Artificial Intelligence Project 1 Proposal

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1 The Problem

The problem is to solve the "Flood-it" game (https://unixpapa.com/floodit/). The game is played as follows

- The goal is to get the whole board to be one color in the minimum number of moves
- You perform a "move" by selecting a color.
- When you select a color c, the top left vertex v is recolored to c, and all vertices adjacent to v of the same color are merged into v.

2 Instance Generation

We will get instances of the problem by randomly generating a 2D grid of integers representing colors. We will then algorithmically convert that 2D grid into a graph as an instance.

3 Algorithms

Our first algorithm that we will implement is A* with heuristics such as total nodes in the graph after recoloring, and degree of the "Blob Node". Our other algorithm will be Beam-Stack Search with similar heuristics.

4 Experimentation

For experimentation we will vary the total number of nodes and the number of colors.

5 Performance Metrics

Percent of instances where it found a solution in under 5 minutes, number of nodes explored, and percent of instances it can solve in a fixed amount of memory.