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
Student debt is a huge problem facing today's post-secondary graduates; so much so that it has become a major part of the cultural identity of millennials. Despite this, few graduates actually have any idea how to approach paying it back. Many feel as though they ought to pay it back faster, but find it difficult to stay motivated as they pursue their career. This results in many graduates paying far more in interest than they need to. Avocado is designed to offer the extra bit of motivation they need by gamifying the repayment of student loans. Avocado uses publicly available data about average median income and average student debt, finds the data that matches your demographic, and calculates a personal rating of how successfully you are repaying your student debt for your demographic. It also lets you keep your friends accountable, and even see your rank on a leaderboard.

1. Objective
The objective of this project is to create an application that will help graduates manage their debt in a gamified and optionally social way. It will aim to accomplish this in three ways: helping the user organize and keep track of their information, motivating the user personally by providing statistics and game-like objectives, and motivating the user by providing social features that allow for friendly competition and encourage friends to keep each other accountable.

2. Motivation
A huge number of students graduate with debt, and many of these students have no idea how they should go about paying it back. This leads to many graduates taking much longer to pay back their debt than they needed, which in turns ends up costing them much more money after interest. The intended users of this product are recent graduates with student debt, especially those with significant debt and those seeking motivation to stay on top of their debt. Ideally, this product will keep its users motivated to pay back their student loans in a timely fashion, saving them stress and money in the long term.

3. Prior Work
There already exist products designed to help graduates manage their student loans. Some of these are standalone applications, such as Student Loan Hero[1], while others are just one service offered by larger financial advising groups, such as DebtHelper[2]. Our goal, however, is not to offer professional financial help, but to provide a simple and fun source of motivation. Recent years have seen a rise in so called

[1] (Student Loan Hero™, Inc. 2019)
[2] (DebtHelper 2019)

'gamified' productivity applications.[3] An excellent example is Habitica[4]: users create a character in the style of a fantasy roleplaying game. Users set goals and habits to enforce or break for themselves, and the application punishes failure with damage to their character and rewards success with experience points and gold. Additionally, users can form groups with their friends and undertake quests together, letting friends keep each other accountable for their goals. The object of our product is to apply a Habitica-like gamification and social aspect to the repayment of student loans.

4. Input/output and proposed solutions

1. Datasets:
   - Characteristics and median employment income of postsecondary graduates two years after graduation, by educational qualification and field of study, 2010 to 2014 cohorts[5]
     https://open.canada.ca/data/en/dataset/47bf6ec6-079c-413a-a6eb-7de43401280b
     This dataset provides median employment income of graduates, allowing our personal rating to be adjusted for the median income of that particular user's field of study.
   - National graduates survey, student debt from all sources, by province and level of study[6]
     https://open.canada.ca/data/en/dataset/c75d7a11-ecce-40d6-939a-ba61247bf98a
     This dataset provides average student debt, broken down by several demographics, which we can use to create personal ratings.
2. Outputs:
   - Personal rating. This is calculated by comparing a user's data to average data for that user's demographic.
   - Rank. Each user who opts in to the leaderboard will be ranked on their rating compared to other users who opt in.
3. Solution:

   A user's interaction with the application would proceed as follows: The user first needs to create an account with a password and unique username. During account creation, the user inputs several pieces of demographic information, such as type of institution, area of study, province, and sex, with the option to leave any of these blank. The user also inputs their amount of debt on graduation, the year they graduated, and their current debt. Once their account is created, the application will generate a rating based on how much debt they have payed, weighted according to the median income and average debt of their demographic projected for the current year using the data from the two relevant databases. The user can check their rating anytime by logging in to the application. The user can thereafter update their debt as they pay it off, which updates their rating. The user can also choose anytime to opt in to the leaderboard feature, which they can choose to opt out of anytime. All users who have opted in to the leaderboard will be ranked according to their personal rating. Any user who has opted in to the leaderboard can check their rank at any time.

5. Algorithmic challenges:

Searching algorithms will be necessary for finding the data in each database that is relevant to any particular user. For example, if the user is a female humanities graduate from Manitoba, it will be necessary to search both databases for the specific data for female humanities graduates in Manitoba. Sorting algorithms will be necessary to rank users who opt in to the leaderboard based on their particular rating. Graphing algorithms will be necessary for both projecting average numbers to future years based on trends in previous years for both datasets, and to display to each user their rating history compared to

[3] (Meister 2015)
[4] (Habitica 2019)
[5] (Government of Canada 2018)
[6] (Government of Canada 2018)

the average. Projecting average numbers without assuming too strong a trend will offer a significant algorithmic challenge, as will developing a rating system that is accurate and meaningful.

6. Project plan

Dataset searching	Implement dataset searching	Week 2
Rating scheme	Settle on formula for generating personal ratings	Week 3
Initial prototype without leaderboard	Implement working prototype of application without leaderboard option	Week 5
Prototype with leaderboard	Implement leaderboard option to working prototype	Week7
Testing and reoptimization	Test prototype with sample user input, refactor code to improve readability and speed, test edge cases and debug properly	Week 8
Final prototype	Finish project	Week 9

References

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