Course Project:
7th November 2018

Summary

During the semester, you have been learning to combine discrete mathematics and computer science. During this time, you have been studying how to write Python programs to link together the mathematical concepts that are discrete in nature, that you have encountered, with concepts of Python programming (i.e., data structures, variables, loops, conditionals and others.) You have also used these concepts to explore interesting experiments (i.e,. writing morse code, creating a colour-checker for graphics, and etc.) where data could be generated and studied to obtain knowledge.

During your course, each week we have spent time to learn about some application of programming and mathematics and to extend original programs to find other applications for them. In this project, you are to create a similar type of demonstration of an idea where one can use Python programs and discrete structures concepts to learn more about the concept of study.

GitHub Starter Link for Groups

STOP! STOP!
https://classroom.github.com/g/zUN3R694
Note, this is the same link as your lab5 repository where you have saved your five ideas, you will use this repository to store your project files.

To push your changes, you can use the following commands to add a single file, you must be in the directory where the file is located (or add the path to the file in the command):

- `git commit <nameOfFile> -m ''Your notes about commit here''`

- `git push`

Alternatively, you can use the following commands to add multiple files from your repository:

- `git add -A`

- `git commit -m ''Your notes about commit here''`

- `git push`

Assignment Specifications

You are to work in groups of no more than four (4) people to create some interesting Python demonstration of the concept in discrete structures. For your class project you will develop a

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solution in Python for a real-world application of your choice. This is an opportunity for you to showcase what you learned in this course, without following a specific assignment. Of course, you can not claim the work of anyone else or your own previous work as a solution for this project, but you can certainly extend your previous work, someone else's work provided you reference it correctly, and use your knowledge and experience as a backbone for this project. You may also download an open source project, for example from GitHub, and extend it in some way.

Plagiarism is strictly forbidden. Please see the discussion of the honor code in your student handbook to learn more about what plagiarism is and how to cite your references properly. If you decide to extend something previously completed or to recreate the work that someone else has already done, your extension must be significant. In that case you must also ensure you give proper attribution to previous work through the comments in your programs and description in your README.md file. In other words, the problem that you choose should not just be a copy of one of the lab or practical assignments, or the class exercises, or the programs in the book or online with slight modifications. Your project must be extensive enough to qualify as a project, but not too extensive so that you can not finish it by the due date. Pick something realistic and preferably useful and fun, and something that you are interested in! You may use anything and everything we have learned in class, and research additional topics if needed.

Timeline: Deliverables

1. ALREADY DONE! **Five Ideas** Deadline: by lab-time 7th November:
   Develop five preliminary ideas for your project and write 2-3 sentence descriptions of each one in the `ideas` Markdown file in the "writing" directory of your project repository. You should discuss your ideas with teaching assistants and the instructor during the practical session to ensure your ideas are feasible within the contents of the course. Submit your five ideas document to your project GitHub repository.

2. **Proposal** Deadline: by 2:30pm on (Monday) 14th November:
   After discussing the feasibility of your ideas with the teaching assistants and/or the instructor, select a single idea for your project and write a three paragraph (minimum of 150 words each) description of what you propose to do. For this writing, create the Markdown File: `writing/proposal.md` of your project repository. Your proposal should give a brief overview of the proposed project and provide motivation for it. It should also justify how completing this project is feasible within the scope of our class. You should provide at least two citations related to your project idea. You do not need to include any specifications on how exactly you will implement your proposed project at this point.

3. **Presentation** 5th-7th (Wednesday and Friday) December, during the class, practical and the lab session: By the presentation session, you should have finished or be nearly finished with your implementation, and have run some tests. In the presentation, you should describe the overview and motivation of your project, discuss challenges, your approach to implementation, results and analysis of your implementation. Use diagrams and a few bullet points rather than long sentences and equations. The goal of the presentation is to convey the important high-level ideas and give intuition rather than be a formal specification of everything you did.

Prepare for 3–5 minute presentation. Design at least 5 slides, including a slide with the title of your project and group members' names. Every member of the group needs to contribute to the presentation talk. At the end of the presentation give a demonstration of your project.

A show of code: During this presentation, you will demonstrate your code to showcase the concept that you have explored in your research.

4. **Final Report, Final Programs and Output** Deadline: 10th **December, 2018 by midnight**: Your final report should highlight the key contributions of your work and consist of at least six high quality paragraphs with a minimum of 200 words in each. The report should include a description of why the chosen topic is important and discuss the implementation that you undertook. The written material should be precise, formal, appropriately formatted, grammatically correct, informative, and interesting. In summary, your report should include:

   - The motivation for your project. Why is the application you chose important/useful?
   - Detailed description of the work you completed for this project. Without giving a snapshot of the code you wrote, provide technical description of what you implemented and how you implemented it. In particular include software requirements and software design for your project.
   - UML diagrams or a flowchart showing your project's software design (e.g., how classes are interacting with each other). To see an example of including an image in the Markdown document, please see "Mastering Markdown" GitHub guide found at `https://guides.github.com/features/mastering-markdown/`.
   - Description of your results. Make graphs, tables, snapshots of your output, or anything else that can help me understand your results.
   - Conclusion. Give a short overview of your project and its results. Describe what you learned, what were the biggest challenges and the biggest rewards.
   - If you worked in a team, you should also include a paragraph that describes the team work and the contribution of each team member.

   Your programs should be well documented, including extensive comments. All of our regularly used naming and styling conventions should be utilized.

Required Deliverables for This Week

Submit deliverables through your assignment GitHib repository bearing your name, as well as all names in your group for your group work. Place ideas and justified citations in the file `writing/ideas.md`. Your submitted document will be about a page in length. Please keep your discussion concise.

1. Create the file, `writing/proposal.md`. You will use this file for your proposal mentioned above.

Please let the instructor know of any questions that you or your group may have. Please use email or make office-hour appointment slots if you would like to discuss an issue.