CSC 505-001, Spring 2021, Final Project

# Purpose

The purpose of the final project is to hone your skills in the design, analysis, and (possibly) implementation of algorithms. A secondary purpose of this project is to organize and present nontrivial concepts to an audience of your peers. This will not only improve your communication skills but also solidify your understanding of the concepts.

# Overview

There are two types of final projects. Both involve learning about algorithms not covered during the semester.

**Survey paper.**

You are to read a collection of papers describing algorithms for a specific problem. While the problem need not be one outside the scope of the course, the algorithms and data structures that are the subject of your research must be. For example, there are several algorithms for the minimum spanning tree problem that use sophisticated data structures and involve nontrivial analysis to achieve almost linear or even linear time bounds.

The paper and the oral presentation should be pedagogical in the sense that it might be used to teach about the topic in an advanced graduate course (one that would have CSC 505 as a prerequisite). So you will read several papers, synthesize the main concepts, and explain them clearly using illustrations and examples.

**Algorithm Implementation and Experimentation.**

This type of project will be similar to the programming projects but more extensive and it will involve one or more algorithms not covered in the course. As with the survey paper, they could be algorithms for a problem not discussed in class or simply algorithms not discussed in class for a problem that was discussed in class. For example, there are algorithms for the minimum spanning tree problem with better asymptotic time bounds than the ones covered in class, but do they perform better in practice (and how large do graphs have to be for them to do so)?

Less is expected in the way of expository writing if you do an implementation project than with the survey paper. Your report should focus instead on implementation challenges, hypotheses (or questions to be answered), and experimental results.