COSC 420/527: Biologically-Inspired Computation
Final Project Rubric

Final Project Report Due: May 11, 2023, 11:59 PM

Poster Presentations: April 27, May 4, May 4, 2023

Introduction

You will choose the topic in bio-inspired computing that you will be addressing. You should have the topic approved by no later than **March 31, 2023**. There are two components to your final project: a project report and a poster presentation. More detail about the requirements for each are given below.

The goal for the final project is to give you a chance to further investigate a topic in biologically-inspired computing of your choice.

Project Structure

For your final project, you should define a research question associated with your topic of interest. For example, your research question might be something like:

- Can cellular automata accurately reflect disease spread models such as SIR?

- Can evolutionary algorithms be used to optimize the parameters of a cellular automata or agent-based model so that it reflects the behavior of a physical phenomena?

- Can evolutionary algorithms be used to optimize the structure of a robot/car/imagined animal/building to meet certain performance criteria?

You will define a research question associated with bio-inspired computing, construct an experiment to answer that research question, run that experiment, and report the results.

Important note: It might not work! That's the nature of research. If you're applying a bio-inspired approach to a new field or in a new way that others have not tried previously, the approach may not work. If it doesn't work, you should probe into why it's not working and provide the results in the results section.

Project Report

Your final project report should be structured as an academic paper for a conference or journal submission is structured. Your final project report should use the IEEE 2-column conference format with the sigconf format. There are both LaTeX and Word templates available here:

https://www.ieee.org/conferences/publishing/templates.html

The final project report should be at least 6 pages and no more than 8 pages long. References are included in the page count!

Your final report will be composed of the following components.

Abstract: 150-250 words to briefly introduce your topic, the key question you're addressing in the project, and a brief summary of your results. Someone should be able to read just the abstract of your report and have an idea of what you did and what the results were.

Introduction and Motivation:

You should address the following questions in the introduction and motivation section of your report

- What is the overarching goal of your project?

- What is the research question you are trying to address?

- Why is this topic interesting? Why did you select this topic/question in particular and why did you select the corresponding bio-inspired algorithm?

Related Work:

You should have a good understanding of whether or not this approach has been taken previously. In order to do that, you should do a short literature review to understand the current state of the field. This section should address the following:

- What other academic works are there that are related to this work?

- How are they related to what you're doing?

- What are you doing differently?

You should use Google Scholar or UT library resources and find at least 10 relevant academic works to cite. Up to two of those sources can be textbooks, but the rest should be relevant conference or journal papers.

You will have a references/bibliography section at the end of your report. All of the references to cited work should appear there.

Method/Approach/Experimental Setup:

In this section, you should describe the structure of your experiment. If you are using any pre-existing software packages or approaches, those should be described and cited here. For example, if you use a pre-existing cellular automata software implementation or a pre-existing evolutionary algorithm implementation, etc., you should indicate that here, give a brief description of it, and cite it.

You should also describe the approach you are taking in your own software that you developed for the project. It is often a good idea to depict your approach or method in a diagram or figure.

You should also describe in detail the experimental setup you have defined. What aspects will you be investigating? How are you investigating those? For example, if you are investigating the application of evolutionary algorithms to a particular problem, you should describe here which approaches and parameter sets you will be evaluating.

Results:

In this section, you will describe the results of your approach. You should depict the results visually through plots (e.g., line plots, bar charts, heatmaps, boxplots, etc.), and you should provide a discussion of each plot and the results you obtained.

Did something unexpected happen in the experiments? It may be worthwhile to probe into that further to try to explain why it happened.

Discussion, Conclusion, and Future Work

In this section, you will provide a discussion of the results and any major conclusions you obtained from these experiments. You will also provide at least a paragraph of "future work" discussion. If you had more time, what would you do next? Did this research open up any new research questions? Was there something else you would have liked to have done and didn't get a chance to do?

Poster

Your poster should be a 24x36 inch poster. A Powerpoint template for the poster is available on Canvas, though if you would like to format your poster differently, that is fine, as long as you include the appropriate content.

Your poster should have an introduction/motivation section, methods/approach, results, and conclusion section. You can omit related work for the most part.

Your poster should be primarily visual with relatively little text. Any text should be given in bullet points, and you should highlight major conclusions you saw from the data.

Poster Presentation Session

You will print the poster and present it during one of the three poster presentation days at the end of the semester.

These will be structured as poster sessions in which everyone assigned to that poster presentation day will have posters set up around the classroom.

You may have animations or other visualizations that cannot be displayed on the poster that you can show on a laptop.

For your poster presentation, you should prepare a 30 second overview (your "elevator pitch") and a more in-depth 3-5 minute overview.

Rubric

- **Report (75 points)**:

    - Abstract: 5 points
    - Introduction and Motivation: 10 points
    - Related work: 10 points
    - Method: 15 points
    - Results: 25 points
    - Discussion, Conclusions, and Future Work: 10 points

- **Poster (25 points)**:

    - Poster content (10 points)
    - Poster presentation (15 points)

Late policy: The deadline for the the report and poster PDF submission is May 11. There will be 10 points off per day, but the absolute last day they can be submitted is May 15.

Topic Deadline: There will be a five points per day penalty for each late day for the topic submission.

Submission

You will submit a PDF of your report and a PDF of your poster to Canvas.