

# AdX Trading Agent Competition: Agent Vickrey

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## 1 Introduction

Our agent participates in the AdX Trading Agent Competition, which, at its core, is a Second Price Auction. This implies that bidding close to our true valuation will be a weakly dominant strategy.

## 2 Agent's Strategy

In this section, we explain the rationale behind the key points of our strategy:

- We (mostly) bid only in the market segments encompassed by the campaign.

Reason: We will not make any profit in any other market segment.

- We bid only in the market segments of highest level of granularity (highest specificity).

For example, if the market segment is "Male", we will bid individually in "Male-Old-High-Income", "Male-Old-Low-Income", "Male-Young-High-Income" and "Male-Young-Low-Income".

- **Specificity Multiplier**

Based on the specificity of the market segment, we multiply the calculated bid with the inverse of the specificity factor.

In general, the narrower the market segment, the higher the specificity factor.

From high to low specificity, possible multiplier values experimented with are:

- Exponential trend: (4, 2, 1), (9, 3, 1), (16, 4, 1)
- Inverse exponential: (1, 2, 4), (1, 3, 9), (1, 4, 16)
- Uniform: (1, 1, 1), (2, 2, 2), (3, 3, 3)
- Linear: (3, 2, 1), (6, 4, 2), (9, 6, 3)
- Inverse Linear: (1, 2, 3), (2, 4, 6), (3, 6, 9)

- **Distribution**

Deciding what fraction of reach is to be targeted in each marginal market segment of a given market segment. There are three strategies we have experimented with:

- **Low Risk**

Bid value proportional to true fraction of population in each marginal market segment.

- **Medium Risk**

- \* High Specificity: 1 bid to given market segment

- \* Medium Specificity: 2 bids, one to each marginal market segment.

- Low population marginal market segment (A): Reach factored to  $2/3 * \text{population(A)}$

- High population marginal market segment (B): Reach factored to  $1/3 * \text{population(A)} + \text{population(B)}$

- \* Low Specificity: 3 bids (instead of 4), one to each of the top three populated marginal market segments.

- Highest population (A): Reach factored to  $\text{pop(A)} / (\text{pop(A)} + \text{pop(B)} + \text{pop(C)})$

- $2^{\text{nd}}$  highest population (B): Reach factored to  $\text{pop(B)} / (\text{pop(A)} + \text{pop(B)} + \text{pop(C)})$

- $3^{\text{rd}}$  highest population (C): Reach factored to  $\text{pop(C)} / (\text{pop(A)} + \text{pop(B)} + \text{pop(C)})$

- **High Risk**

Same as Medium Risk strategy, except in Medium Specificity:

2 bids, one to each marginal market segment.

Low population marginal market segment (A): Reach factored to  $1/2 * \text{population(A)}$

High population marginal market segment (B): Reach factored to  $1/2 * \text{population(A)} + \text{population(B)}$

- **Safe Play**

If the Budget for a round is  $\leq 0.1$  (which implies that the Quality Factor is 0 for that round, we play safe by releasing a simple Bid of value 1 to approximately achieve half the reach.

- **Aggressiveness**

A small fraction (0.05 as of now) of our budget is allotted to consuming reach of other (narrow) market segments, so as to resultantly reduce the profit of other agents in the competition.

- **Reach Based Risk**

For a given category of specificity, we evaluate whether the given reach in the campaign is "high" , "medium" or "low", based on the average

population of market segments of that category.

- If the reach is high, we go for a low risk distribution strategy.
- If the reach is medium, we go for a medium risk distribution strategy.
- If the reach is low, we go for a high risk distribution strategy.

## References