



EELU

GRADUATION PROJECT 2024

Job Recommendation Web application.



presentation content:

1-INTRODUCTION.

2-STAKEHOLDERS.

3-PROBLEM DEFINITION & BACKGROUND

4-SCOPE.

5-COMPETITORS.

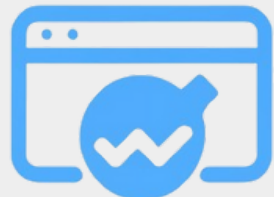
6-USER REQUIREMENTS.

7-DIAGRAMS.

8-IMPLEMENTATION.

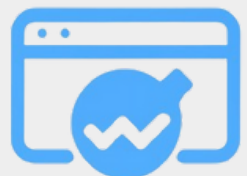
9-TESTING.

10-FUTURE WORK.



1-Introduction

At the forefront of this technological revolution stands the job recommendation system – a sophisticated platform empowered by artificial intelligence (AI) and machine learning algorithms. By leveraging the vast troves of data available in the job market, including user profiles, job listings, and historical interactions, the job recommendation system employs advanced analytics to generate tailored job recommendations that match the skills, experience, and preferences of individual users.



2-Stakeholders:

1)JOB SEEKERS

***ROLE:**INDIVIDUALS ACTIVELY SEEKING EMPLOYMENT OR STUDENTS THAT WANT TRAINING...

***INTERESTS:**EFFICIENT JOB MATCHING, PERSONALIZED RECOMMENDATIONS.

2)EMPLOYERS/RECRUITERS

***ROLE:**ENTITIES RESPONSIBLE FOR HIRING EMPLOYEES.

***INTERESTS:**ACCESS TO A POOL OF QUALIFIED CANDIDATES, EFFICIENT RECRUITMENT PROCESSES
EFFECTIVE FILTERING MECHANISMS

3)COMPANY ADMINISTRATORS

***ROLE:**INDIVIDUALS RESPONSIBLE FOR COMPANY PAGE MAINTENANCE, UPDATES, AND MONITORING.

***INTERESTS:**•CONTROLLING OF COMPANY PROFILE PAGE.



3-problem definition & Background:

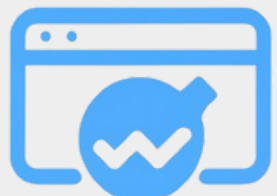
1) Challenges and Pain Points:

-The traditional job search process is often overloaded and inefficient for both job seekers. Job seekers find it hard to find relevant job opportunities in a sea of listings, while employers face challenges in attracting qualified candidates.

1.Information Overload

2.Lack of Personalization:

3.Inefficient Matching Process:



4-Scope:



1) Objectives:

- 1-Efficient Job Matching.
- 2-Enhanced User Experience.
- 3.Personalization.



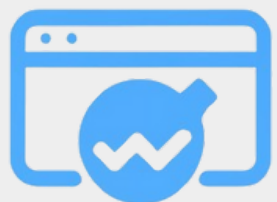
2)Inclusions:

- 1-User Registration and Authentication.
- 2-Profile Management.
- 3-Job Recommendation Engine.
- 4-Application and Recruitment Workflow.
- 5-User Feedback Mechanism.



3)Exclusions:

- 1-Job Placement Services.
- 2-Semantic analysis.
- 3-Background Checks .

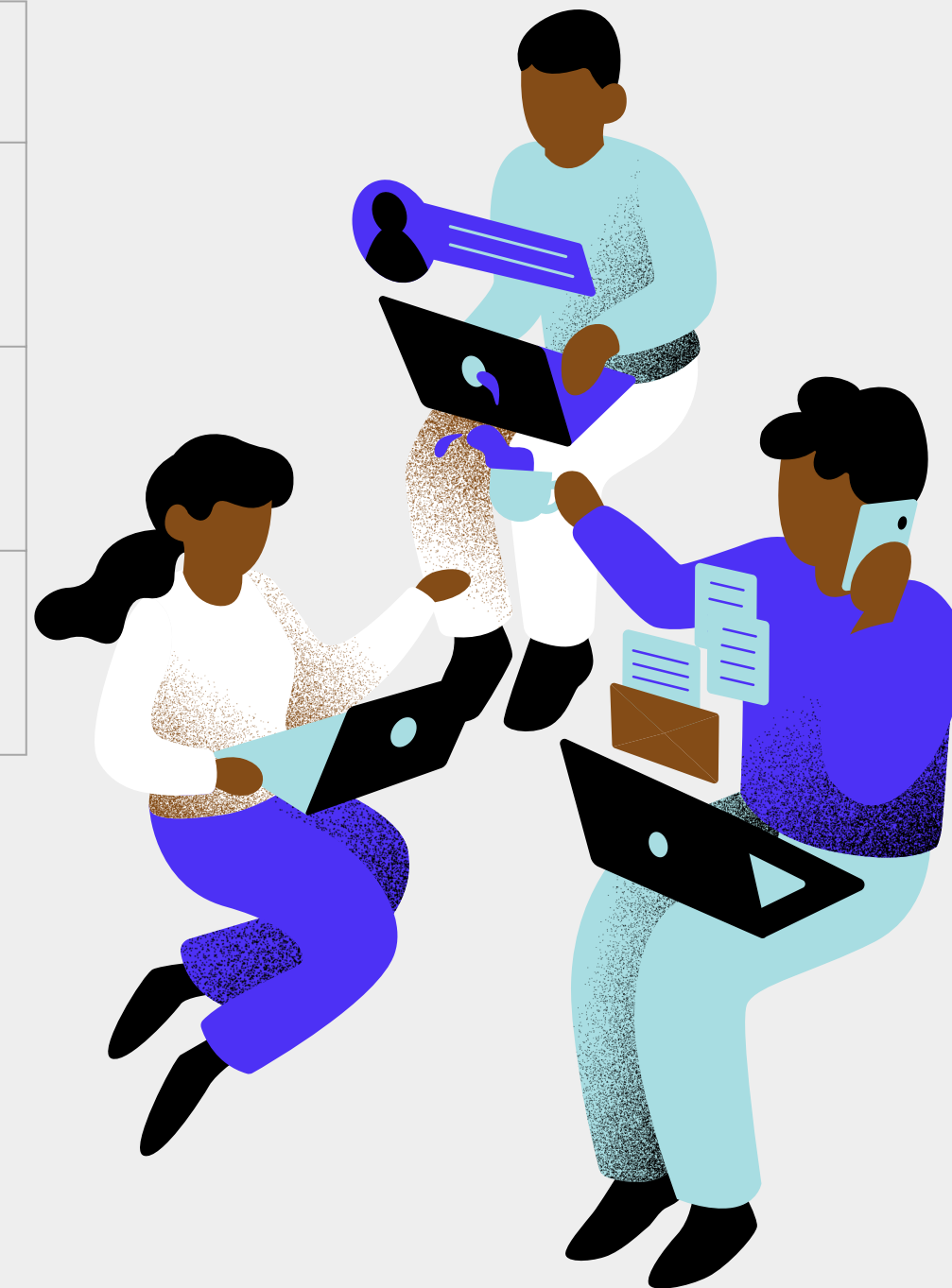


5-Competitors:

Disadvantages of competitors	Our solutions
-Indeed.com : Do not provide specific information about companies.	-Each company has company profile that contains its all posted jobs and all fields that company support.
-Bayt.com : Does not explain job requirements.	-The response of each recommendation request contains explained job requirements.
-Monster.co.uk: Jobs are not updated on an ongoing basis	-Each company employer can update jobs required in any post.

6-User Requirements :

user	Functions
Job Seekers	-Login , Profiles , Job search , Request Recommend , Security , Application Submission ,Application management .
Employers	-Login , Profiles , Job Posting , Candidate matching, submitted application manage ,Security.
Company Administrator	-Employer Management, content management , Field Management, Job posting.





7-Diagrams (Sequence Diagrams)

1-REGISTRATION

2-LONG

3-JOB SEARCH

4-MAKE A POST

5-APPLICATION SUBMISSION

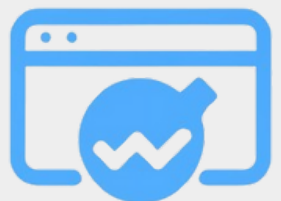
6-APPLICATION MANAGEMENT

7-CREATE EMPLOYER

8-FIELDS MANAEGEMENT

9-FEEDBACK

10-REQUEST RECOMMENDATION





8-Implementation

8.1-Technologies used :

-PROGRAMMING LANGUAGES USED:

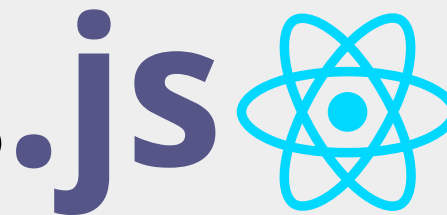
-JAVA FOR BACK-END:



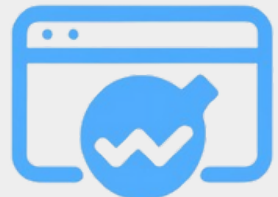
-PYTHON FOR AI AND MACHIN LEARNING



-JAVASCRIPT FOR FRONT-END



--DATABASE USED:MYSQL



8.2-Hardware and Software Requirements :

- **THE BACKEND (DATABASE SERVER):** THE DATABASE SERVER IS PREFERABLY A COMPUTER WITH THE PROCESSOR SPEED OF 2.0 GHZ (RECOMMENDED), 8GB OR HIGHER RAM, 70 GB OR HIGHER STORAGE SPACE DEPENDING ON THE COMPANY'S DATA STORAGE REQUIREMENTS.
- **THE APPLICATION SERVER (WEB SERVER) :** IT IS OBSERVED THAT THE PERFORMANCE OF THE WEB SERVER IS ONE OF THE MOST VITAL FACTORS PERTAINING TO THE SPEED OF THE SYSTEM. THEREFORE, A PROCESSOR (3.0 GHZ), 8GB OR HIGHER RAM, 30 GB OR MORE FREE HARD DISK CAPACITY.
- **CLIENT:** ALL THAT IS NEEDED BY THE CLIENT SIDE IS A COMPUTER THAT CAN RUN ANY STANDARD JAVASCRIPT ENABLED WEB BROWSER (PREFERABLY GOOGLE® CHROME) AND ACCESS TO INFORMATION SUPERHIGHWAY AT A MINIMUM RATE OF 1MBPS. NEVERTHELESS, THE MORE THE PERFORMANCES OF THE COMPUTER AND THE NETWORK BANDWIDTH, THE FASTER THE SYSTEM PROCESSES AS IT WOULD BE.

8.3-Back-end jobseeker functionality :

- **MAIN PACKAGES:**
 - DTO, CONTROLLER, SERVICE, REPOSITORY
 - **FEATURES:** PROFILE, QUALIFICATION, REQUESTS, SKILL
- **CONTROLLER PACKAGE:**
 - [GITHUB LINK \(INCLUDE REST CONTROLLER ENDPOINTS\)](#)
 - **FUNCTIONS:**
 - [JOBSEEKERRESTCONTROLLER.JAVA:](#)
 - SAVE SKILLS AND QUALIFICATIONS (POST)
 - UPDATE PROFILE (PUT)
 - APPLY FOR JOB (POST)
 - FIND ALL APPLICATIONS (GET)
- **SERVICE PACKAGE:**
 - **SERVICES:**
 - [JOBSEEKERSERVICEINTERFACE.JAVA](#)
 - [JOBSEEKERSERVICE.JAVA \(INCLUDES FIRST MATCH ALGORITHM\)](#)
 - [JOBSEEKERREPOSITORY.JAVA \(JPA REPOSITORY\)](#)

•

8.4-Back-end jobSeeker job matching Algorithm :

- **Algorithm Overview:**

- **Function:**

- `getPostsWithSkillsOnPublic(Long jobSeekerId)`

- **Main Steps:**

- a. **Fetching Job Seekers and Their Skills:**

- Find job seeker entity by ID.
 - Retrieve skills and qualifications using service.

- b. **Processing Posts:**

- Fetch posts matching job seeker's skills.
 - Filter posts based on job seeker's criteria.

- c. **Calculating Scores and Filtering:**

- Calculate score for each post based on skill match.
 - Categorize posts as matched or unmatched.

- d. **Sorting Posts:**

- Sort posts based on match quality.
 - Prioritize posts with more matches and fewer remaining skills.
 - Use a comparator for sorting logic.


- e. **Handling Duplicates:**

- Remove duplicate posts to avoid redundancy.

- f. **Returning Results:**

- Return a list of unique posts with scores and match statuses.
 - Include percentage of match in the results.

8.5- job matching after login:

 **JOBSHOP**

Home

Recommend me

Notifications


Lists

Profile


More

ADD SKILLS

SHOW APPLICATIONS

 Mohamed Ehab

LOGOUT

 Employer 1 @software_company

APPLY WITH (100%)

Title: Software Development

Description: We are seeking a talented and motivated Software Developer to join our growing team. In this role, you will be responsible for designing, developing, and maintaining software applications. You will collaborate with cross-functional teams to deliver high-quality products that meet our clients' needs.


Job Requirements: Develop and maintain software applications using [specific technologies, e.g., Java, Python, C#] Collaborate with product managers, designers, and other developers to understand requirements and deliver solutions Write clean, scalable, and efficient code Perform code reviews and provide constructive...



Filter Accounts



8.6-Apply for matched Jobs with more than 50% only:

JOB SHOP

Home

Recommend me

Notifications


Lists

Profile

More

ADD SKILLS


SHOW APPLICATIONS

Mohamed Ehab Rabea
@ehab75227@gmail.com

LOGOUT

JOB POSTS

YOUR POSTS

Mohamed Mahmoud @software_a

Title: Android framework


Description: English Talk must be good ,C# Developer , Set plans to meet those goals ,Maintaining project timeframe reports ,Experience in Scrum, DevOps, CI/CD Help in leading Architecture skills

Job Requirements: English Talk must be good ,C# Developer with plans to meet those goals ,Maintaining project timeframe reports ,Experience in Scrum, DevOps, CI/CD Help in leading Architecture skills

Experience: 1-2 Years

Location: Egypt/Alfayoum

Employer: [Redacted]

Matched Skills: 

- Application Development

- Database Administration

- Python (Programming Language)

- JavaScript

- PHP

- Android SDK

- AJAX

✕ Apply for this job

SAVE

Job Seeker skills that match the post skills

** skills for apply :

- Application Development

- Database Administration

- Python (Programming Language)

- JavaScript

- PHP

- Android SDK

- AJAX

Job Seeker Skills which not in the post

C (PROGRAMMING LANGUAGE)

ASP.NET CORE

ASP.NET

.NET FRAMEWORK

.NET CORE

** Qualifications for apply :

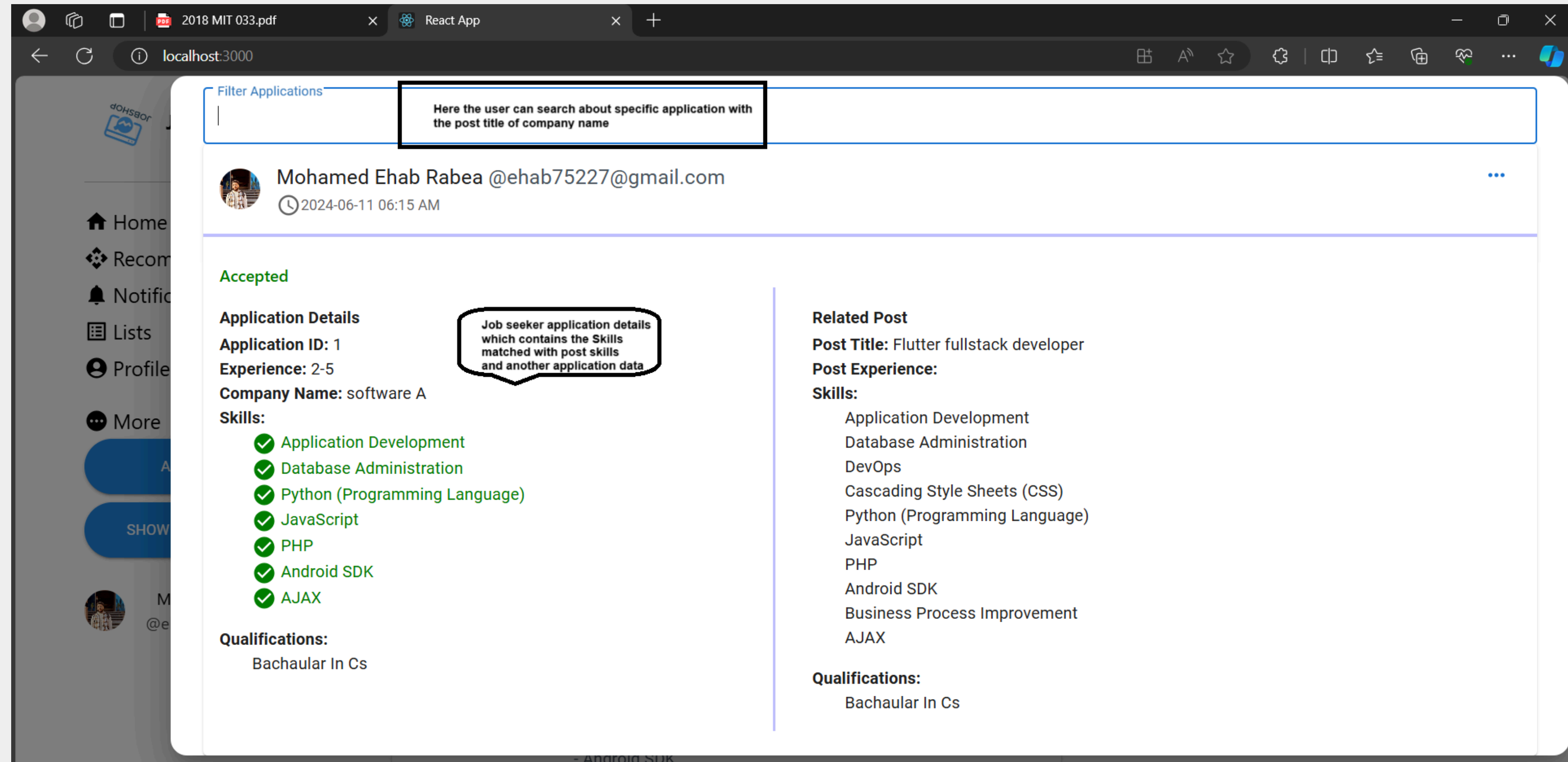
- Bachaular In Cs

Years of experience in this field of job

Experience

2-5

-Show Applications



-Filter Posts.

- A jobseeker can filter job posts using the following criteria:

1. Specific field only.
2. Job title only.
3. Location only.
4. Employment type only.
5. Any combination of the above filters.
6. Specific filters combined with other filters.

The screenshot displays a job application interface. On the left is a sidebar for a user named Mohamed Ehab, with options like Home, Recommend me, Notifications, Lists, Profile, and More. It also features 'ADD SKILLS' and 'SHOW APPLICATIONS' buttons, and a 'LOGOUT' link. The main area shows a job post from 'Employer 1 @software_company' for a 'Cybersecurity' role. The job description and requirements are listed. Below this, there are filters for 'Experience: 1-2 Years', 'Location: Egypt', and 'Employment Type'. A progress bar indicates the user's progress. At the bottom, there are sections for 'Matched Skills' (with a green checkmark) and 'Missed Skills' (with a red exclamation mark). The 'Matched Skills' include certifications like CISSP, CISM, and CompTIA Security+, as well as experience with cloud security and effective communication. The 'Missed Skills' include familiarity with incident response procedures and forensic analysis, understanding of regulatory compliance requirements, and specific cloud security experience. On the right, there is a 'Filter Accounts' section with a search bar, a 'Filter Fields' dropdown, and a 'Filter Accounts' dropdown. Below this, there are input fields for 'Title' and 'Select a location'. At the bottom right, there is a toggle for 'Employment Type : Remote' and a 'SUBMIT' button.

JOBSHOP

Home
Recommend me
Notifications
Lists
Profile
More

ADD SKILLS

SHOW APPLICATIONS

Mohamed Ehab
LOGOUT

Employer 1 @software_company **APPLY WITH (50%)**

Title: Cypersecurity

Description: We are looking for a skilled Cybersecurity Analyst to join our dynamic team. In this role, you will play a crucial part in protecting our organization's information systems and networks from cyber threats. You will work closely with our IT teams to monitor security breaches, conduct investigations, ...

Job Requirements: Monitor and analyze security incidents and threats to our systems and networks Conduct vulnerability assessments and penetration testing Implement and maintain cybersecurity policies, procedures, and best practices Perform regular security audits and risk assessments Collaborate with IT teams to ens...

Experience: 1-2 Years Location: Egypt Employment Type

Matched Skills:

- Certifications such as CISSP, CISM, CompTIA Security+, CEH, etc.
- Experience with cloud security (AWS, Azure, Google Cloud)
- Effective communication skills and ability to explain complex technical issues to

Missed Skills:

- Familiarity with incident response procedures and forensic analysis
- Understanding of regulatory compliance requirements

Filter Accounts

Filter Fields

Information Technology

Title

Select a location

Employment Type : Remote

SUBMIT

8.7-Job Seeker Skill Matching with Machine Learning:

- **Main Steps:**

- a. **Data Preparation:**

- i. **Cleanup Function:**

- Tokenizes sentences, removes punctuation, converts to lowercase, and rejoins cleaned sentences.
 - Essential for text data preparation before machine learning.

- b. **Model Training:**

- Training and Saving the Model:
 - Reads data from a CSV file.
 - Encodes job titles into numerical labels.
 - Transforms skills into TF-IDF features.
 - Splits data into training and testing sets.
 - Trains a Random Forest classifier.
 - Evaluates the model and prints a classification report. (With accuracy 95%).
 - Saves the model, vectorizer, and label encoder to disk.

- c. **Model Deployment:**

- Saving and loading the trained model for future use.

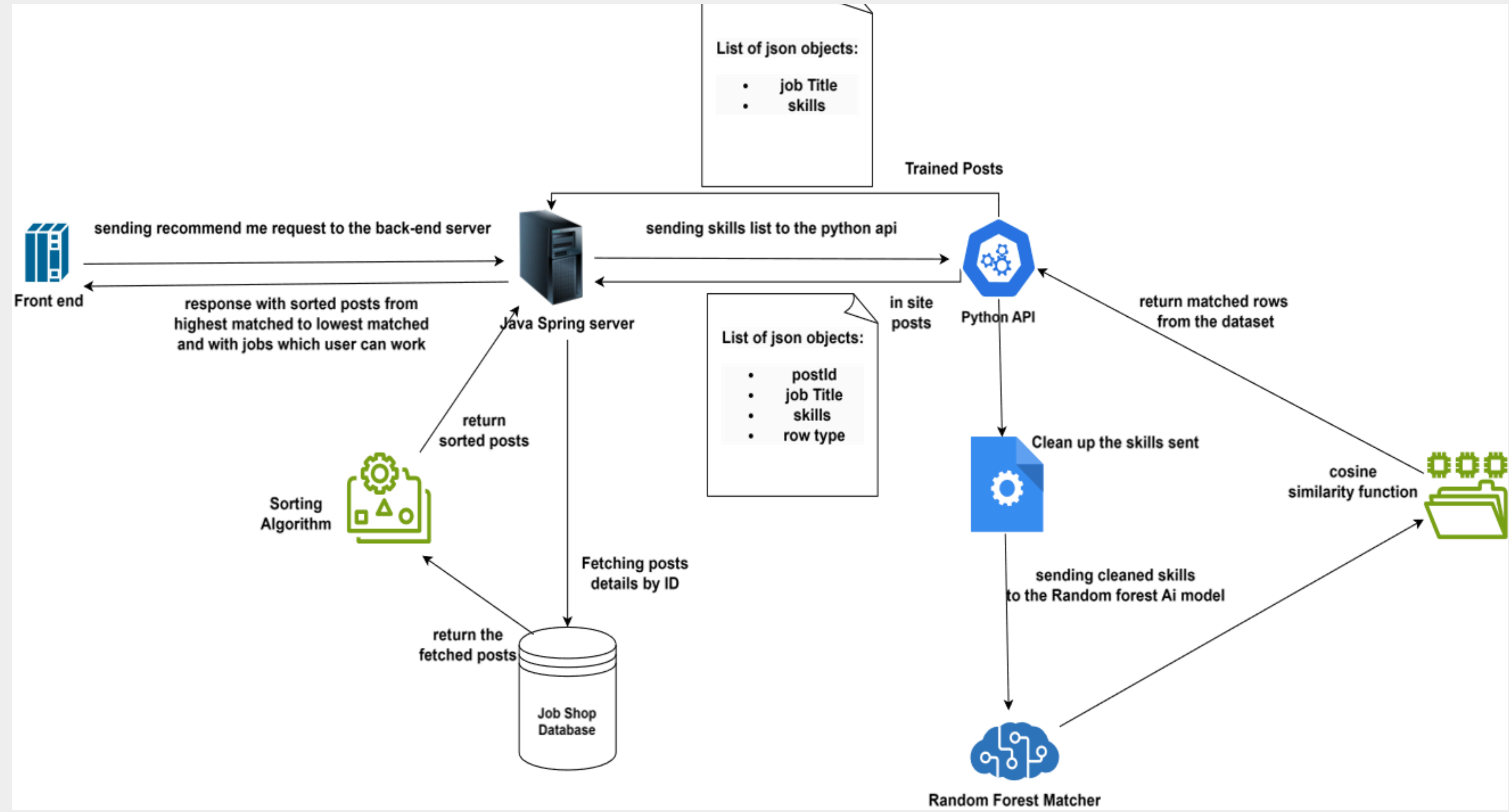
- d. **Skill Matching:**

- Uses cosine similarity to find relevant jobs based on user-provided skills.

- e. **API Integration:**

- Exposes the functionality via Flask API endpoints.

8.8 -> The integration between back-end and ai model:



8.9- Fetching and Sorting Matched Posts in the Job Recommendation System

- returning matched posts id which opened in the website from the dataset.
- fetching the posts from the database and pass the posts into the sorting algorithm which arrang from the best matched to the highest matched

Filter Skills

.NET Core X

.NET Framework X

AJAX X

Android SDK X

Application Development X

ASP.NET X

ASP.NET Core X

C# X

BUSINESS PROCESS IMPROVEMENT


C (PROGRAMMING LANGUAGE)

SUBMIT

Filter Posts

RECOMMENDED POSTS

RECOMMENDED JOBS



Mohamed Mahmoud

@software_a

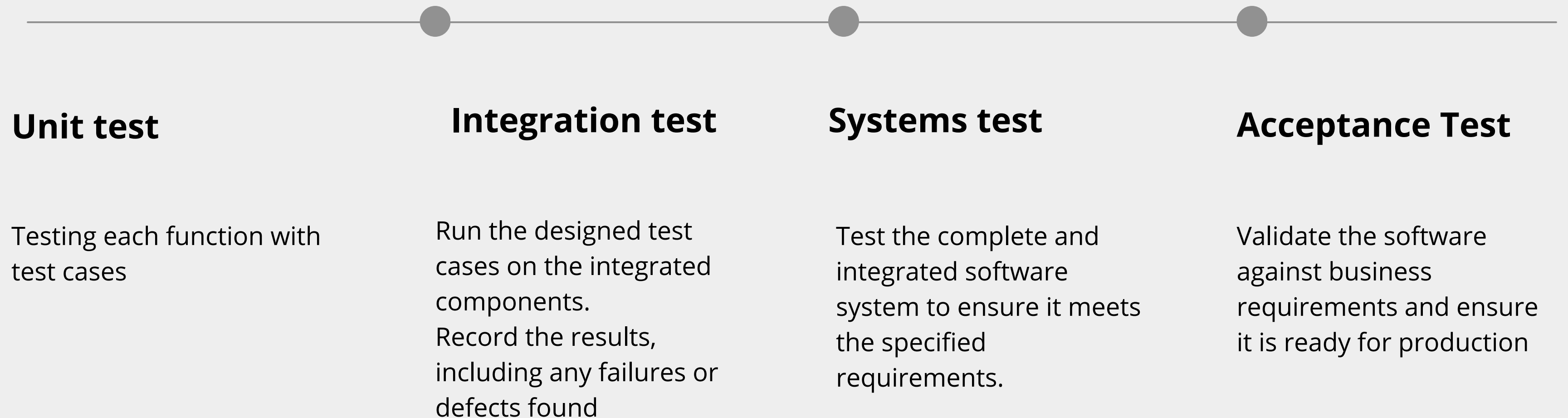
APPLY WITH (54%)

Title: test post

Description: post test

Job Requirements:

9. Testing



10 -> FUTURE WORK:

10.1- Development and IT Team User Requirements:

10.1.1 Web Application Management

- System Monitoring: Regularly monitor the web application for performance issues, security vulnerabilities, and uptime.
- Updates and Upgrades: Implement necessary updates to the web application framework, libraries, and dependencies to ensure the system remains secure and efficient.
- Backup and Recovery: Establish and maintain backup protocols and disaster recovery plans to prevent data loss.

10.1.2. Skills Formatting

- Standardization: Develop and maintain a standard format for skills input to ensure consistency across the system.
- Data Validation: Implement validation mechanisms to ensure that the skills entered by users adhere to the defined format.
- Enhancement: Continuously enhance the skill database with new and relevant skills based on industry trends and user feedback.

10.2- After making a Job Post Recommendation :

- **Objective:** Enhance the hiring process by automatically recommending the top ten matched job seekers after a job post submission.
- **Job Post Submission**
 - **Employer** submits job post.
 - **System captures job details:** Title, skills, experience, location, etc.
- **Matching Algorithm**
 - **Criteria Matching:** Compares job details with job seeker profiles.
 - **Analysis:** Evaluates skills, experience, and attributes.
 - **Ranking:** Job seekers ranked by match score.
- **Top Ten Recommendations**
 - **Selection:** Top ten job seekers with highest match scores are selected.
 - **Employer Notification:** List of recommended candidates sent to the employer.
 - **Candidate Summaries:** Profiles include key details (skills, experience, location).
- **Enhancing the Hiring Process**
 - **Immediate Access:** Employers get quick access to potential candidates.
 - **Improved Matching:** Higher quality matches improve hiring outcomes.
 - **Feedback Loop:** Employer feedback refines future matches.

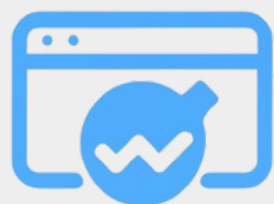
10.3- Job Seeker Automatic gmail Alert with matched job :

- **Objective:** Keep job seekers informed by automatically sending Gmail alerts with matched job postings.
- **Email Alert Generation**
 - **Selection of Matched Jobs:** Jobs with the highest match scores are selected for each job seeker.
 - **Email Template:** Pre-designed template includes job details and a call-to-action.
 - **Personalization:** Emails personalized with job seeker's name and relevant job information.
- **Sending Alerts**
 - **Automatic Dispatch:** System sends email alerts to job seekers via Gmail.
 - **Frequency:** Alerts can be sent daily, weekly, or as new matches are found.

10.4- Making a social media department :

- **User-Generated Posts:**
 - **Social Posts:** Users can create posts, sharing their experiences, job-related tips, or industry insights. These posts can include text, images, and videos.
 - **Notes:** For more private reflections or reminders, users can make posts visible only to themselves.
- **Engagement Mechanisms:**
 - **Likes:** Posts can receive likes from other users, providing feedback and encouragement.
 - **Followers:** Users can follow each other to stay updated with posts from professionals they admire or colleagues they want to keep in touch with.
- **Visibility Settings:**
 - **Public Posts:** Visible to all users, these posts can help users build a professional presence and share valuable content with the community.
 - **Follower-Only Posts:** These posts are restricted to followers, allowing users to share content within a trusted network.
 - **Private Notes:** Personal notes that are only visible to the user, useful for private reflections or reminders.
- **Content Sharing:**
 - **Multimedia Support:** Users can enrich their posts with images and videos, making the content more engaging and informative.
 - **Rich Text Editing:** Users can format their text, making it easier to highlight important information and improve readability.

Thank you!



JOBSHOP 2024