Does dynamics in an auction matter in predicting the end-price?

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Introduction

Online auctions has been widely studied today, and a wide variety of algorithms have been proposed to predict the end-price. However, most past research treats data from online auctions as cross-sectional and ignores the dynamics of an ongoing auction.

This study focuses on two dynamics of an ongoing auction: the dynamics of bidding in the current auction and of other auctions.

Research Question

The goal is to explore that does dynamics happening during an ongoing auctions play an important role in predicting the final price?

Data

The eBay dataset employed contains 628 auctions ended between December 2012 and January 2013, including 136 auctions of Cartier wristwatch (Cartier), 343 auctions of palm pilot M515 PDA (PDA), and 149 auctions of Xbox game console (Xbox).

Figure 1(a) shows the end-price of auctions for items within each of the three categories, and figure 1(b) shows the bidding history in a PDA auction.

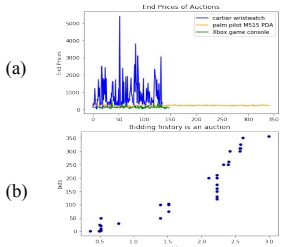


Figure 1. (a) End prices of all auctions. (b) Bids arrived within one auction.

Methods

- **Dynamics in the current auction**
  Two groups of parameters are used to capture this dynamics.
  1. Number of early and late bids (0.02 of total lasting time suggested by figure 2a).
  2. Coefficients from 33-degree Chebyshev polynomial estimation on bidding history (figure 2b)

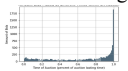
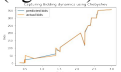
(a)  (b) 

Figure 2. (a) Aggregated Bidding History. (b) Chebyshev estimation of a Cartier auction.

- **Dynamics of other auctions**
  Two parameters are used to capture this dynamics.
  1. End-price of the last recently-ended auction of a same-category item.
  2. Average end-price of ten recent auctions of similar items.
- **Multiclass Classification**
  Three classifiers are used to predict the end-price in $20 intervals (less than 10% of average price of Cartier, PDA, and Xbox items).
  1. Decision tree classifier
  2. Supporter vector machine classifier
  3. K-nearest neighbors classifier

Results

- Table 1. Suggests that Decision Tree classifier is the best classifier for prediction for items of all categories.

	Decision tree	SVM	KNN
Overall	0.27	0.12	0.10
Cartier	0.43	0.10	0.15
PDA	0.75	0.49	0.06
Xbox	0.73	0.13	0.03

Table 1. Classifier accuracy averages from 10-trials.

- The end-price of items in categories with drastically oscillated price is hard to predict (figure 3).

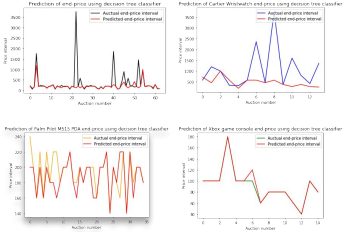


Figure 3. Actual price interval versus Predicted price interval.

- Parameters representing the dynamics yield relatively accurate prediction, indicating the importance of dynamics in end-price prediction.