Bernoullis Tafelrunde

Graduate Student Seminar

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Virtual seminar

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Modeling Auctions: Winning Bets, Betting on Wins

Abstract

We start with a typical real-world economic situation: business is increasingly awarded to companies based on winning auctions for tendered offers, pitting competitors against each other. We analyze such auctions in more detail so that the probability of winning a contract can be maximized.

We model the distribution of historical auction data and use such distributions to infer the probability of winning/losing a tender given an own price and a known competitor set with assumed offering prices. This entails looking at the number of auctions and bidders, at prices offered and at bids won. Typical points addressed are finding underlying structures and distributions, using detours into game theory (how to win an auction), sports betting (setting quotas) and extreme value distributions (addressing information asymmetry). To find valid distributions we (parametrically) fit data to various (extreme value) distributions or (non-paramerically) by kernel density optimization algorithms. As an alternative we present a machine learning approach to this problem via gradient descent and XGBoosting.

We generalize the steps from economics into game/auction theoretic base models. Specification of theoretical model parameters, construction of suitable estimators and fitting the model to actual data is discussed. Optimizing residuals and parameters leads to a model suitable for statistical inference and final back-translation into economic terms in order to solve the original business question.