

JobMate: A Web Application for Resume and Job Application Improvement

Proposal

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Table of Contents

1.0: Introduction
1.1: Statement of Objectives
1.2: Plan to Progress Towards Objectives
2.0: Background
2.1: Current State-Of-The-Art Model
3.0: Description
4.0: Group Skills and Education, Relation of Project to Degree Program and Collective Skills
5.0: Methods and Relation of Methodology to Degree Program
6.0: Proposed Timetable and Milestones
7.0: Risks and Mitigation Strategies
8.0: Special Components and/or Facilities
9.0: References

1.0: Introduction

This document outlines the information required for 4th year project proposal. This proposal is structured to provide an in-depth insight into the JobMate project that Team 23 is working on this year.

1.1 Statement of Objectives

The aim of this project is to develop a web application that will act as a tool automate parts of the job search processes whilst being an excellent aid to users for improving their respective resumes in both structure and content. The application will accept user resume/cover letter and retrieve input from the user about certain information regarding the application processes. This information includes which of the many available job application websites the user would like to use, the field of employment they wish to search for, location, and level of seniority of the position. These choices will be made through radio buttons and will be easy to navigate through. Once the personalized options have been chosen for the user, the application will then perform back-end logic to retrieve jobs from multiple websites that match the criteria given by the user. With these jobs there will be an information section which will give details about the percent match of the resume and what skills were relevant enough for the match to occur.

For further improvements to the resume, the application will provide a list of certain jobs that could have been met by the users resume but fell short of the percent match threshold that was set. This way the user will be given an information section that explains what fields/skills can be added to the resume to improve their resumes to match more available jobs. Grammar checks will also be done through the application using backend external api's and the system will give a rating of the resume to the user with certain rules that resume should follow. We want this application to be the one stop shop for any user with the desire of improving their resume or currently seeking new employment opportunities.

1.2: Plan to progress towards objectives

Our team has opened a GitHub repository [4] which we will be using as our versioning and collaborating system. We have broken up the major features of the project into parts that have been assigned to each member correlating with the strengths/weaknesses of said team member. We have weekly meetings as a group with our supervisor in which we will be discussing our current progress, roadblocks, and any questions that may arise. Aside from this our team has also opened chat channels in Discord [5] and other messaging apps to have a constant flow of communication between team members. This way if any issues come up it is up to the team member to communicate it through our various modes of communication to find a solution. If a problem is not able to be resolved on our own we can then bring this issue to Dr. Lynn for any further feedback or suggestions. Each team member is responsible for developing readable and maintainable code with comments to allow for further improvements by other team members.

In terms of development, as a team we will begin a proof of concept to prove that the objectives are both obtainable and maintainable in a live web application environment. The POC will be a simple website that will fulfill the acceptance criteria. This is a reduced scope of work however it must still include all the major components such as resume parsing, job search according to fields, and resume improvement recommendations which will make this application unique and useful. The POC will prove the use of the proposed API's or headless chrome selenium scripts, back-end integration of databases, and other complex software components. To perform this POC we will use dummy resume's and job applications and prove out the concept.

For this project we will be following an Agile approach, in which we are going to be doing weekly meetings to discuss our progress. This is the approach we followed in our previous university projects and professional work environments.

In the case of one of the team members facing a issue that will affect the progress, will be offering to help with that issue to progress further in the project so no deadline is missed.

If there are any impediments holding the whole team back from progressing and no solution can be found online, refer back to our lectures and notes from previous classes and also consult Dr. Lynn Marshall for direct help.

The steps we are going to take when facing a problem are

- Define the problem
- Determine the effect on the overall progress of our project
- Brainstorm ideas individually and as a group
- Select the most reliable solution for now and the future
- Determine an action plan to implement the agreed upon solution

These steps have been agreed upon by all team members and are an important part of problem solving while doing a project of this size and complexity. We have been involved in team projects together as a team before and this has helped us to dissect big problems into smaller more manageable issues. In return this process will allow things to flow smoothly throughout the term whilst also saving time.

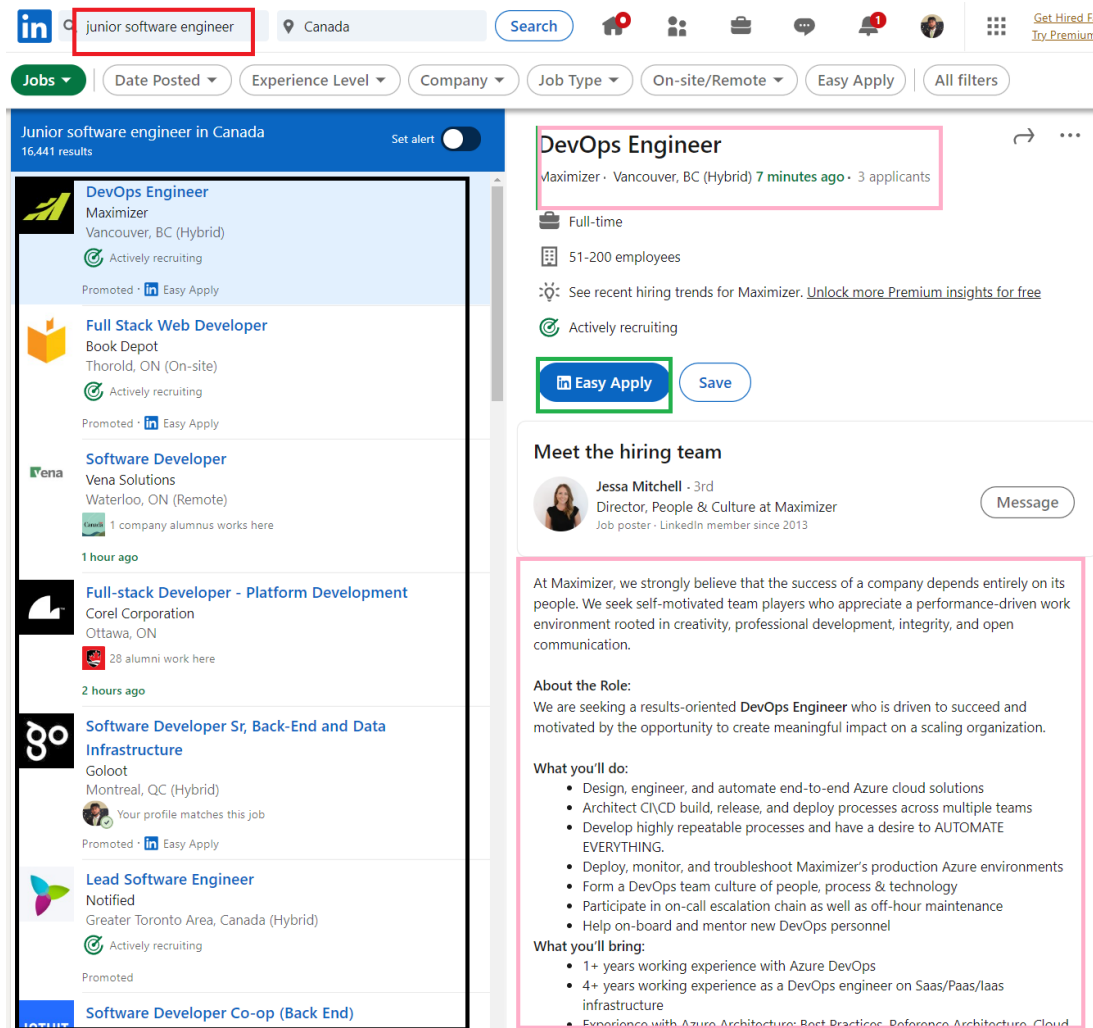
2.0: Background

The job search is a process that millions of people deal with every year. There are a wide range of applications and websites that people utilize in order to acquire a new position. In recent events of the Covid-19 pandemic a wide range of opportunities have opened up with new jobs that are accessible to people nation wide. The remote access of jobs has opened up the job market to people and to apply to these jobs the majority of applications are done through online job postings. Websites like Indeed [6], LinkedIn [7], Workopolis [8], etc. have seen a huge increase in traffic. These websites either directly accept user job application materials and send it to the companies or link the user to the company's internal job posting pages.

This process lacks the feedback that users need to improve their current resumes with keywords and experiences. A statistic from the popular company rating website. Glassdoor states that "On average, each corporate job offer attracts 250 resumes. The typical employer will then interview 4–6 candidates for the job, and only one will be successful." [1]. This means that it is crucial for applicants to thoroughly review their resume for any improvements in grammar, structure, and content. Many job application websites utilize a system called ATS short for Applicant Tracking System [9]. A Capterra statistic shows that "75% of recruiters and hiring professionals use a recruiting or applicant tracking system." [2]. This system is responsible for removing applications that don't match certain requirements in key words in documentation, format, or structure.

2.1: Current State-Of-The-Art Model

The current model as it stands allows users to create an account on the website i.e., LinkedIn, upload your resume, search, and apply for jobs. In the example below the process for applying to a job in LinkedIn is shown:

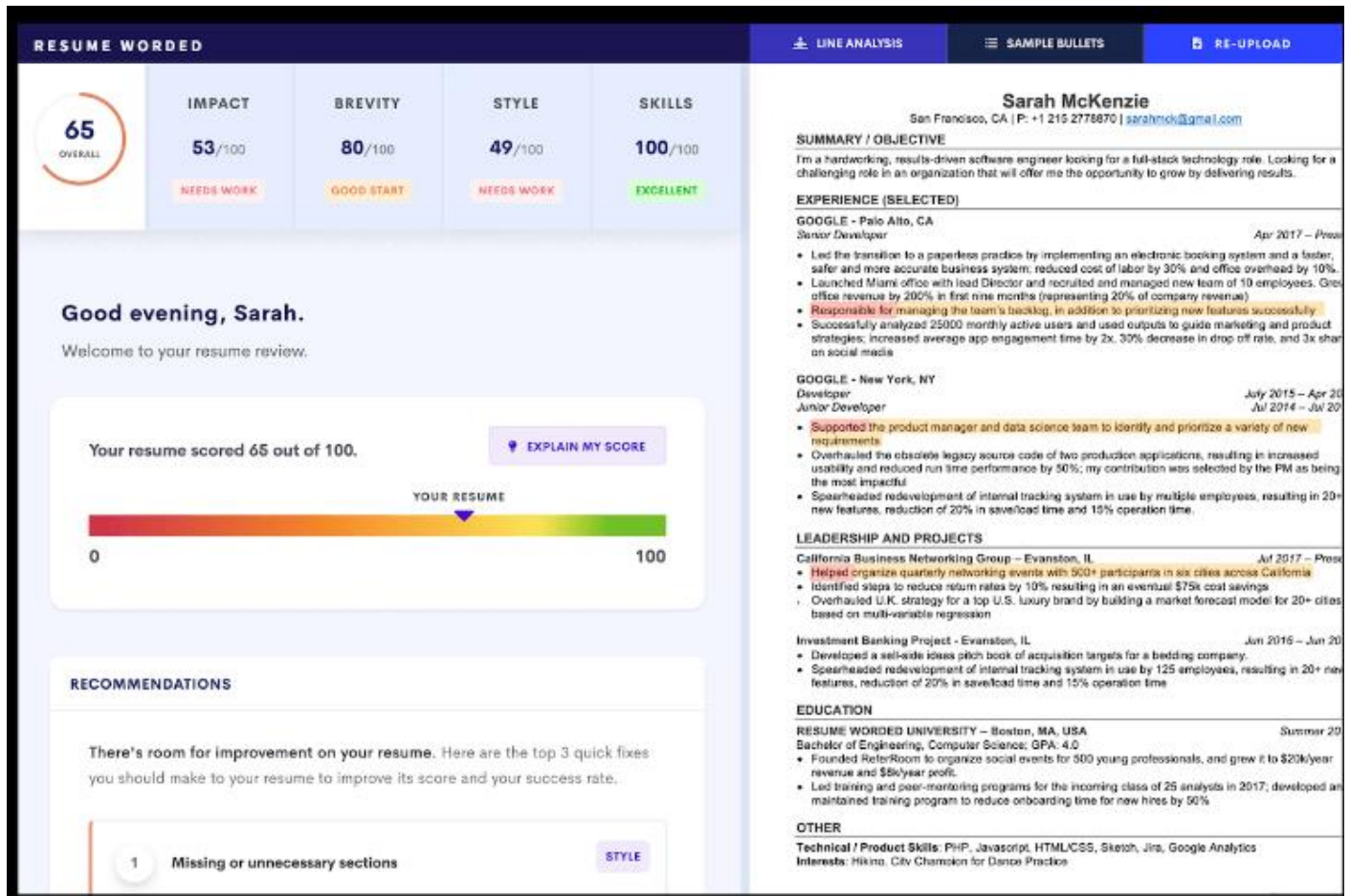


In the image above is a direct screenshot of what a user will see while applying for jobs on an online platform, in this case LinkedIn. In the red box, is a query made for junior software engineer postings with the location of the job right beside it. In the black box is the jobs that show up based on the search criteria given. In the Pink boxes is the current job posting that the user is on and the information about it such as job title, location, time of posting, # of applicants, and description. Finally, in the green box is the current job the user can apply to by hitting Easy Apply. This is already a very seamless process and has very little room for improvement thus making sense to utilize APIs offered by these companies instead of developing our own job posting webpage. If API's are not available we can develop our own python scripts or selenium web implementations

What this model lacks are the ability to offer any feedback and suggestions to the user on how well their resume has matched this job description, if these jobs are even relevant to the experience the user currently has,

what experience/skills the user would need to gain and add to the resume to meet the standards set by the job description, any grammar or structural flaws that may be present in the resumes.

There are also applications on the internet that rate resume's and provide feedback on the structure, formatting, and grammar of any inputted resume. An example of this would be resumeworded.com [10] as shown below.



Websites like these are great resources that are current state of the art for users to input their resumes and receive feedback on how to improve the document in grammar, format, and structure.

With all these given applications readily available both free and paid, there is a lack of cohesion of these services in to a one stop application that does all this. LinkedIn does not provide meaningful feedback on the resume, while websites like resumeworded.com do not provide feedback based on the actual jobs that are available on the market at the given moment. The feedback on the resume is solely based on the back-end rules set up by the website which means it does not improve the persons resume based on actual job postings.

3.0: Description

We are going to develop a fully functioning web application from start to finish. The back-end coding of this web application will be done using Python [11] and the Django framework [12]. Python is our programming language of choice as it has many characteristics that are advantageous to our development. Some of these advantages include being scalable and adaptable, easy to prototype with, ease of data collection through web-scraping, plug-ins and APIs, and database connectivity [3]. These are all features we require to complete the objective of this project.

Django is a high-level Python web framework that allows for development of web applications with security, speed, and scalability in mind. Our users will definitely require a secure system as we are handling critical information about them through their resumes. Speed is also very important as we want to retrieve jobs and rate resumes quickly.

Firstly, our website HTML [13] and CSS [14] formatting will be based on current online HTML templates that are available for free and we will customize them to our liking. These customizations will offer us a clean and usable landing page all the while having our own requirements fulfilled. The landing page will have a secure and fast user account creation system in which basic user information will be taken. A user account will be necessary in order to maintain the resume and past results of job searches. However, the application will also allow for a user to access the application as a guest which will offer a one-time job search and will not store the resume or any results that come from a given job search.

Once a user has access to the application through an account or a guest access, they will be asked to upload their resume using a file explorer system or a drop box. If a user account has been created that account and the information regarding the account + resume will be stored in a PostgreSQL database [15]. For guest accounts, the resume will be stored in a temporary database for usage and will be discarded of after the user has left the website. PostgreSQL is fully supported by the Django plugin and connectivity to the database is very easy. PostgreSQL is also known for its Open-Source community, security, and scalability. These are all valuable characteristics to the development of the JobMate application.

The user is then redirected to a page where they will be given a few options to chose through about the type of job they are looking for and which websites that the application should scan that match those characteristics. The application will then return a list of jobs and provide information as to how well your resume that is stored in the database matches the given job descriptions as a whole. It will also provide a suggestions box which will give the user some input on what skills the resume is lacking and how much more it would increase the resume score by.

If a user has an account, we can maintain these scores and information on hand and the user can perform multiple searches to see how well their resume has increased over time and what additions are left to be made.

Finally, the JobMate website is going to be a one stop application for students, new grads, or people in their careers who are wishing to find new employment opportunities. This application will provide a place for the user to look for jobs through multiple major job posting websites, apply through the application or be provided a link to the internal job postings, and receive constructive feedback on the effectiveness of the resume and possible further improvements.

4.0: Group skills and education

For this project, we are going to be using various methods that we learned through different classes during our time at university.

One of the first methods we are going to be using is objected-oriented programming (SYSC2100) which was taught by Dr. Marshall. The course covered the different abstract types and their usage in Java classes, some examples of those abstracts are Stacks, queues, linked lists, and trees; those abstract types are going to help in this project by giving us various options which could be useful later while creating methods and how we going to be able to store accounts.

Another class we are going to use methods for this project is the Software Development Project (SYSC 3110) which was taught by Babak Esfandiari. Some of the methods that will help us are how we going to be developing and design pattern we are going to be using for our project such designs are the Model View Controller (MVC), Composite, etc. For this project, we are going to follow the MVC pattern since it is the most reliable method, due to its versatility and if there are any changes in the future you wouldn't need to change the entire model.

Another class in which we are going to use its methods for the front end is "Fundamentals of Web Development (SYSC 4504)" which was taught by Thomas Kunz. The course helped us by understanding the basics of HTML, CSS, JavaScript [16] and how those three languages can be combined, and how we can make them work together, this course method will help us drastically since most of our front end would be done with those three languages.

Some of the other classes in which its methods are going to be helpful are "Project Management (SYSC 4106)". This course would guide us in which kind of way we are going to keep track of our project work and make sure everything is going according to the deadlines. We are going to follow the agile methodology which will be doing weekly meetings in which we are going to discuss our progress and any impediments we can be facing and where are we in terms of project completion.

One final course we are going to be using its methods for this project is COMP3005 Database Management Systems. This course emphasizes database management system and how we can save data in the database and use it later in our project. The course also taught us the programming language SQL [17] which is the programming language mainly used for databases.

The final course we going to be talking about is SYSC 1005. The course was introductory to the programming language Python, which is going to be our main language of programming for this course. The course also introduced us to dictionaries [18] which is an important feature in our project since will keep track of the account using dictionaries [18].

5.0: Methods and relation of methodology to degree program

The objective of developing a web application that helps students and professionals apply for jobs tailored for their skills requires a specialized skillset present in students that are in the field of software engineering. Our group of three students with each student studying and succeeding in the software engineering program gives us the leverage to create such an inspiring web application that can help shape the future of students and professionals.

First student in our group, Ali Alvi, has the experience of working on the frontend of various web applications due to his coop experience. Ali has gained certain skills related to the front-end development that is only achievable through professional experience. Ali's expertise in front end development will give our group a boost in creating a user-friendly interface and improve user experience (UX).

Our second member, Areeb-UI Haq, has the experience of developing back-end systems for web applications as well as REST API's [19]. With this sort of experience coupled with UI design experience at Kinaxis, he is able to provide aid in the full-stack solution required for this project. Areeb also has real world experience helping students build their resumes which will prove to be valuable when designing the logic behind the web application. Areeb's experience will also give us the correct direction in making the web application so that it fits the needs and requirements of our potential clients.

Our third member, Ahmed Abuoudeh, has great experience in handling the backend and framework of web applications due to his extensive coop experience at Motorola Solutions. Ahmed's ability to create and implement astound logic in web applications and to construct a bridge of communication between backend and frontend will prove to be valuable when we will need to make our web application interactive.

We believe that as a group, our experience and understanding of complex software concepts will help us succeed in this objective of deploying a platform for users to apply for jobs and improve their resume. Our group has a great amount of professional experience which will prove to be helpful in setting up regular meetings and meeting deadlines in timely manner. Our group has the common skills of understanding the syntax of the programming language we will use, the concept of the web application that is being developed and the understanding of how Django projects work.

Communication in the group is also very important to produce a valuable project deliverable. Our team has split up tasks depending on strengths and weaknesses as well as interest in certain aspects of the project. For example, in this report, the sections were split up evenly amongst the three group members. Moving forward, tasks will also be split up to ensure a smooth flow of the development. The splitting of work is further discussed in Section 6.0.

These experiences combined are also heavily tied to the degree program of all three team members which is Software Engineering. As discussed in section 4 and 5 of this proposal, it is evident that the wide variety of courses and experiences are easily linked to each other and will certainly aid in the eventual development of this system.

6.0: Proposed timetable and milestones

Milestone 1 (Ahmad): Creation of landing page and front-end UI: October 7, 2022

Milestone 2 (Ahmad): User account creation and database connection: November 18th, 2022

Milestone 3 (Areeb): Resume box upload page with database connection: November 18th, 2022

Milestone 4 (Ali): Resume Parser API: November 18th, 2022

Milestone 5 (Areeb): Application using LinkedIn, Indeed, Workopolis API's or Selenium Scripts: November 18th, 2022

Milestone 6 (Ali, Areeb, Ahmad): Resume Rating Service (grammar, structure, format) November 30th, 2022

Milestone 7 (Ali, Areeb, Ahmad): Integrating components together into one application: December 14th, 2022

Milestone 7(Ali, Areeb, Ahmad): Final touches and Bug fixes: January 10th, 2022

Milestone 8(Ali, Areeb, Ahmad): Final product launch: TBD

** These dates are estimated and may be changed according to assessment of requirements, and risks.

** The milestones are written in order of priority and Milestone 2-5 are key components which should be developed before adding new features.

7.0: Risks and Mitigation strategies

A) Risk: Communication between teammates

A) Mitigation strategy: Discord, messaging apps, slotted meeting times every week, milestones, and constant communication throughout development and testing phases to avoid issues and completing milestones on time. Section 1.2 has details in terms of mitigation strategies for miscommunication and facing problems as a team.

B) Risk: 3rd Party API Maintenance

B) Mitigation Strategy: We will be utilizing well known website API's that have a track record of staying online and being reliable

C) Risk: Coding Skill/Competencies

C) Mitigation Strategy: Discuss the use of technologies that are already in the skillset of all team members or learn new skillsets required for each milestone and implement together.

D) Risk: Sickness

D) Mitigation Strategy: Rescheduling of deadlines, dropping less important features such as grammar checks.

E) Risk: Technical Difficulty

E) Mitigation Strategy: Rescheduling of deadlines, dropping less important features such as grammar checks.

8.0: Special components and/or facilities

This project will require multiple special components. These components are mainly third-party API's that should be available to access. Some websites have paid APIs, but our \$500 allowance should cover any API or database costs [15]. To name a few, LinkedIn [7], Grammarly [20] are examples of API's that we will be using for job applications and grammar checks.

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