Exploiting Betting Market Inefficiencies with Machine Learning

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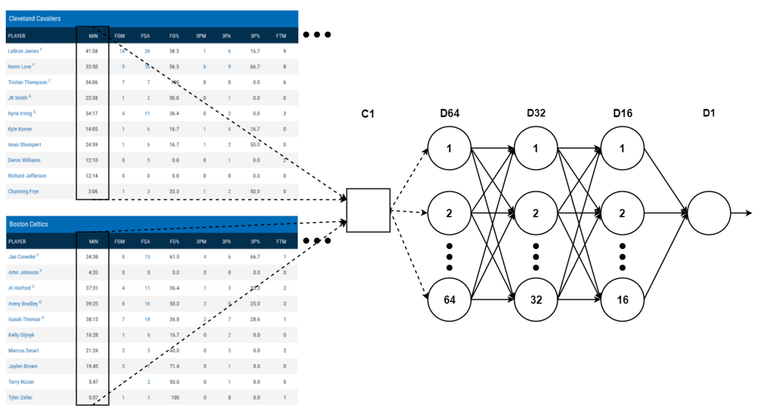
Problem Statement

In this work, we focused on predictive sports analytics in the context of betting markets. Our goal was to profit from the market. Betting markets thus served for validation of our findings as well as a subject of our research inquiry by themselves. To assess the theoretical profits of the model, authentic simulation of betting had to be implemented. The resulting evaluation criterion of the models' was their profitability.

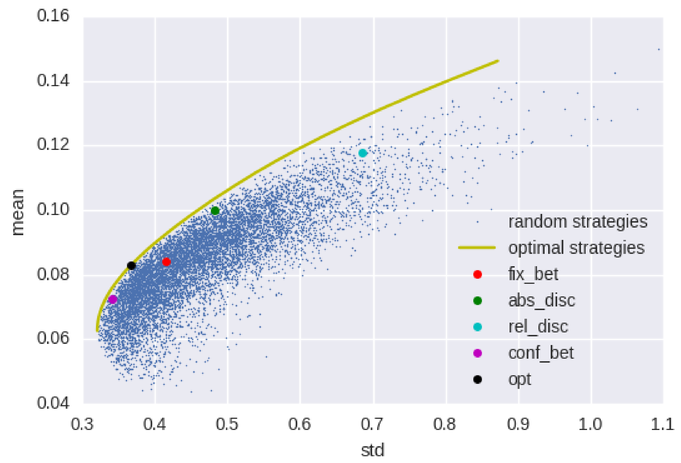
Procedure

- We gathered historical statistics from 15 NBA seasons on both team and player level
- We transformed the data into datasets
- We analyzed bookmaker's odds to find possible exploits
- We learned neural models for predicting the outcomes of the games
- We proposed a betting strategy that maximizes the profit while minimizing the risk
- We tested several ways how to decorrelate with the bookmaker



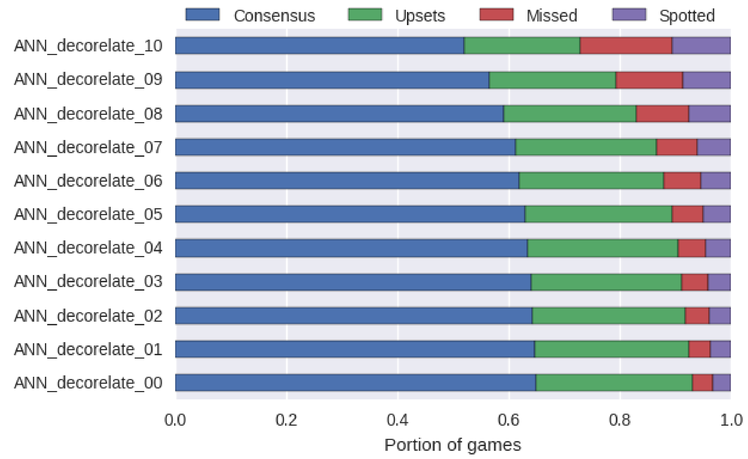
Observations

- Bookmaker is perfect on average
- Higher prediction accuracy does not necessarily lead to profit
- Decorrelation with the bookmaker is desirable
- Commonly used betting strategies are highly suboptimal
- Modern Portfolio Theory can be used in sports betting context



Decorrelation

- Simulations confirmed that decorrelation from the bookmaker leads to higher profits
- Decorrelation increases the number of *Spotted* opportunities (correctly identified outsider wins)
- We enforced the decorrelation by embedding it into the loss function used for training the neural models
- Not using bookmaker's odds as an input for the model reduces the correlation
- We also experimented with weighting the outsiders' wins in the learning process



Results & Conclusion

- The proposed (opt) betting strategy outperformed other known strategies
- We introduced convolution as an effective way to aggregate players' statistics
- Following our strategy and the convolutional model would result in increasing the bettor's wealth **~25x**
- The bettor can increase his ROI (over 1 week) by up to **2.5 %** when being more selective about his bets
- Enforcing decorrelation with the bookmaker in learning process lead to increase of ROI by up to **1 %**