

Advanced Algorithm Research Project

CPSC 4115 - Algorithms

Objectives

The objectives of this assignment are for you to:

- 1) Learn about an advanced algorithm in-depth
- 2) Practice your technical writing skills and
- 3) Refine your team communication and collaboration skills.

These objectives align with skills sought by employers.

Proposal

Create a team of up to a total of three students. As a team, select an advanced algorithms topic. Explore this topic by conducting an initial literature review (two to three academic references that refer to your selected algorithm). Write a proposal (approximately two to three paragraphs) listing your team members and your selected algorithm. Include your academic references with some explanation of what they report about your selected algorithm. Also include what experiment(s) you plan to conduct and why the results are important. Here's a potential outline for your proposal:

- **Project title**
- **Subtitle** (the name of the selected algorithm if not included in the title)
- **Team members' names**
- **Introduction / Background** (including mini literature review and the objectives of the proposed research)
- **Methodology of the proposed experiments** (including plans to analysis results)
- **Expected Outcomes** (outline the potential results, their format and their implications to your research)

Your proposal must be approved by your instructor before continuing with the project.

Proposal Submission

You only need to make one submission per team to the Assignment in CougarVIEW. Other team members should submit something (for example, "<name> submitted the assignment") so that they too can see the posted feedback. The preferred format is a PDF file (typeset from a LaTeX file). Extra credit will be awarded for teams that submit both a PDF and the LaTeX file.

Literature Review

As a team, conduct an more extensive literature review on your topic (at least 10 articles published in professional conference proceedings and/or journals). Your literature review will be integrated into your presentation and written report.

Research Paper

Implement your proposal and write a research paper about your results. Include the following sections:

- **Abstract:** A concise summary of your research.
- **Introduction:** Introduce the problem, objectives, and significance of your research.
- **Related Works:** Discuss each one of the references from your literature review and how it relates to your research.
- **Methodology:** Describe your experiments (your approach and analysis)
- **Results:** Present the findings of your research, including any data, graphs, or tables.
- **Discussion:** Interpret the results, discuss their implications, and relate them to the literature.
- **Conclusion:** Summarize the main findings and suggest possible future work.
- **References:** List all sources cited in your paper using a consistent citation style.

Format the paper using an established academic conference proceeding or journal format (for example, [ACM's formatting guidelines](#)).

Research Paper Submission

You only need to make one submission per team to the Assignment in CougarVIEW. Other team members should submit something (for example, "<name> submitted the assignment") so that they too can see the posted feedback. The preferred format is a PDF file (typeset from a LaTeX file). Extra credit will be awarded for teams that submit both a PDF and the LaTeX file.

Presentation

As a team, prepare and deliver a 10-15 minute presentation during the final exam time. Your presentation should include:

- Introduction (team members, background/context for your project, your selected algorithm [definitions, key concepts, etc.] and proposed project overview)
- Related work from your literature review
- Your methodology for the experiment(s) conducted
- Analysis and results of your experiment(s)
- Conclusions (your insights, ideas, hypotheses, etc. for future research opportunities)

Presentation Submission

Please submit your slides / visuals to the Assignment in CougarVIEW. You only need to make one submission per team. Other team members should submit something (for example, "<name> submitted the assignment") so that they too can see the posted feedback.

AI Policy

You are allowed to use Generative AI tools like ChatGPT or CoPilot for tasks like brainstorming, grammatical correction, outlines and find potential sources. You must acknowledge the use of AI and properly attribute it. This includes providing in-text citations, quotations, and references.

You should include the following statement in assignments to indicate use of a Generative AI Tool: *“The author(s) would like to acknowledge the use of [Generative AI Tool Name], in the preparation of this assignment. The [Generative AI Tool Name] was used in the following way(s) in this assignment [e.g., brainstorming, grammatical correction, citation] in the [which portion of the assignment].”*

Note: A small fraction of these instructions (primarily the sections for the research paper) were generated with ChatGPT 3.5.