CS 523 - Project Proposal
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1 Problem Statement

We intend to solve a tangential problem to the Majority Classification problem discussed in class. We call it the "separator" problem, where, given a colored graph (or 1-D line) with two colors, we separate the colors on the graph:

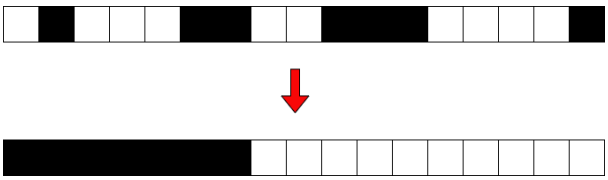

Figure 1: One dimensional case

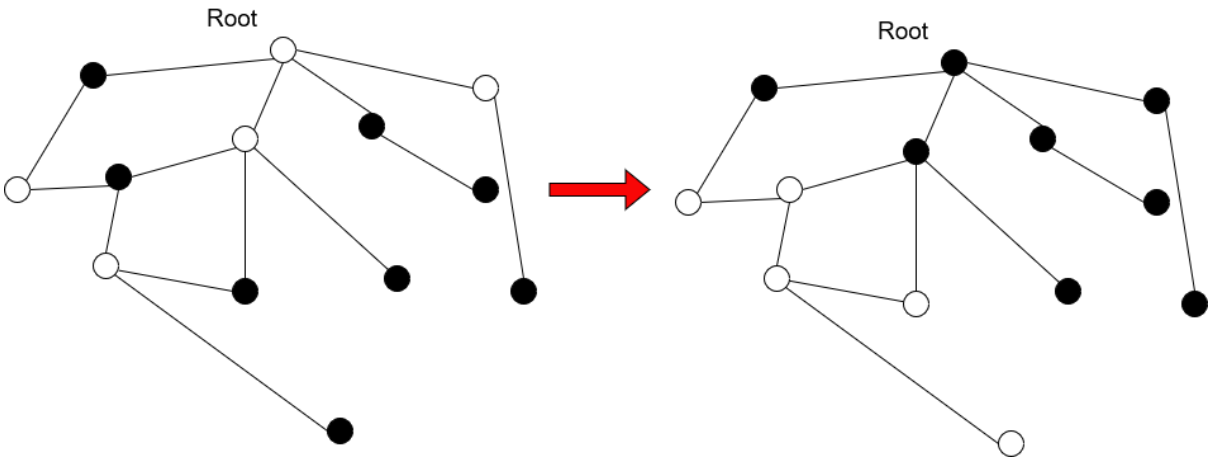

Figure 2: Version on a graph

1.1 Why We Chose It (and Why It Matters)

We chose it because cellular automata are something that we have always been interested in! Our specific problem matters because in a mobile computing environment there is often a need to transfer certain bits of data from some area to another, and our local communication could be thought of as an ad hoc network.

1.2 How it Relates

Our project directly relates to the Majority Classification problem discussed in class as well as CAs.

2 Methods

We plan to use the DEAP library for generating rulesets for our cellular automata. We plan to have a visualization tool that will allow us to visually confirm as a search algorithm to verify the success of the ruleset.

3 Schedule

Below we present our schedule:

Week 1 — Begin building tools for graphs, solve 1-D case.

Week 2 — Starting evolving genetic algorithm on simple graphs.

Week 3 — Attempt to solve more complicated graphs.

Week 4 — stretch goals and document generation.

Week 5 — continue stretch goals and document generation.

We intended for our schedule to have some flexibility! If weeks 1-3 are don't go as smoothly as planned we have the ability for them to bleed over into weeks 4 and 5.

4 Quantifying Success

We have a handful of incremental goals:

1. Solving the Separator Problem in one dimension (figure one).
2. Solving the Separator Problem in simple graphs (e.g. trees).
3. Solving the Separator Problem in more complex graphs.

We will also have some stretch goals depending upon the success of our initial goals:

1. Solving the Majority Classification problem on graphs.
2. Solving the Separation problem with more than 2 colors.
    - In 1-D.
    - On a graph.