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For this project I will be looking at two different types of algorithms, Rubik's Cube Algorithms and BFS(Breadth First Search). For the rubik's cube algorithm section, I will be looking at several algorithms that can solve a rubik's cube. I have not chosen which algorithms they will be but at least 2 of them will be analyzed. I will research specific ones and choose to implement them into my own program. I will not implement these myself because that would be beyond the scope of this project. I will be analyzing these algorithms based on several factors including how fast they can solve a cube, how efficient they are and their different time complexities. I will be performing an empirical analysis on these algorithms. Next I will create a visualization of the cube being solved.

The second algorithm I will be looking into is BFS (Breadth First Search) with the METAL graphs, but slightly modified. I will be researching/creating data that has roads on the graphs that have sidewalks. The BFS algorithm will search for these roads in and mark which ones have sidewalks and which ones do not. This will be useful data for people who enjoy walking, biking or running. They can create routes on these main roads and will know which ones have sidewalks. I will analyze different graphs and locations to see how well BFS can find these sidewalks.

I plan to implement this project using Java programs. There are a few milestones for this project. The first one that can be done after the first week is finding my rubik's cube algorithms that I would like to analyze. This can be done by 3/23. Next would be implement these algorithms myself and create a visualization of the rubik's cube. This can be done by 4/3. Next I would perform an empirical analysis on these algorithms, my goal is to have this done by 4/12. Lastly would be to create the sidewalk data, implement it and analyze which my goal is to have done by 4/19. The rest of the time would be to work on the presentation and the writeup.

Progress Report #1 (3/22/2024) -

The goal by this first progress report was to research and find two rubik's cube algorithms to implement and analyze. That is exactly what I have done so far. The first algorithm I found was on Github and can be found at the link <https://github.com/tasosmpourtsouklis/CuBot>. This algorithm has three files within this repository. The Cube.java file is extremely long but only having three files is ideal because it is simpler to look at and understand for the purposes of my analysis. The next algorithm I found can be found at the link https://github.com/BensonJBeck/Java_Rubiks_Cube. This algorithm is slightly different from the first one, it is more condensed. I will be taking both these algorithms and modifying them into my own implementation. This is so both can be visualized, timed and analyzed in the correct way. Now that I have completed my first milestone of finding my algorithms, now is to modify

and implement them into my own java program. Also My next goal is to create a visualization of these algorithms in action. This milestone can be completed by 4/3.