Project Proposal

Domain description and goals

The goal of the project is to develop a Blackjack strategy using Reinforcement Learning techniques. The base setting is having a single player play against the bank without any other players at the table. For the rules of Blackjack, we referred to the following website: [Blackjack Guide | Official Game Rules](). The side rules mentioned on the page (i. e. Insurance, Surrender, Splitting and Doubling Down) give us the option to increase complexity if needed.

Methodology

The game of Blackjack can be formalized as a Markov Decision Process, where the states represent the various combinations of player's and dealer's cards, and the actions are the available moves. We intend to use Q-Learning to approximate an optimal strategy. We may also investigate other algorithms if Q-Learning performs not as expected.

Experiment design

To evaluate the performance of our method, we will let it play for a long period and then compare its winnings to the expected return in Blackjack. Existing solutions could be other known strategies such as the Basic Strategy. We could research expected returns on those strategies or implement and test them ourselves, before comparing them to our solution. The measure for success will always be the return after a given period. Checking the robustness on variations of the problem would require us to adapt our method to include more actions.

Expected results

We expect our method to yield a Blackjack strategy that leads to higher winnings or lower losses than other known strategies. Because Blackjack in the real world is designed to make money for the casino, we still expect the return after a long period to be negative. It is possible that our model will not converge quickly enough to yield the expected results.

Authors: Matteo Biner, Benno Thalmann