Criterion B: Analysis

Proposed solution:

My proposed solution is to use Python to create an app that could read student and seminar information from an excel file that my client said she will be providing, and distribute students to their top choice of seminars, while making sure every seminar has a minimum amount of students.

Requirement specification

IT system requirements

- Development Requirements:

  o Hardware – a PC with internet connection;

  o Software – Python for the application/development; Excel for data manipulation/testing;

- Production Requirements:

  o Hardware – a PC;

  o Software – Windows for the PC; The finished software; Excel for editing/checking/receiving data;

System interaction

User:

- Open the app/program
- Import students and seminars using a file open dialog/continue from a previous save
- Set specific settings for the student distribution algorithm/or use the defaults
- Manually assign specific students to specific activities
- Use the assign students button to run the algorithm
- Check the assignments and shift some students if needed
- Run the algorithm again if needed
- Export the results
- Quit the application

Input/output requirements

Input requirements

- The specific way students should be distributed
- The input excel file's format, with examples for testing
- The wanted export format
- The scope of the program (expected student/seminar count)

Output requirements

- The software for Windows PC
- Being able to import student and seminar information from excel file

- Being able to export the results
- Ability to force assign students to activities, both before and in the middle of algorithm runs

Processing

- Development:
  - Create drawings to ensure the GUI includes everything needed
  - Create a working version with placeholder data
  - Test the software with the client
  - Do a mock process of gathering student polls, putting the data to excel, assigning students, and exporting the output to a desired format to ensure things will go smoothly when the next years profession seminars are done
- Production:
  - Convert the input excel file to an internal class format useable by Python
  - Change settings
  - Set force student decision flags based on user input
  - Assign students based on parameters
  - Change student assignments based on user input
  - Export the final results

Security

- Backups: The project will be backed up regularly to both my hard drive and a version control server (Bitbucket)

Specific performance criteria

a) Student and seminar info can be imported from a specifically formatted excel file
b) Settings for the algorithm can be changed
   a. Minimum amount of students required for each seminar could be changed
   b. Maximum amount of students for each seminar could be changed
   c. Some students' decisions can be forced to be assigned
   d. Some students' decisions are considered more valuable (12th graders should be placed in their top choice first rather than 9th graders, because it is more important for them)
c) The algorithm properly assigns students to the activities while making sure every student is assigned to the best possible activity according to their decision, and other rules are kept
d) Students can be reassigned after the algorithm is run, and algorithm could be run again
e) The assignments can be exported into a desired format
f) Can run on client's Windows 10 computer.

Justification of chosen solution

A computer application is the most effective solution, because this problem is very similar to the marriage problem, which already has algorithmic that can be calculated by the computer. Before this, my client manually assigned every student to the seminars while trying to make sure everyone was assigned to a seminar they wanted, while also giving the higher grades better places, and while trying to make sure every seminar had about the same number of students attending. This was a time consuming process, and because of the amount of different parameters my client wasn't always sure if she found the best assignment. The new solution will find the most optimal assignment of students in minutes, instead of the days my client needed before. Also my client already has a school issued PC, so no extra hardware or software other than the application will be necessary. The solution will be intuitive to learn and easy to use year after year for the yearly profession seminars.

Normally the client spends a lot of time just before the event to assign students, while also trying to make sure all the people invited to give seminars could arrive to the school and ensure to problems are present. With the solution my client is free to attend to these more important tasks, without the stress of trying to assign every student on time.

I chose to do this project using Python, because I have a lot of experience using Python to manipulate data and create algorithms. I will be using various libraries, most importantly a library to read excel files with Python, and Tkinter to create the GUI for the program. I will use SourceTree with BitBucket for backups and version tracking, which I also have experience using. If I have any problems during development I can just check various online resources such as Stack Overflow (https://stackoverflow.com) or various python help sites (https://docs.python.org/3/). All of the required software is installed on my laptop, which fulfils the hardware requirements. For any problems concerning the specific criteria, I can contact my client directly at school.

Word Count: 376