

# Abstract Learn2Win

In our project we set out to develop an AI for football bets. The main goal was to test whether the betting odds can be exploited by a simple AI without any surrounding knowledge such as player skill, health, team performance and without even knowing which teams are playing against one another.

Our main target was to train an agent, that should be able to not only predict the outcome of one singular match and place bets according to a pre-formulated strategy, but to devise a strategy for betting on one or more matches on a given matchday, for a number of consecutive matchdays. We decided to use Reinforcement Learning (RL) as our approach, employing the A2C learning to train our agent.

For the input data we took lists of betting odds from betting providers. We prepared the data and split it in training and test data in order to later verify our trained model.

The environment we use for experimentation is built from scratch and models a Markov decision process, in which the current observable state equals the combination of money the agent has left as well as the odds of the matches on the current match days. Then the agent takes an action in the form of placing bets on the three possible outcomes of each match (home team win, draw, away team win) over 10 matches and has the option to not bet everything (saving for the next episodes). An episode concludes with the reward that the agent receives depending on the bets it has placed.

Through experimentation we found a reward function which enables the agent to learn from the training data and build a model that is profitable when applied to the training data. As we were unable to generalize from the set of training data to the previously set aside test data, we conclude that an exploitation of purely the betting odds is not feasible with our limited approach. We tested our approach on rigged odds and find that our agent can devise a winning strategy if the odds allow for one.

Our paper follows the structure as described above. Chapters 1 and 2 give a short introduction to our project and an overview over similar project. Chapter 3 contains information on the preparation and usage of data in our project. In chapter 4 we describe the environment we use, as well as the agent and training we employ. The experiments we conducted regarding the reward function and the strategy analysis are described in Chapter 5, and we finish with our conclusion in Chapter 6.