AA 228 Final Project Proposal

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For the final project, we are planning on tackling the game of RISK – the popular game whose name conveniently alludes to the topic of uncertainty. At a high level, we aim to solve the problem of the ideal strategy to conquer the world in the game of RISK. Inherent to the game of RISK is a great deal of uncertainty with dice rolling, which introduces *outcome uncertainty* when players go head to head for a territory. The attack-defense game-play ensures that certain strategies will have more success; however, nothing is guaranteed. Gameplay changes significantly depending on opponent troop placement and the number of troops per turn your opponent receives. In addition, RISK contains an aspect of uncertainty in the RISK cards. RISK cards allow you to create sets of 3 which give you more and more one-time troop placements as the game progresses. These cards are hidden, meaning that while players can see most of the board and the troops other players have, there is a level of *state uncertainty*, as players don't know the fully true state of the game. RISK provides additional strategic opportunities such as taking over certain continents. Since there are other players in the game and many strategic options to choose from, there's also a great deal of *interaction uncertainty* in this game, as you don't necessarily know how the other players are going to interact with the game or what moves they will choose to make. However, this project may have some issues with the size of the state space of this game. The nature of the board means that there's an exponentially large number of board states, and the number of different actions a player can take per turn is very large. Since the correct choice for any given turn can depend on many aspects of the current board state, this can lead to issues in computational runtime. It would help to characterize the board state with a single factor such as its win probability, but this would require large amounts of data from previously played RISK games to evaluate. Overall, there are many strategic aspects to consider, as well as a great deal of uncertainty. Therefore, many questions remain to be answered in Decision Making. Where should our automated decision-maker attack? Where should they place their troops? When should they turn in their cards for more troops? How aggressive should their conquering strategy be? How will gameplay change when you are playing against 1 player compared to playing against 3 players?