Bidding Strategies in Sponsored Search Auctions: Advertisers with Diverse Objectives

Research in progress

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1. Introduction

- Sponsored Search Advertisements
- Auction
1. Introduction

• Ad Network

• Most literatures are based on the assumption that advertisers always want to be at the very top of slots.

• However, in reality, different advertisers have different objectives.

• What are the bidding strategies to reach the advertisers’ objectives?
2. Identification of Bidding Strategies

• Taxonomy of bidding strategies developed by Bapna et al. (2004) and advanced by Goes et al. (2012)

• Bapna et al. (2004)
  • Isolated Yankee auction
  • Time of entry (TOE)
  • Time of exit (TOX)
  • Number of bids (NOB)

• Goes et al. (2012)
  • Sequential auctions
  • Time since last auction (TLA)
2. Identification of Bidding Strategies

**General bidding behaviors (Bapna et al. 2004)**

- **Participator**
  - Low TOE, high TOX, high NOB

- **Evaluator**
  - Low or medium TOE, NOB ≈ 1, TOX ≈ TOE

- **Opportunist**
  - NOB ≈ 1, high TOE, high TOX

**Goes et al. 2012**

- **Recurrent**
  - Low TLA

- **Intermittent**
  - High TLA
2. Identification of Bidding Strategies

**K-means clustering**

- Minimize intra-cluster distance and maximize inter-cluster distance
- Number of clusters $K$ is the one with the smallest validity

$$\text{validity} = \frac{\text{intra} - \text{cluster distance}}{\text{inter} - \text{cluster distance}}$$

**ANOVA**

- Test if there are significant differences among the clusters
3. Conceptual Model and Research Questions

Diverse Objectives

• Type one: place the advertisement in the very top of the list
• Type two: place the advertisement as long as possible with limited budget but not care much about the rank
• Type three: beat the rivals, placing the advertisement on the upper slot of their competitors

Quality Score

• (Quality score) X (bidding amount) → slot
• Higher position attracts more clicks from consumers (Ghose & Yang, 2009)
• Consumers can click the ads based on their knowledge, quality, and other advertisements on the list so that profits are often higher at the middle positions (Ghose & Yang, 2009; Rutz et al. 2011)
• In order to avoid some disadvantage, advertisers with different quality scores have different bidding strategies (Jerath et al. 2011)
3. Conceptual Model and Research Questions

- Conceptual Model of Bidder’s Strategy

Advertiser’s objective
(Type 1
Type 2
Type 3)

Quality Score

Bidding Strategy in the Auction
(Clusters defined with [TOE, TOX, NOB, TLA])

H1

H2
3. Conceptual Model and Research Questions

- Opportunists have higher winning proportions than participators and evaluators (Bapna et al. 2004)
- Participators are good at maximizing surplus (Bapna et al. 2004)
- Bidders use jump bidding to signal their valuation of auction, deter competitors, and increase bidder’s likelihood of winning (Avery 1998; Daniel & Hirshleifer 1998; Simonsohn & Ariely 2008; Easley & Tenorio 2004)
- Early evaluators, who place only one bid early in the auction, bid higher than the current bid in order to win (Bapna et al. 2004)

H1a: Advertisers who want their advertisements to be at the very top of the list (type 1 objective) are likely to adopt opportunistic strategies
H1b: Advertisers, who want to place their ads as long as possible with limited budget, not caring much about their ranks (type 2 objective), are likely to adopt participation strategies
H1c: Advertisers who want upper slot than their competitors (type 3 objective) are likely to adopt evaluator strategies
3. Conceptual Model and Research Questions

- Position paradox (Jerath et al. 2011)
- A superior firm, which is famous and has high quality score, are likely to bid lower than an inferior firm, which wants to be on the top of search results in order to get more clicks from consumers
- However, although superior firm is positioned on lower rank, consumers click its link frequently, but the inferior firm gets fewer clicks
- Still, the inferior firm wants to pay more to be on the top because it has incentives of showing themselves to consumers

| H2a: Advertisers with lower quality score are likely to adopt opportunistic strategies |
| H2b: Advertisers with higher quality score are likely to adopt participation strategies |
4. Conclusion and Ongoing Research

- Three different types of objectives for advertisers
  - Type 1: place the advertisements on the top position of slots
  - Type 2: place the advertisements in the middle so that they can maximize views but minimize costs
  - Type 3: place the advertisements on the higher position than their rivals

- Bidding strategies
  - Participator, evaluator, opportunist
  - Classified with four variables: TOE, NOB, TOX, TLA
  - K-means clustering analysis

- Multinomial logistic regression model to explain the choice of bidding strategies

- If there is better strategy that meets advertiser’s objective, I will show how much difference there is between the results of current strategy and expected results of better strategy

- If the ad network is not likely to change the strategy although there is better one, it will be interesting to approach this problem with perspective of principal-agency problem