

COMPSCI 2XB3:Computer Science Practice and Experience: Binding Theory to Practice Project Proposal

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By virtue of submitting this document I electronically sign and date that the work being submitted is my own individual work.

Abstract

The university application process is undoubtedly one of the most stressful times of highschool years. Most students spend hours and hours trying to find related information and statistics on the university/program they desire, and try to conceptualize their relative choices based on the information they find off the web. This process can be highly inefficient and time consuming, so UniFind comes to the rescue! UniFind aims to organize this time consuming process into a more manageable and efficient system by providing algorithmic solutions in sorting Universities and specific programs by categories such as ranking, program size, location, acceptance rate, using related datasets.

1. Objective

This is an information-searching app for Canadian universities designed for grade 12 students when they are applying. Students and teachers get a sorted list of universities according to different search keywords so that they can get a more comprehensive understanding for universities and make better decisions. In addition, they will be able to search for specific keywords in the app to retrieve related information about it. The target audience for this project will be highschool students, and this project aims to address their need of accessing information about universities in more concise/convenient ways by providing sorting/searching algorithmic solutions on related data sets.

2. Motivation

When we were choosing our university, we got so much information that it was hard for us to draw a conclusion. In this case, we wonder if there is a helper to conclude the information for us. This problem is important to be addressed because sometimes when there is too much information, our memory might have bias, so this app can provide the more detailed and clearer fact to universities. Our target user is the grade 12 students and school teachers, they can get the university list according to different categories sorting. Using this app, it is expected that students receive inner look to universities and hopefully we could publish it on android play store.

3. Prior Work

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The OUAC website has some duplicated functions to our product. On its main page, users can apply to an Ontario University as an undergraduate. After selecting the proper entrance, all universities available are listed with an application guide. Users can choose an university they prefer, and an introduction about everything they need to know shows up. Similarly, our project was aimed to provide detailed and accurate information of Universities in Canada to all users using CSV format datasets. Users can type in the name of university we want to understand to search for related information, especially university rankings, or they can screen out some universities according to conditions checked. Conditions could be programs, location of campus, and the number of students etc... To improve existing products, we want our product to be more targeted and relevant to users. Without a great amount of searching, they can get whatever they want. Also, some graphs are inserted to help them comprehend important data visually.

4. Input/output and proposed solutions

(1) Datasets

1. **3Years Employment Outlook:**

(<https://open.canada.ca/data/en/dataset/b0e112e9-cf53-4e79-8838-23cd98debe5b#wb-aut-o-6>)

- data available from 2016 to 2020
- will provide user information about program/university employment outlook

2. **Full-time enrolments and graduates in postsecondary community college programs, by program field, year in program and sex**

(<https://open.canada.ca/data/en/dataset/e0311b05-2706-4d84-9f6a-6affc372c843>)

- will provide demographic statistics about university/programs

3. **Canadian and international tuition fees by level of study**

(<https://open.canada.ca/data/en/dataset/f8c7ff85-c6cb-450f-99d2-0cd907cc3593>)

- will provide useful information about tuition, which could be major determining factor when choosing universities

4. **Canadian government finance statistics for colleges and universities**

(<https://open.canada.ca/data/en/dataset/cf8ecfec-d3be-4af9-95dc-72cecd848910>)

- will provide information on how much government supports universities

5. **PRELIMINARY Undergraduate Application Statistics — January 2020, Undergraduate Application Statistics**

(<https://www.ouac.on.ca/statistics/ugrad-application-statistics/uapp-january/>)

(<https://www.ouac.on.ca/statistics/ugrad-application-statistics/>)

- provides information on OUAC choices
- we will make our custom database since statistics is not given in csv files

6. **Revenues of universities and degree-granting colleges**

(<https://open.canada.ca/data/en/dataset/dc40973f-8aea-47ca-b215-b21bd42ec2b5>)

- will provide information on how much the profits from research, how much the faculty earns etc...

7. **Expenditures of universities and degree-granting colleges**

(<https://open.canada.ca/data/en/dataset/1072b7c8-9a65-42ff-9a52-0147938536a8>)

- will provide information if the university provides many campus events, etc

8. **Percentage of population with postsecondary certificate, diploma or degree by census division, 2016**
set of four maps showing education achieved by percentage of population 5 years of age and over for each census division as of 1961
(<https://open.canada.ca/data/en/dataset/097e5d7b-c537-455c-8882-b4fc2874dd51>)
(<https://open.canada.ca/data/en/dataset/f5e8bb9a-70a7-53c4-8c3b-b726926b3c10>)
 - [inform users of which province, which city, which location is education-intensive](#)
 - provide some side information on how many % of canadian population has university/major degree, just another side feature
9. **University degrees, diplomas and certificates granted, by program level, Classification of Instructional Programs, Primary Grouping (CIP_PG) and sex**
(<https://open.canada.ca/data/en/dataset/51490469-8200-4c22-bf44-bd33a3fe57c4>)
 - provide demographic information about university/program
10. **Employment Income Groups (23), Work Activity in Reference Year (3), Presence of University Degree (3), Major Field of Study - Classification of Instructional Programs, 2000 (13) and Sex (3), for the Population 15 Years and Over With Postsecondary Qualifications of Canada, Provinces, Territories, 2005 - 20% Sample Data**
(<https://open.canada.ca/data/en/dataset/00b73fdd-74ca-4e52-9c5d-13a22d3cc11a>)
 - can be used to provide expected income for university/major
11. **Top University**
(<https://www.topuniversities.com/universities/level/undergrad/country/canada>)
 - we will make our custom database for top universities since there isn't an already existing one for Canadian universities
12. **Target enrollment, expected grades, requirements, programs offered by universities and location**
 - we will make our custom database for this since there isn't an already existing one. We will refer to OUAC statistics and information from university websites

(2) Output of the product:

For example, we will get the following outputs based on the following keywords:

([] = keyword)

1. Sorted list of the 3 year employment prospect dataset by [program name] or [university name] and display result
2. Sorted list of universities by [Computer Science] program, in alphabetical order
3. Get a list of Universities within certain [tuition range] and sort them in increasing order
4. Ranked list universities by [highest research output] (analyze revenue dataset, extracting revenue from research and sorting them in increasing order)
5. Sorted list universities by [faculty size]
6. Sorted list universities by expected [admission average]
7. Sorted list universities by [acceptance rate]
8. Sorted list university programs by [gender ratio]

(3) Proposed Solution:

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We wouldn't be needing every information on every dataset (for example we wouldn't need information about campus size when we want an output of a sorted list of universities based on rankings). For example, let the function of a page in our app be list universities in sorted order based on input keywords. If user inputs "Computer Science" program in "Ontario" that's within "200th" place in the world rankings, and wishes to list all such programs in a page in increasing order, we could first retrieve all Computer Science programs in Ontario using dataset #12. Then, using dataset #11, we can create a HashMap that maps university/program to its world ranking if ranking ≤ 200 . Then, we can sort the HashMap based on the value using one of the sorting algorithms we learned in the course, and output result on the screen in table format.

5. Algorithmic challenges:

There will be several categories, such as university names, rankings, and requirements. Each list has a different size of elements. Therefore, we have to apply the most efficient method among the various sorting algorithms depending on the range of the groups. To be specific, The quicksort algorithm is one of the fastest sorting algorithms for large data sets. The insertion sort is much slower than the other ones, however, it shows better efficiency at the small data sets. The biggest challenge is finding the best search algorithm for our software. Our solution is developing the program based on the linear search algorithm. Specifically, the size of the data will not be larger than 1000. The complexity of the algorithm is $N/2$ for this data set. The other challenge is making every method run systematically. We should avoid collisions between systems. The accessibility is the last one that should be concerned. Even though we build the best software, if the client does not access the information about what they are looking for, it is not a well-developed program. In conclusion, solving these challenges is a top priority.

6. Project plan

Milestone	Deliverable	Date
0. Forming a Team	Finding group members (Group 3)	Week 3-4
1. Project proposal	Finish the proposal document according to the template	Week 5
2. Project proposal presentation preparation	Division, presentation power point, making cvs (QS university ranking, program ranking)	Week 6
3. Work on java project	Brief structure, function of each page, and separate work on each page	Week 7-11
4. App design	Work on xml, app pages design	Week 12-13
5. Project presentation preparation	Presentation power point, final check	Week 13
6. Final project presentation	Presentation to the class	Week 14

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7. Evaluation	Submission, complete evaluation form for teammates	Week 15
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