

TJHSST Senior Research Project Proposal: The Unique-Bid Auction 2006-2007

David Phillips

September 13, 2006

Abstract

My interest within Computer Science is using Java to model economic situations and determining the effect of variables on them:

- Project area: The effect of size and information on unique-bid auctions

Keywords: economics, unique-bid auction

1 Introduction: program versions

1.1 1st Quarter

The first version of the project will be devoted to establishing the auction in a single human player format. It will run the auction on one computer through a GUI. After defining the parameters of the scenario (maximum bid, minimum bid, number of opponents, number of wins, total games played), the player will submit a bid that he or she thinks will be the highest unique bid. He will be playing against robots with simple strategies (random in top 5 percent of range, random in top 10 percent, random in top 15 percent, previous winning bid, at most 5 from the highest value, average of previous 2 winning bids). Also, a table of the player's history (previous bids and whether they were successful) will be displayed. If he does indeed have the highest unique bid, then his statistics will change and a new round will start.

All relevant data will be exported to a file and other programs will be written to process the data from the file.

1.2 2nd Quarter

The second version of the project will be devoted to processing the results and displaying them graphically. It will include programs that will, given the bids from each player in the previous round,

1. display a table of the bids, with the winning one distinguished,
2. display a distribution graph, again, with the winning value distinguished,
3. a table that compares the strategies used by the different robots and determines which one has performed best, and
4. recreate the entire experiment by displaying distribution graphs of each round, distinguishing the bids submitted by the top 3 performers.

1.3 3rd Quarter

The third version of the project will be devoted to networking computer so that players could bid against eachother. The program will run multiple scenarios varying the number of bidders in each pool and the amount of information that is given (in other words, how they will behave differently when they are given the distribution graphs) and save the results. After the program is completed, I will observe the difference in performance in each of the different treatment groups.demonstrate how to start a new paragraph.

2 Appendix: The Unique-Bid Auction

The following paragraphs are from "Unique-Bid Auction" on Wikipedia.

2.1 Definition

Unique bid auctions are a type of lottery in which the participants bid for a particular item by submitting blind or sealed (ie secret) bids: the winner is the bidder who places the highest (or, in some variants, the lowest) unique

bid. A "unique" bid, in this context, means one in which the amount offered is different from that offered by any other participant.

In unique bid auctions, it is normal for bidders to be charged for placing their bid. The seller's payment includes the total of these charges, as well as the actual amount bid by the winning participant. For the buyer, the attraction is that they may acquire an item at well below its true value. This type of auction may be regarded as having some of the elements of a normal auction (placing bids) and of a lottery (paying an entry fee and guessing the bids which may be made by other participants).

2.2 Variants

The two most common types are maximum and minimum bid auctions. In a Maximum bid auction, a limit is set for the maximum amount that can be bid. The highest unique bid when the auction is closed wins the auction.

In a minimum bid auction the procedure is the same but the lowest unique bid wins.

2.3 Example

For example, a maximum bid auction sets a limit of 10 and the highest ten bids on the auction are:

10.00, 10.00, 9.99, 9.99, 9.99, 9.98, 9.97, 9.96, 9.96, 9.96.

The bidder who placed a bid of 9.98 would be the highest "unique" bid and therefore the winner.

In a typical real example, a car worth 20000 might be offered to bidders at a maximum bid of 100. The winning bidder would get the car at a price well below its retail value. If the auctioneer charges 10 a bid then they would need to get 2000 bids to cover the cost of the car. Once the auctioneer has received 2000 bids, any more bids would result in the auctioneer (or the seller) making a profit.

2.4 Strategy

Assuming there was an optimal strategy for unique bid auctions, all players would come to the same conclusion about what the optimal bet(s) should be, thereby invalidating the same strategy. Therefore, by proof by contradiction, there exists no optimal strategy for a unique bid auction in the general case.