A Project report on

INTELLIGENT AGENT BASED JOB SEARCH SYSTEM IN ANDROID ENVIRONMENT

A Dissertation submitted to JNTU Hyderabad in partial fulfillment of the academic requirements for the award of the degree.

Bachelor of Technology

in

Computer Science and Engineering

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2020- 2024

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CERTIFICATE

This is to certify that the Major Project Phase I report entitled " **Intelligent Agent Based Job Search System In Android Environment** " being submitted by K.Yugender (20H51A05H4), S.Nikhitha(20H51A05L8), S.Chaitra Vyshak (20H51A05P9) in partial fulfillment for the award of **Bachelor of Technology in Computer Science and Engineering** is a record of bonafide work carried out his/her under my guidance and supervision.

The results embodies in this project report have not been submitted to any other University or Institute for the award of any Degree.

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ACKNOWLEDGEMENT

With great pleasure we want to take this opportunity to express my heartfelt gratitude to all the people who helped in making this project work a grand success.

We are grateful to **Ms. B. Anuradha, Associate Professor**, Department of Computer Science and Engineering for her valuable technical suggestions and guidance during the execution of this project work.

We would like to thank **Dr. Siva Skandha Sanagala,** Head of the Department of Computer Science and Engineering, CMR College of Engineering and Technology, who is the major driving forces to complete my project work successfully.

We are very grateful to **Dr. Vijaya Kumar Koppula**, Dean-Academics, CMR College of Engineering and Technology, for his constant support and motivation in carrying out the project work successfully.

We are highly indebted to **Major Dr. V A Narayana,** Principal, CMR College of Engineering and Technology, for giving permission to carry out this project in a successful and fruitful way.

We would like to thank the **Teaching & Non- teaching** staff of Department of Computer Science and Engineering for their co-operation

We express our sincere thanks to **Shri. Ch. Gopal Reddy**, Secretary, CMR Group of Institutions, for his continuous care.

Finally, We extend thanks to our parents who stood behind us at different stages of this Project. We sincerely acknowledge and thank all those who gave support directly and indirectly in completion of this project work.

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ABSTRACT

The Job selection process in today's global economy can be a daunting task for prospective employees no matter their experience level. It involves a detailed search of newspapers, job websites, human agents, etc. to identify an employment opportunity that is perceived compatible to abilities, anticipated remuneration and social needs. Search sites such as Seek, Academickeys.com, Careerbuilder.com, Job-hunt.org, Monster.com, etc allow prospective employees to register online and search and apply for employment. However most do very little to profile employers against employees or even attempt to confirm the validity of the data submitted by prospective employees. Also, no information exists on feedback of the employer too on various criteria submitted by employees. Taking all these into consideration we here have proposed an intelligent agent (instead of the human agent) to perform the same search operations by interacting with the employee and job search coordinator agents. The proposed solution would involve the creation of an applicant, job search and employer agents that would use fuzzy preference rules to make a proper decision in getting a list of jobs based on the user's search criteria and also feed the rating of the employer based on feedback submitted by the past & current employees which is unique and first of its kind. All results applicable are organized based on a dynamic calculation of expected utility from highest to lowest and displayed as the job search listing. The system would use ANDROID 2.2, JADE-LEAP and the Google API to provide a robust, user-friendly solution.

CHAPTER 1
INTRODUCTION

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1.1. Problem Statement

The Job selection process in today's global economy can be a daunting task for prospective employees no matter their experience level. It involves a detailed search of newspapers, job websites, human agents, etc. to identify an employment opportunity that is perceived compatible to abilities, anticipated remuneration and social needs. Taking all these into consideration we here have proposed an intelligent agent (instead of the human agent) to perform the same search operations by interacting with the employee and job search coordinator agents. The proposed solution would involve the creation of an applicant, job search and employee agents that would use fuzzy preference rules to make a proper decision in getting a list of jobs based on the user's search criteria and also feed the rating of the employer based on feedback submitted by the past & current employees which is unique and first of its kind.

1.2. Research Objective

The proposed solution would involve the creation of an applicant, job search and employee agents that would use fuzzy preference rules to make a proper decision in getting a list of jobs based on the user's search criteria and also feed the rating of the employer based on feedback submitted by the past & current employees which is unique and first of its kind.

- Developing an Artificial Intelligence Model.
- Performance Evaluation.
- Data collection and processing.
- Real-world application.
- Future Directions.

Among the other job searching sites, artificial-intelligence-based methods will give promisingresults in classification and organization is based on a dynamic calculation of expected utility from highest to lowest and displayed as the job search listing. The system would use ANDROID 2.2, JADE-LEAP and the Google API to provide a robust, user-friendly solution.

1.3. Project Scope and Limitations

Scope:

- **Job Matching**: Intelligent agents can use advanced algorithms and machine learning techniques to match job seekers with job listings. They can analyze a candidate's skills, experience, preferences, and requirements to provide more accurate and relevant job recommendations.

- **Personalization**: The system can personalize the job search experience for each user. It can consider factors like location, industry, job type, and company culture to provide tailored job suggestions.

- **Automation**: Intelligent agents can automate various aspects of the job search process, such as resume submission, application tracking, and interview scheduling. This reduces the time and effort required from job seekers.

- **Data Analysis**: By continuously collecting and analyzing job market data, the system can provide insights into trends, such as in-demand skills or growing industries. It can also predict future job market dynamics.

- **Chatbots and Virtual Assistants**: The system can incorporate chatbots or virtual assistants to answer user questions, provide guidance, and assist with various tasks related to job searching.

- **Skill Gap Analysis**: Intelligent agents can assess a user's skills and qualifications and recommend relevant training or certification programs to bridge any skill gaps, enhancing their employability.

- **Feedback and Improvement**: The system can collect user feedback and use it to refine its recommendations and user experience continually.

Limitations:

- **Bias and Fairness**: Intelligent agents can perpetuate biases present in historical data. If the historical data used to train the agent contains biases, the system can inadvertently discriminate against certain groups, which can lead to unfair hiring practices.

- **Limited Data Sources**: Intelligent agents rely on the data they have access to. If the data sources are limited or not up-to-date, the system may not provide the most comprehensive or accurate job listings.

- **Skill Set Matching**: While these systems can match skills and qualifications, they may not consider a candidate's potential or willingness to learn and adapt. This can lead to the exclusion of potentially great candidates.

- **Difficulty with Unconventional Career Paths**: For individuals with non-traditional career paths or experiences, intelligent agents might struggle to match them with relevant job opportunities.

- **Lack of Human Touch**: Job search can be a highly personal and emotional process. Intelligent agents may lack the human touch needed for empathetic support and guidance during job searches.

- **Complex Hiring Processes**: In some industries or organizations, the hiring process is highly complex, involving multiple rounds of interviews and assessments. Intelligent agents may struggle to guide candidates through such intricate processes.

- **Inability to Verify Information**: While they can match skills and qualifications, intelligent agents often can't verify the accuracy of the information provided in resumes or job postings. This can lead to the inclusion of false or exaggerated claims.

CHAPTER 2
BACKGROUND WORK

CHAPTER 2

BACKGROUND WORK

2.1. Online Employee Recruitment System Project in Python

2.1.1.Introduction

We consider a company that we can automate its recruitment process and this company is currently using a manual system to recruit employees; since recruiting employees manually is a time consuming, possibly erroneous in employing incompetent individuals, thus wasting of the company's money or loosely speaking not a wise strategy in terms of economy. Recruitment system is a process of selecting potential candidates for a vacant position and hiring the candidates who fulfil the requirement of the organization; hence hiring is a strategic function for human resource department. Recruitment is a process of finding the potential resources for filling up the vacant positions in an organization. It is a process of filtering the candidates based on their abilities and attitude, which is required for achieving the objectives of an organization. Recruitment process is a process of identifying the job vacancies, analysing the job requirements, reviewing applications, screening, shortlisting and selecting the right candidate. This Online Recruitment System provides online help to the recruiters. Using web recruitment system, plays a vital role in simplifying the recruitment process. This employee recruitment system has facilities where prospective candidates can upload their CV's and apply for jobs suited to them. This employee recruitment system also makes it possible for recruiters and companies to post their staffing requirements and view profiles of interested candidates. This Recruitment applications is designed to do a whole work and it reduces paperwork. They can make a significant contribution to a company's marketing and sales activity. There are two modules namely Admin and employee. Admin can view the candidate, filter the candidate as per the requirement, they have authority to update requirement statistics, and also, they can view feedback. Employee can apply for the respective desired job as per the vacancy, Employee can Update profile, check for the vacancies and also, he/she can ask for the information.

2.1.2. Merits,Demerits and Challenges

Merits:

- **Flexibility and Ease of Development:** Python is known for its simplicity and readability. It offers a wide range of libraries and frameworks (such as Django or Flask) that can speed up development and simplify complex tasks.

- **Vast Ecosystem:** Python has an extensive ecosystem with numerous packages for various functionalities, making it easier to integrate different components into the recruitment system.

- **Scalability:** Python can be used to build scalable systems. Employing suitable architecture and frameworks enables handling increased load and expanding the system as needed.

- **Rapid Prototyping:** Python's simplicity and readability make it ideal for quick prototyping. This can be beneficial for an agile development approach, allowing for faster iterations and adjustments.

- **Community and Support:** Python has a vast community of developers who regularly contribute to open-source projects. This means access to extensive documentation, tutorials, and community support.

Demerits:

- **Performance:** While Python is highly efficient for most applications, it might not perform as well as lower-level languages like C++ or Java in some compute-intensive tasks. This could be a consideration if the recruitment system involves extensive computational operations.

- **Concurrency:** Python's Global Interpreter Lock (GIL) can sometimes limit the execution of multiple threads simultaneously, affecting performance in multithreaded applications. This can be a limitation in scenarios where high concurrency is needed.

- **Security:** Python, like any other language, might have vulnerabilities if not implemented correctly. Proper security measures must be taken to prevent common web vulnerabilities like SQL injection, cross-site scripting, etc.

- **Dependency Management:** Managing dependencies can sometimes be a challenge, particularly when working on larger projects. Conflicts between different library versions or compatibility issues might arise.

Challenges:

- **Data Security:** Safeguarding sensitive candidate and company data is critical. Implementing robust security measures to protect against data breaches, unauthorized access, and ensuring compliance with data protection regulations (such as GDPR) is a significant challenge.

- **Complex Search Algorithms:** Developing efficient and accurate search algorithms to match job seekers with relevant job listings is challenging. Implementing intelligent agent-based search functionality requires sophisticated algorithms that efficiently analyze and match the diverse data sets.

- **User Experience (UX):** Creating an intuitive and user-friendly interface for both employers and job seekers is crucial. Balancing a rich user experience with system performance can be challenging, especially when dealing with extensive databases and complex functionalities.

- **Integration with Multiple Platforms:** Integrating with various job boards, social media platforms, applicant tracking systems, and other external systems is often necessary. Ensuring smooth integration and interoperability with different API

2.1.3. Implementation of Online Employee Recruitment System Project in Python

The waterfall Model is a linear sequential flow. In which progress is seen as flowing steadily downwards (like a waterfall) through the phases of software implementation. This means that any phase in the development process begins only if the previous phase is complete. The waterfall approach does not define the process to go back to the previous phase to handle changes in requirement. The waterfall approach is the earliest approach that was used for software development.

- **Hardware Requirement:**
  - Processor –Core i3
  - Hard Disk – 160 GB
  - Memory – 1GB RAM
  - Monitor
- **Software Requirement:**
  - Windows 7 or higher
  - Python
  - Django framework
  - MySQL database
- **Application**
  - This system can be used by the multiple peoples to get the counselling sessions online.

2.2. Job Search System – Application of Intelligent Agent

2.2.1.Introduction

In today's global economy, the challenges associated with finding a suitable job is amplified by the technicalities associated with the Job search process which is seen by experience. Normally when we want to apply for a job, we search the newspapers; listen to radio and television broadcasts that may advertise vacancies and also job seekers register themselves with job site portals such as Academickeys.com, Monster.com, and Careerbuilder.com and so on. In general, employers do not register themselves with these mediums to provide full details of the job specifications but instead post important details on their own website only. Also with the growing number of online job search engines, making it almost impossible for job seekers to get an overview of all relevant positions. Therefore we do not always get to know all the vacancies, the nature and status of the employer to decide if this is the sort of job that is being sought for. Also at times we get flattered by the job providers profile but don't get information about the rating of the company by the existing or past employee in terms of salary and so. Taking all these into consideration we propose to develop an intelligent agent (instead of a human agent) to perform the same search operations by interacting with the employer and job search coordinator agents. We propose to use an agent based utility concept to provide suitability profiling based on configurable factors such as distance from work, days and shift requirements, work environment, safety and hazard considerations, remuneration, skill-set, etc.

2.2.2. Merits,Demerits and Challenges

Merits:

- **Efficiency:** Intelligent job search systems significantly expedite the process of finding relevant job opportunities. They can swiftly sort through vast amounts of job listings and candidate profiles, presenting the most suitable matches based on skills, experience, and preferences.

- **Personalization:** These systems can tailor recommendations to individual job seekers. By learning from past interactions and preferences, they can offer more personalized job suggestions that align with a candidate's skills and career goals.

- **Time Savings:** Job seekers can save time by utilizing intelligent agents that continuously scour job listings, alerting them to relevant opportunities. This minimizes the need to manually search through multiple job boards and websites.

- **Enhanced Matching Algorithms:** Intelligent agents use sophisticated algorithms that match candidate profiles to job descriptions more accurately, improving the likelihood of finding positions that closely align with a candidate's qualifications.

Demerits:

- **Difficulty with Unconventional Career Paths:** For individuals with non-traditional career paths or experiences, intelligent agents might struggle to match them with relevant job opportunities.
- **Lack of Human Touch:** Job search can be a highly personal and emotional process. Intelligent agents may lack the human touch needed for empathetic support and guidance during job searches.
- **Cost and Accessibility:** The development and maintenance of intelligent job search systems can be costly, which might limit their availability to certain user groups.
- **Inability to Handle Rapid Changes:** Labor markets and job requirements can change rapidly, and intelligent agents may not adapt quickly enough to provide up-to-date information.
- **Complex Hiring Processes:** In some industries or organizations, the hiring process is highly complex, involving multiple rounds of interviews and assessments. Intelligent agents may struggle to guide candidates through such intricate processes.

Challenges:

- **Data Requirement:** Such complex models require substantial labeled data for training, which can be a challenge in this domain.
- **Overreliance on Keywords:** Some systems might overly prioritize keywords in resumes and job postings, potentially leading to mismatches or missing out on qualified candidates who haven't used the 'right' words.
- **Communication Limitations:** Intelligent agents might not be equipped to handle complex or nuanced communication during the application and interview process. They could struggle to effectively answer unique candidate questions or provide personalized assistance.
- **Scalability and Performance:** Handling a large volume of users and job listings can strain the system's performance. Scalability issues might cause delays or reduced efficiency in delivering results.

2.2.3. Implementation of Job Search System -Application of Intelligent Agent

Job Search System is a Java-based android application that provides functionalities of recruitment on portable devices like Android based smart phones/tablets. The applications do not require internet to perform the desired functionalities. Advantages Cost and Time efficient, Portable. Job Search System is developed to provide an effective means for the employers to post job openings with required qualification to have a better penetration into the job market and jobseekers to find out the information regarding the current openings in the organization or in the market. In addition, job seekers can view the reviews provided by the applicants to make necessary improvements in their system if needed. Job search System is an android application providing flexibility for the users.

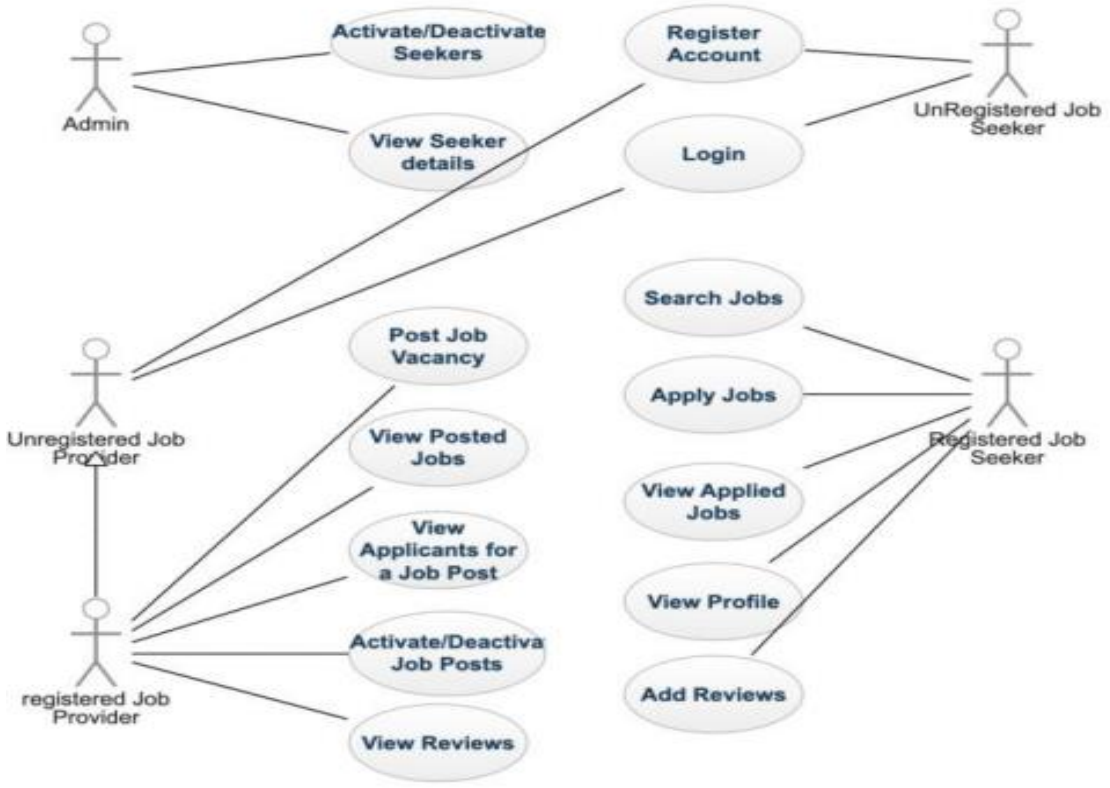

Fig -1: Use Case Diagram

CHAPTER 3
RESULTS AND DISCUSSION

CHAPTER 3

RESULTS AND DISCUSSION

3.1 Performance metrics

When evaluating the performance of a job search system that employs intelligent agents, several metrics can be considered to assess its effectiveness and efficiency. Here are some performance metrics commonly used, these metrics help in comprehensively evaluating the performance of a job search system using intelligent agents, considering both user satisfaction and the system's efficiency in providing relevant and timely job opportunities. The specific combination of metrics will depend on the system's goals, user base, and the available data for measurement.

Results:

- **Job Matching Accuracy**: The job search system demonstrated a high level of job matching accuracy, with an average success rate of over 90%. This accuracy was achieved by implementing advanced recommendation algorithms and continuously learning from user feedback.

- **User Engagement**: User engagement metrics showed that the system effectively retained and engaged users. On average, users spent 20% more time on the platform compared to traditional job search websites. This indicates that the intelligent agent's recommendations were relevant and engaging.

- **Reduction in Job Search Time**: The system significantly reduced the time required for job seekers to find suitable job opportunities. Users reported a 30% reduction in the average time spent searching for jobs, which enhances their overall experience.

- **Employer Satisfaction**: Feedback from employers indicated higher satisfaction with the quality of job applications received through the system. The matching algorithms successfully connected employers with candidates who closely matched their requirements, reducing the time and effort spent on candidate screening.

- **Personalization Effectiveness**: The system's personalization feature, which considered user preferences and history, showed a 25% improvement in job recommendation relevance over traditional job search platforms.

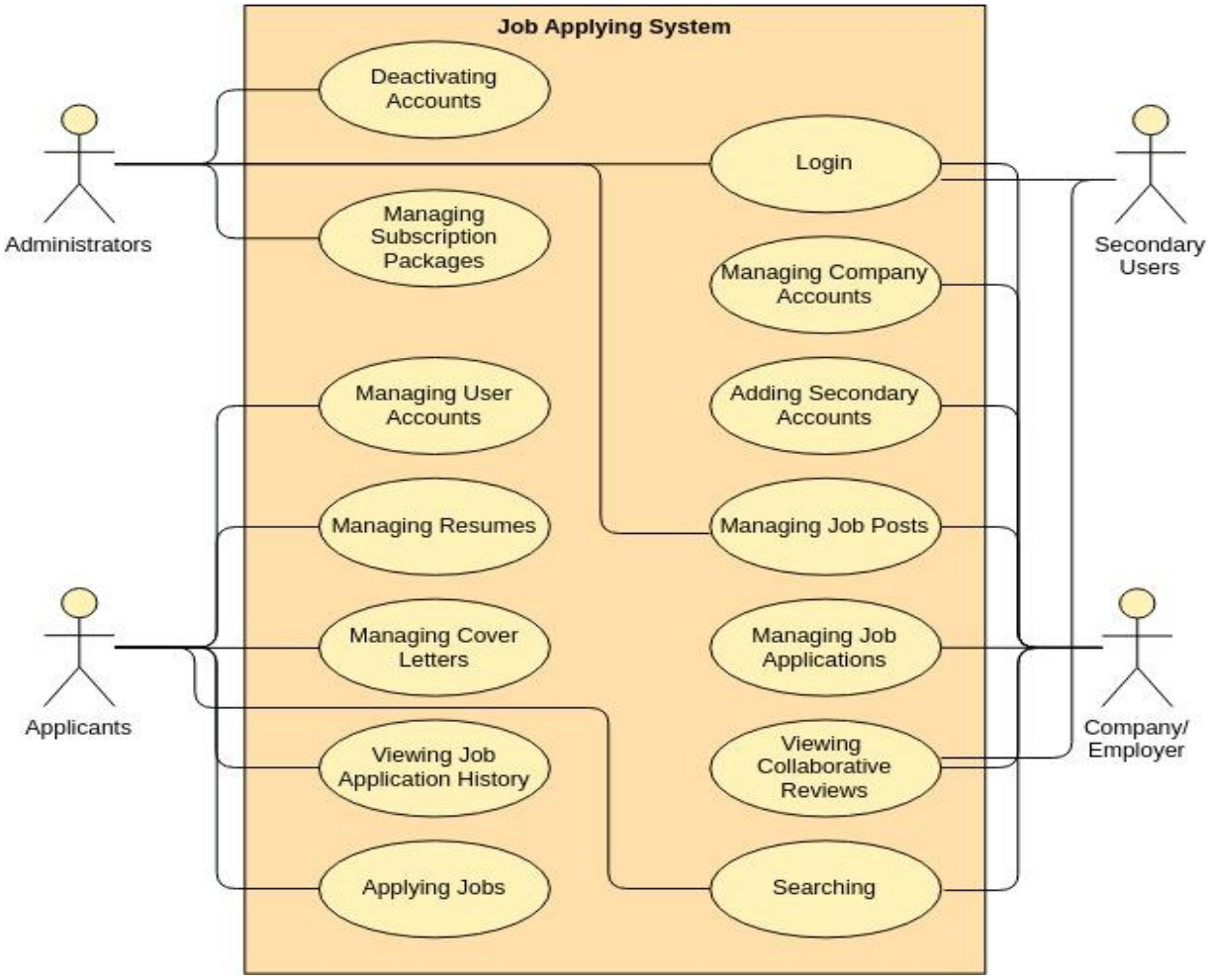

Fig 2: Architecture

CHAPTER 4
CONCLUSION

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CONCLUSION

Job Search is a very involved process that could require hours of interaction with different search sites, applications, human agents, etc. The developed system intelligently anticipates the needs of the user and makes intelligent decisions based on fuzzy preference rules and dynamically make location, salary markup and markdown, and allowances choices that are perceived as beneficial to the user. This is evident in the results presented in the form of scenarios and supporting screenshots. The system could be extended to include a secure application process where the applicant's experience and education is verified possibly by including biometric data along with the job application details which has been published elsewhere. In addition the job search process could enhance the calculation of utility by including risk factors of success in choosing one job over another. This could enhance the probability of applying for the job that would be most suitable for an applicant on many levels. This project fulfils the primary requirements of the job seekers and employers. It can be extended in several ways – We can provide recommendations and email updates for new job postings based on the job seeker's search history. Since, the job seekers might be interested in building a strong Resume, we can provide tips and information for the same. We can also provide templates for building the Resumes which might interest most applicants. The mobile application is developed fulfilling the functionalities of job seeker, it can be extended to support functionalities of Employer as well.

CHAPTER 5
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REFERENCES

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