Tristan Pommering Individual Capstone Assessment

I will be helping create a mobile application for android (and possibly IOS). This application is designed to scan an image of a rock climbing course and calculate an optimal path. It will take in some user data such as height, weight, skill level. With that info it would use a path finding algorithm as well as image recognition to create optimal paths for the user. We will be using AI related work as well as mobile app development as the main genres for this project. We planned on making it for Android but if it is simple enough we also plan on allowing it to work on IOS mobile devices as well

There are a few courses that I feel would help me gain a better understanding of how we can tackle this project. CS 4033 Ai Principles and Applications, this course as well as the notes and textbook I feel will be a great resource when we decide how we plan on creating the path finding algorithm. The course covers different topics on pathfinding alone, I feel like this will be a good starting point. The next course I feel will be helpful is ECE 3093C and ENGL 4092, Software Engineering gave a lot of good resources on how we can plan out the entire process which should help us in the first semester as well as prepare the workload for the actual development. Technical Writing should help us document the process in a more professional manner. 2 final classes I feel would help us are possibly CS 4071 Design and Analysis of algorithms, and CS 2028C Data Structures, these classes should offer us some ideas on how we can optimize our algorithms to operate on phone with limited resources as well as structuring the code in an organized way for development.

As for my coop experience I only had time to do 3 terms, I did 2 primary things. 1 was Data Science for Ethicon, I was collecting, analyzing, and presenting results of surgical robots. I feel like this 1 term may not provide much to this specific project unless we have some sort of data we can collect to improve our algorithms. My final 2 terms were at KLH Engineers as a Software Engineer. I was creating software tools for Autodesk Revit in C#. I feel like This coop gave me a lot of skills and ideas I can use to help in this project. The main skill was I developed a tool that uses NSGA 2 Genetic Algorithm, I feel like a genetic algorithm could be a perfect solution to solving complex rock climbing problems in a short amount of time. I feel like the experience I gained working on this gives us a big head start in identifying a possible path forward. The rest were general tools using logic and math to orientate or locate and place things based on specific inputs. I primarily used C# for my development giving me a strong understanding of OOP as well as development of tools and integrating them into an application.

I didn't have many ideas for a senior design project, all I could think of was general topics I wish to cover to gain a deeper understanding of it. One of those topics was mobile app development. Another was the use of AI to solve a problem. The group I joined wanting to create a mobile app using AI felt exactly like the challenge I was looking for. I also felt confident with my coop experience that I could at least give some insight on pathfinding AI as I worked with similar problems during my coop. This project will be a challenge as I am doing something new and hopefully using my coop experience to assist me in helping the team. I don't know much about rock climbing either, so I look forward to exploring the new hobby that the other group members enjoy.

For a preliminary approach to the problem there seems to be 3 major problems. Creating a mobile app that is simple and easy to use for the user, scanning an image and identifying "rocks" as

these will be the point used for the path finding. On top of that we may have to add some extra information for complex courses with depth that the image may not showcase such as courses that expand outward or inward. The final challenge which I feel like will be the hardest part of the project is the actual pathfinding AI, I feel like this will be difficult as with rock climbing you have your core point as well as your arms and legs. To create an optimal path, we need to find a way that allows our arms and legs to work together to find a good way up. The shortest path up may not be the best for a given user as they may have long or short limbs that create conflict with the path. I expect to get experience in mobile app development as well as working more with AI and photo recognition algorithms. We plan to document our own work separately as well as plan out equal workload with weekly updates for progress or help if needed. I feel like if my coop experience with genetic algorithms helps us with this problem then I played a fair role in this group. We will know we are done when we have a working app for at least Android that scans a picture and creates a path. This path will be evaluated by experienced climbers to see if the AI generated solution is good enough.