Final Project Writeup and Presentation

Math 155: Mathematical Imaging - Winter 2023

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There is a LOT of material provided in this document. Please read it carefully! Failure to follow instructions in this document will result in lost points. Please contact me with any questions or clarification. If your question is answered in this document I will just refer you back to the document.

1 Timeline

- Presentation due: Monday, March 13 at 1:00pm
- Presentations: March 13, 15, 17
- Write up due: Friday, March 17 at 11:59pm

2 Group Contributions

My expectation is that all project members will contribute approximately equally to all project assignments. Therefore, by default, all members of a project group will receive the same grade[1]. However I reserve the right to change an individual's grade based on their contribution.

If you are experiencing persistent issues in which a group member is not contributing to the project, I encourage you to first reach out to them with empathy and understanding. Sometimes, there are obstacles to our full participation that can be hard for others to see. That said, if you've tried this approach and are still having participation issues, please contact me.

The writeup is required to include a section that will outline in some detail the role that each group member played in the project.

3 Project Writeup

Your writeup should be written in the form of a research article where your intended audience is your classmates in other groups. You should write it as if you are talking to other students in the class; you can expect readers know the topics we covered in lecture, but will need a more thorough description of methods/concepts you learned for this project outside of class.

A specific latex template is provided for you on BruinLearn. I recommend using Overleaf as all group members can collaborate together on the same document.

[1] With the exception of the peer feedback during presentations. That portion of the presentation grade is individual.

3.1 Sections and Writeup Components

1. Title: Your writeup needs a title.
2. Authors: You need to give your names.
3. Abstract: This gives a brief synopsis of what is in your report. It should be understandable to students in Math 155 at a broad level.
4. Index Terms (keywords): This gives relevant keywords to tag methods and applications. Think of tagging things like a blog entry or photograph.
5. Introduction: This describes, in big-picture terms, what the goal of your project is.
6. More detailed (perhaps mathematical) background: After briefly mentioning background in a big-picture way in an introduction, it is often appropriate to give more precise mathematical details (if relevant) in a separate section.
7. Methods: Carefully describe all methods and models. This should be understandable to all Math 155 students.
8. Results: Carefully describe the results of your project. You should include images and examples that demonstrate your work.
9. Conclusions and Discussion: Summarize your results and discuss their implications. It may be relevant to bring up improvements you would make if you had time. For example, if there is a limitation of your project like a step that doesn't work as well as you wanted, how would you go about fixing it if you had time? If there is a concept you wanted to study or a tool you wanted to use in your project that you didn't have time for, mention it here and why you think it would be useful/interesting. This section typically does not include figures however it can reference figures in other sections.
10. Acknowledgements: Acknowledge all help and resources from others. This could include the instructor or TA if they provided specific advice, other classmates who gave you ideas or proof read your report, etc.
11. References: You must include proper citations with in-text references and full citations in the references section of all sources that you use. This includes (but is not limited to) sources for data sets, methods used, similar work that exists or that you used for inspiration, background work that helps with the big picture, and so on. You can (and probably will) use the textbook as a citation. I have included an example .bib file. You do not have to use a .bib file, but you will almost certainly find that to be the easiest way to do things. Make sure you cite everything. If you use information from the textbook, cite the textbook. If you use an image from google, cite it. If you use a research paper, cite it.
12. Author contributions: State who did what
13. Appendices: Appendices are optional, but sometimes they are useful for organizing things. You will probably have a lot of images in your writeup. If you have many examples that demonstrate the same thing, you can include the most interesting/important ones in the main text and include other supporting examples in the appendix. This is also a place to include an example that maybe didn't work as well as you wanted and displays a limitation of your method.

3.2 Requirements

- Writeup length: minimum length of 2-3 pages, maximum of $N+1$ where N is the number of students in your group. Page count does not including references and appendices.
- Code and scientific replicability: Scientific work must be replicable. Everything needs to be specified precisely. All notation must be defined precisely and unambiguously. Either include (1) a hyperlink to a code and data repository or (2) a shared folder or .zip file of these materials. A common place to put hyperlinks to code repositories is towards the end of the paper before the acknowledgements, but sometimes other spots are easier for readers.
- Figures: There should be figures to illustrate your work. This typically includes figures of results, and it often includes figures to help describe the problem (or, when relevant, how a mathematical model or algorithm works). You should label the figures and reference them in the text by their number. Captions for figures should be sufficiently descriptive that the figure with caption can stand alone separate from the text and a reader can still know what is being presented (even if they can't analyze it).
- Equations: You may have equations, including displayed equations. Number them and refer to them by number. Explicitly define all notation in them.

3.3 Formatting

Formatting can be tricky and takes time. Do not wait until the last minute to put together the report. Feel free to e-mail or talk to me with any specific questions regarding formatting or the report contents. If this is your first time working with LaTeX, it has a learning curve but you will get used to it. It is a great skill for math majors to have so I encourage you all to learn it!

4 Project Presentation

Your presentation should be slides made using Google Scholar, powerpoint, or Beamer, whichever your group prefers. Regardless, your presentation must be submitted as a PDF on BruinLearn before class on Monday March 13.

Your presentation must have a title slide (with the title and names of group members) at the beginning and a references slide at the end. The structure of your presentation between these two things is up to you, but it should essentially summarize your writeup. You do not need to present your code, or show screenshots of code. You can explain the methodology, but how you implemented it is not important (unless you have a particularly creative algorithm you wish to share, but even then it should not be shown in code, it should be pseudo code or a list of steps). You can include a demonstration of your code, however I'd recommend pre-recording it and showing it as a short animation during your presentation. Running code live rarely goes well and you don't want to deal with these difficulties during your presentation.

Remember that your audience for your presentation is your classmates. You can assume the know the material presented in class, but if you used any additional tools or techniques you should present them to the class. After the presentation, there will be time for the audience to ask questions. You should be prepared to answer any questions about your presentation.

4.1 Requirements

- Your presentation should be 7-10 minutes. There will be a firm cutoff at 10 minutes to ensure all groups have enough time.
- It can be pre-recorded or presented live.
- Each member of the group must speak in the presentation.
- Title slide and references slide.

4.2 Peer Feedback

You are also required to give feedback to other group members (for a small portion of your presentation grade). You must fill out a peer evaluation form (to be provided during the presentations) for at least 3 other groups.

This portion of the project grade will be individual so you will not be penalized if your fellow group members do not participate in the peer feedback.

Other Comments from Instructor

- This project is intended to be fun and let you engage with the course material in a new way. Feel free to be creative!
- You have the freedom to use any APPROPRIATE images you want for this project with one exception. You should NOT use the image "Lena" (also sometimes spelled "Lenna"). This is a standard image that is used in the field of image processing that I am strongly opposed to. This image is a cropped version of a picture from a 1970's playboy magazine. I believe the use of this image is inappropriate and offensive, as well as contrary to efforts to improve working conditions for women in STEM. The woman photographed in the picture has even asked that the image not be used anymore, yet many people still do. You are not allowed to use this image in your project, and I encourage you NEVER to use this image in your future work. If you need example images please let me know, I have almost all the images that are included as examples in the textbook and would be happy to provide you with them.

Acknowledgements

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