Prototyping and Absorbing feedback. In the first phase, the researcher gathered the system's requirements. The researcher gathered information by conducting interviews to collect necessary information like design considerations and by conducting a comparative analysis of existing systems. The acquired information was then used to understand the job-seeking challenges faced by users, including data on user preferences, common obstacles, and frustrations in the job search process. In the second phase, the researcher created a prototype of the system based on the design needs and functionalities that were gathered in the first phase. With the developed prototype, the researcher gathered feedback to see if the functionalities and design needed improvement by presenting the prototype to the end users.

After developing the prototype, the next step was to gather feedback from potential users and stakeholders. This feedback was crucial for understanding the practical design considerations and user requirements. In gathering feedback, the researcher presented the developed solution and conducted User Acceptance Testing (UAT) with the end users to measure the level of acceptability of the developed system. In the final phase, the JRS was refined based on the incorporated feedback from the previous phase, and a comprehensive evaluation was conducted to ensure it met the defined objectives and user needs.

VII. RESULTS AND DISCUSSION

A. Challenges in finding a job

Upon conducting interviews with potential users of the system several common challenges in finding a job opportunity were identified. Figure 8 depicts these challenges, with thematic approach used to group them.

Fig. 8. Affinity Diagram

One major challenge is the cumbersome process of applying and submitting requirements to various employers, especially when done face-to-face from distant locations. Job seekers often struggle with

preparing and delivering their resumes and other documents.

Creating an impressive resume that meets employers' needs is also a challenge. A resume is crucial for presenting a job seeker's qualifications, yet many struggle to craft one that effectively highlights their skills and experiences. According to Shore, Tashchian et.al. (2021), applicants with error-laden resumes are less likely to be interviewed or hired. Furthermore, these applicants are often offered lower starting salaries and are rated lower on job-related traits compared to those with error-free resumes. This underscores the practical implication that job seekers must ensure their resumes are free of spelling, grammatical, or typographical errors to enhance their chances of securing an interview and receiving a competitive job offer.

B. Strategies and Best Practices in recommending a job

In terms of strategies and best practices for recommending jobs, the use of technology, including job portals, mobile apps, and social media, is seen as an effective way to stay informed about job openings and company updates. The data also emphasized the importance of personalized job matching. Tailoring recommendations based on an individual's skills, experience, and preferences helps users find relevant opportunities more effectively. Recently, job recommendations have attracted a lot of research attention and have played an important role on the online recruiting website (Portugal et.al., 2018).

Active networking and leveraging both personal and professional connections emerged as critical strategies, allowing job seekers to discover job opportunities that might not be advertised. The importance of networking in the job search process is further supported by Mowbray (n.d.), who highlights the value of different types of information obtained from network contacts.

This information can be crucial for various job search tasks. Frequent networking, both offline and on social media, is associated with positive job search outcomes. This underscores the need for job seekers to actively engage in networking as a way to access hidden job opportunities and improve their chances of securing employment.

C. Design Considerations in developing the system

After properly defining the problems, the researchers brainstormed to generate ideas for design considerations and potential solutions to the challenges discussed. During this session, the researchers carefully analyzed the aggregated representation of user needs derived from the initial interviews with potential users. A comparative study was also conducted to explore potential features that could be added to address gaps in existing job recommender systems.

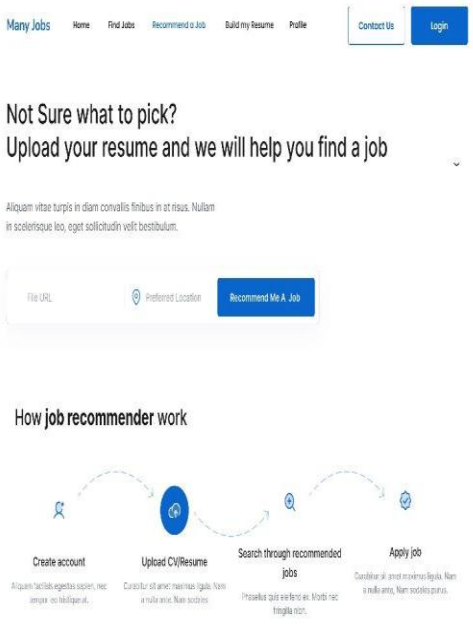


Fig. 9. Landing Page

Figure 9 illustrates the landing page of the system. At the top is a navigation bar that allows users to easily access different features of the system, and a login button for those who already have an account. New users are prompted to sign up. The landing page includes functionality for job recommendations through the upload of a resume, allowing users to search for jobs themselves. It also features simple instructions on how to use the recommender system, addressing the challenge of not knowing which jobs to apply for and helping users find suitable opportunities based on their skillset.

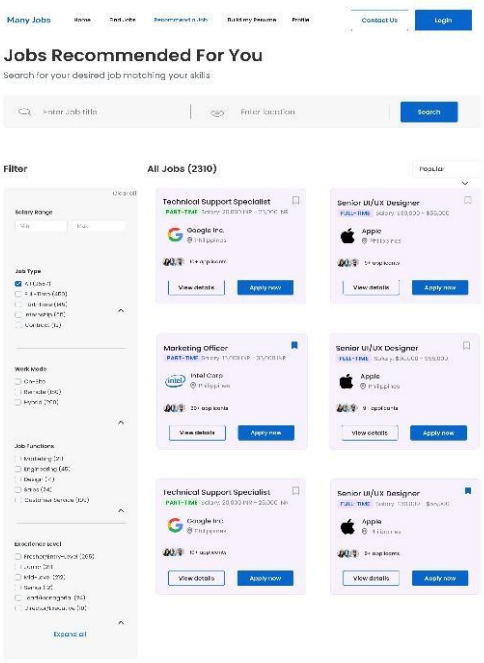


Fig. 10. Job Recommended Page

Figure 10 displays the job recommendation page, which shows the number of jobs recommended by the system based on the user's resume or profile. Users can also filter the recommended jobs according to their preferences on the same page.

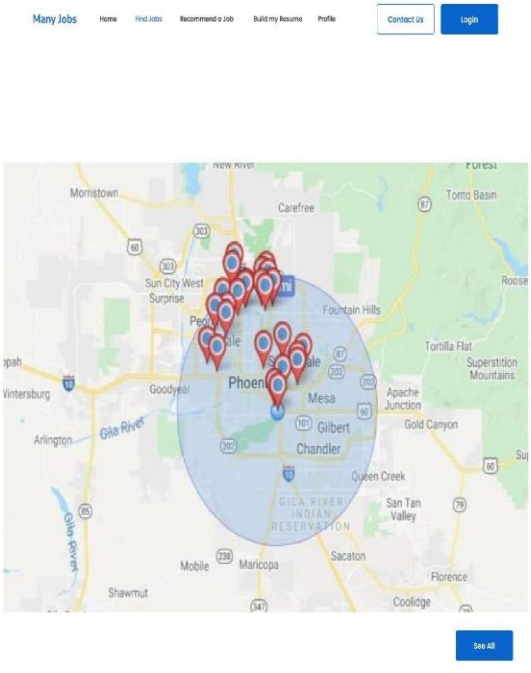


Fig. 11. Location Based Job Recommender Page

Figure 11 presents the Location-Based Job Recommender Page, where users can plot their location on a map. The system then recommends jobs suitable for the user within their specified area.

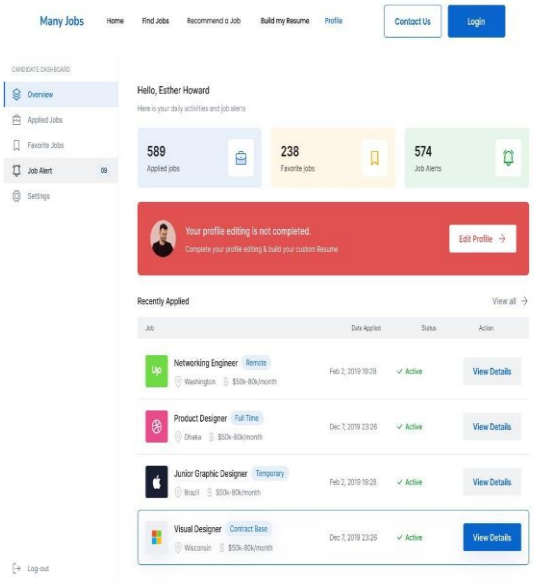
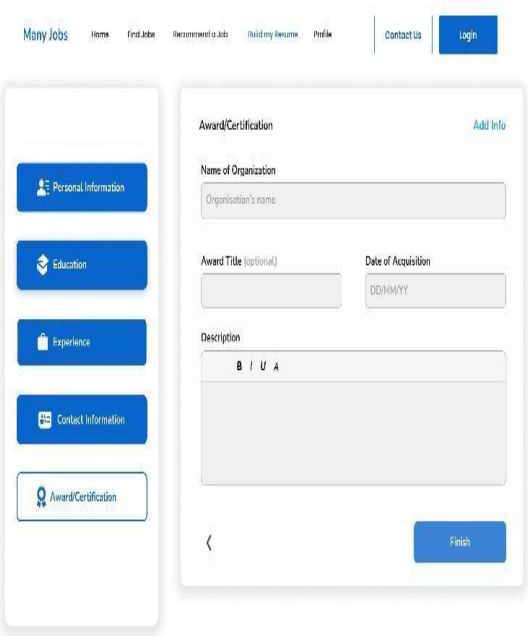


Fig. 12. Application Tracking Page

Figure 12 depicts the application tracking page, allowing users to track the status of their applications. This feature helps reduce confusion and enables users to monitor the jobs they have applied for.



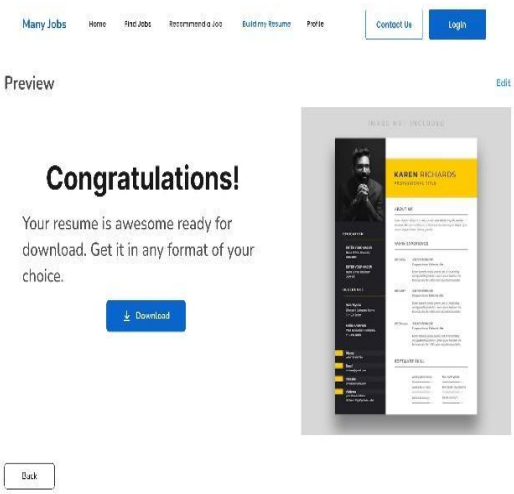


Fig. 13. Resume Builder Page

Figure 13 shows different stages of the resume builder within the job recommendation system. The interface guides users through sections such as Personal Information, Education, and Awards/Certifications. Each section includes clear fields for users to input relevant details, such as names, profession, educational background, and awards. Navigation is straightforward with "Next Section" and "Finish" buttons, emphasizing user-friendliness. This resume builder is integrated into the larger system to enhance the job search experience by providing structured, easy-to-fill forms that contribute to a comprehensive resume.

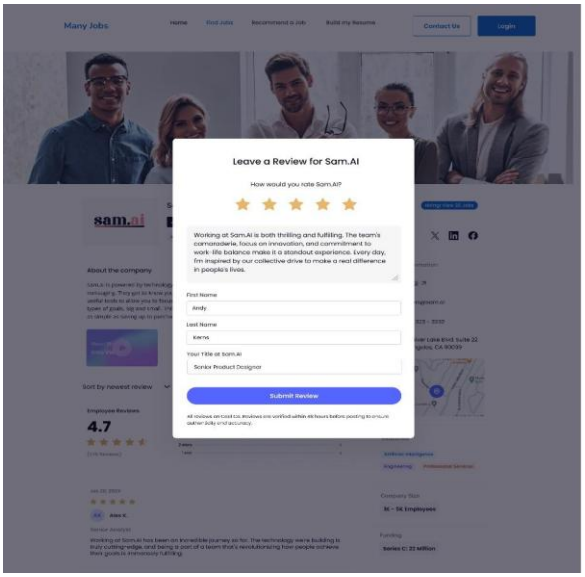


Fig. 14. Employer Review Page

Figure 14 illustrates the employer review system designed to enhance job seeker experience and promote employer accountability. Users can rate and provide feedback on their employers regarding company culture, work-life balance, compensation, career growth, and overall satisfaction. This feedback benefits employers by providing constructive insights to improve workplace culture, while job seekers gain valuable information to make informed decisions.

D. User Acceptance Testing

TABLE II. Overall Usability Evaluation Results

Criteria	Mean	Descriptive Evaluation
Functional Suitability	4.3	Strongly Agree
Usability	4.3	Agree
Satisfaction	4.2	Strongly Agree

The usability evaluation results indicate that the system is effective, with a mean score of 4.3 for both Functional Suitability and Usability, and 4.2 for Satisfaction. Users "Strongly Agree" that the system's functionalities meet their needs, reflecting well-designed and complete features. While Usability is rated positively with an "Agree" evaluation, suggesting the system is user-friendly, there is still potential for improvement to enhance user experience further. Satisfaction, also rated as "Strongly Agree," underscores the overall positive reception of the system.

VIII. CONCLUSION

The study identified key challenges for job seekers, including the cumbersome application process, lack of employer feedback, and difficulties in creating effective resumes. To address these issues, a job recommender system was developed with features like a resume builder, application tracking, and location-based job recommendations. Supported by literature, the system aims to streamline the job search process and improve outcomes by emphasizing the importance of resume quality, networking, and job matching. The user feedback from UAT indicated high levels of functional suitability and satisfaction, validating the system's practical value.

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