Final Project Overview

MAT 167 001 / University of California, Davis / Summer Session 1 2024 / DP Varn, Instructor

20 July 2024

Purpose: The purpose of the project is to allow you to use your linear algebra knowledge in projects that are relevant in today's society.

Due Date: Please have your work uploaded to `GradeScope` by Noon on Sunday, 04 August.

References: Please see:

(i) The text by Cleve Moler at `https://www.mathworks.com/moler/chapters.html`.
(ii) Prof. Saito's Lectures #24 and #25.
(iii) Other relevant sources

Please remember to cite any sources that you use in your presentation.

Project: Google's PageRank algorithm: PageRank is nothing else but the problem of finding an eigenvalue and eigenvector of a matrix. The challenge is to explain and illustrate how the Google search algorithm works. There are many other sources online that discuss the PageRank algorithm, and a—no irony here—google search might be useful.

Project Requirements: Your completed project should include the following:

(i) A short power point presentation (between 20-30 slides in a pdf) explaining the idea of the solution and the key concepts from linear algebra used in solving the problem. Your explanation should be at the level of a MAT 167 student (someone that knows the basics of linear algebra terminology, etc).
(ii) Write and submit MatLab code (or equivalent code in another high level programming language such as python or R) that solves the problem in simple instances. If I wish, I should be able to run your code from the file that you submit here.
(iii) Submit a pdf of your code along with a sample run that shows the output that you use in your presentation.

Grading Criteria: Points will be awarded according to the following schedule:

(i) Content (40 points). The mathematics in the presentation should be correct. Your should explain what the questions are that you are answering. The code should run without bugs.
(ii) Clarity, Quality of presentation, Organization (40 points). I can follow and understand the mathematics being described. The order of slides makes sense, correct spelling of terms. You should use pictures and diagrams when possible.
(iii) Creativity and Originality (20 points). You will get these last points for expanding/elaborating on the problem. There are many ways that you can do this: (a) Expand the solution beyond what is given/suggested in the sources. You could (b) write your solution/presentation in `LaTeX`, (c) make a YouTube presentation or (d) write a poster. For the latter we would need to meet so that I could quiz you on your poster. We could do that over zoom. Surprise me!

NOTE #1: Outside help: You may only discuss the project with your classmates and me. You are allowed to use any book available in the UC Davis library or online. Sources must be cited!!

NOTE #2: Group Member Contributions. You should tell me how each member contributed to the project. Please include this at the end of your presentation. You should address the following:

(i) Writing the code;
(ii) Writing the presentation;
(iii) Preparation of tables/figures/graphics (if any);
(iv) Assembly of the presentation;
(v) Any other items relevant to the completion of the project.

Of course multiple group members may contribute to each task.

Thanks to Professor Jesus De Loera for allowing me to borrow this project idea that he used in a previous classes.

