Analysis and Modeling of Lowest Unique Bid Auctions

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Outline

- Introduction
  - What is Lowest Unique Bid Auctions (LUBA)?
  - Problem Definition
- Dataset
- Analysis
  - Network Analysis
  - Winners under the Lens
  - Profit Analysis
- Synthesis
  - Modeling user behavior in LUBA
- Conclusion

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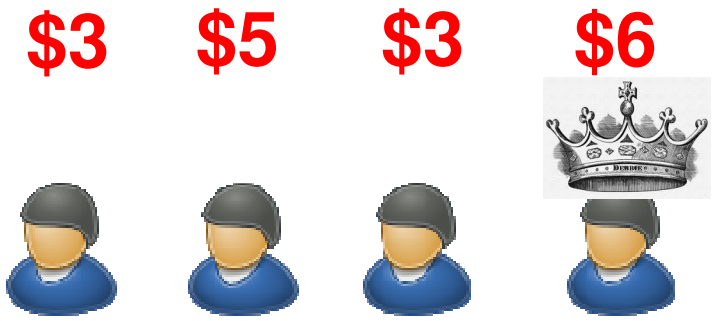
Lowest Unique Bid Auction (LUBA)

Quite popular in many European countries

Winner is the bidder whose bid is **lowest** and **unique**

General Auction



LUBA

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Problem Definition

- **Analysis:**
  - Whether bidders learn from their experiences or participations?
  - Whether this mechanism is a game/lottery/scam?
  - On what parameters do winners rely on?
  - Can winning be correlated with activity, co-activity, value of item, competition etc.?

- **Synthesis:**
  - Modeling LUBA which explains user behavior

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Dataset

- We collected data from uniquebidhomes.com

[Radicchi et al., PloS ONE, 2012]

Number of Auctions	189
Number of Bidders	3740
Number of Bids	55041

- Detailed information of all parameters of auction (value etc.) and bid (amount, timestamp etc.) are collected

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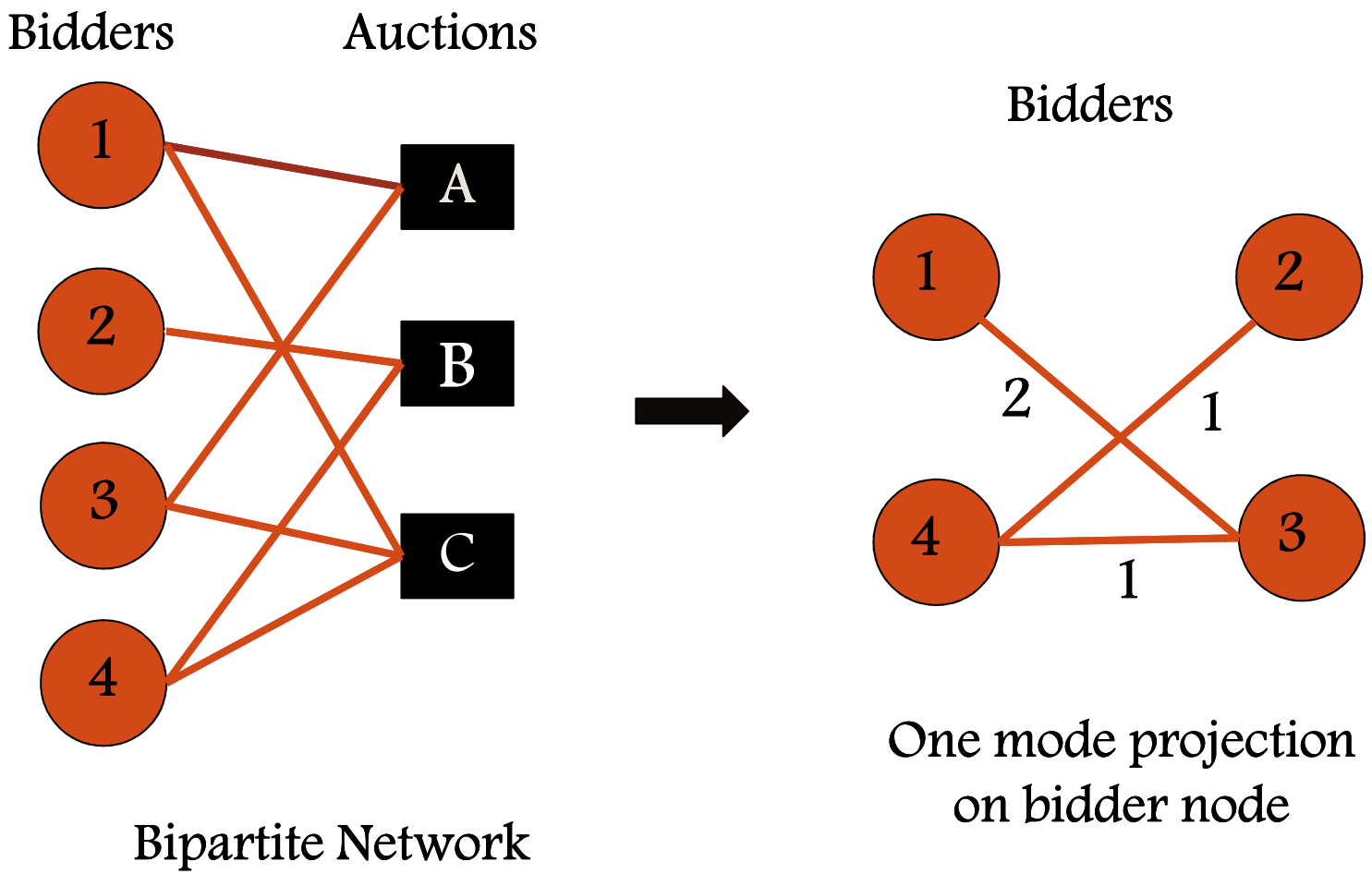
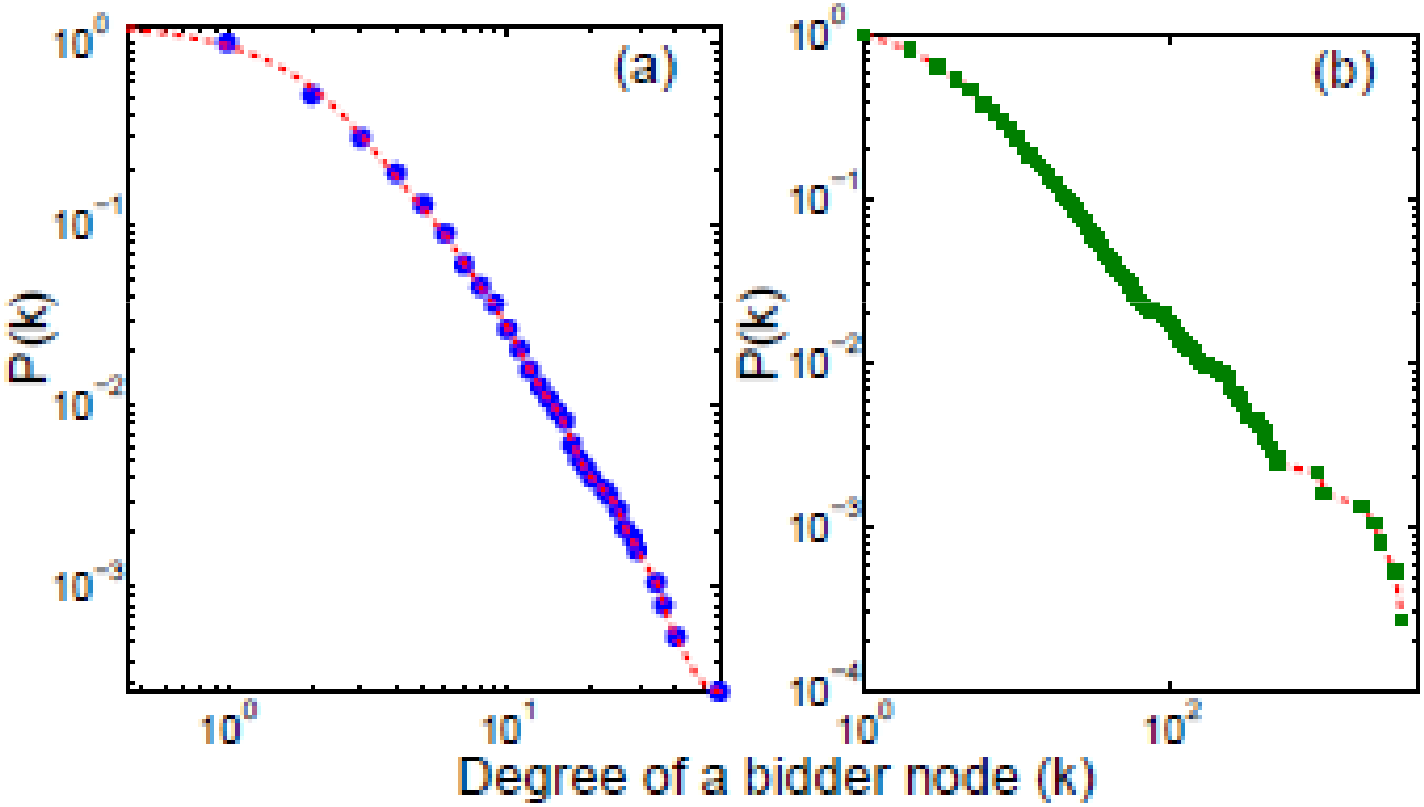
Bidder-Auction Bipartite Network



Bidder–Auction Bipartite Network

Cumulative degree distributions of bidder nodes



(a) Unweighted one mode projection.

(b) Weighted one mode projection.

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Top winners

- Out of 3740, only 52 bidders won at least one auction.

Seems to be an addiction

- Top 5 winners

Seem to be very efficient

  - Participated 70% auctions
  - Won 57% of auctions

Are they so ???

Top winners: Other Properties

- "Mean Item Value" per bidder => Bid Selection

Avg: 76421.61

Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
-52%	+154%	+211%	+284%	+190%

- "Mean Number of Bids" per bidder => Aggressiveness

Avg: 5.81

Rank1	Rank2	Rank3	Rank4	Rank5
59	58	24	94	34

- "Mean Number of other Bidders" per bidder => Competition

Avg: 50

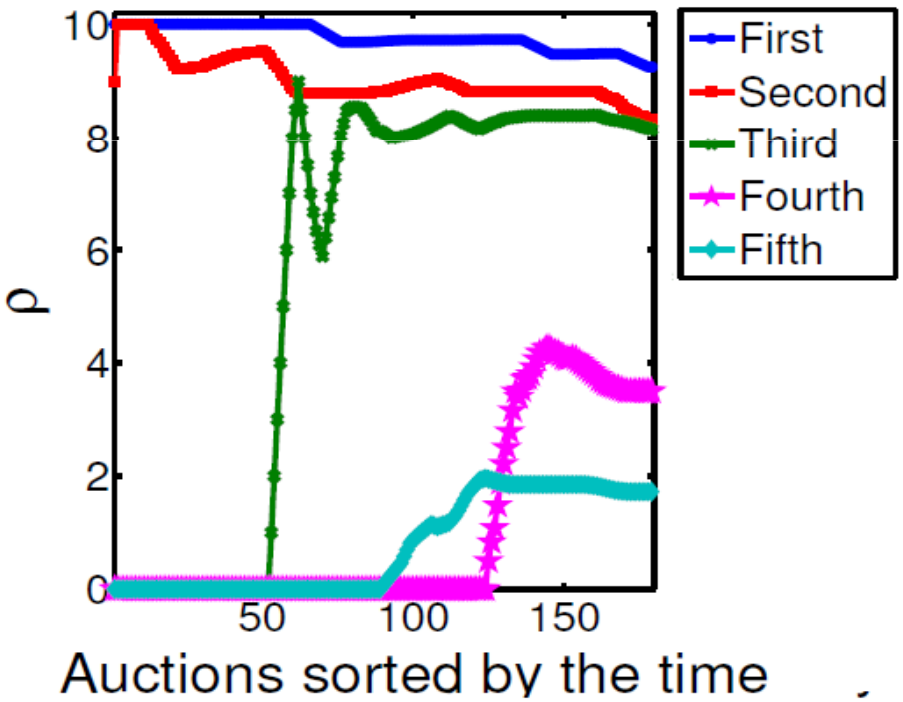
Rank1	Rank2	Rank3	Rank4	Rank5
30	87	101	124	91

Top winners: Other Properties (Contd…)

of wins might not be an efficient measure

ρ = Number of wins per participation for each user

	Rank based on ρ
Rank 1	3
Rank 2	4
Rank 3	5
Rank 4	13
Rank 5	35



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Profit per bidder: Formulation

Item

Actual price:
$1000

Bidder A (Winner)

A's Bids

Bid fee	Bid value	
$2	**$0.02**	
$2	**$0.04**	← Winning bid
$2	**$0.05**	
$2	**$0.06**	

A's Profit = $1000 – ($2 × 4) - $0.04

= $991.96

Profit per bidder: Formulation

Item

Actual price:
$1000

Bidder A
(Loser)

A's Bids

Bid fee	**Bid value**
$2	**$0.02**
$2	**$0.04**
$2	**$0.05**
$2	**$0.06**

A's Profit = – ($2 × 4)

= - $8

Winners are not Gainers !!

- 99% of the bidders are in loss => Chance of addiction ???
- Among **top 5 winners** => only **2 are in top 5 high profit bidders**
- **Winners are in loss**, even **top most winner** who won **37/40** has **Net Profit -1127**
- **High loss** in an auction generally **followed after a win**
- **Top two winners win with losses** => **Crazy / Scam ???**

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  - **Modeling user behavior in LUBA**
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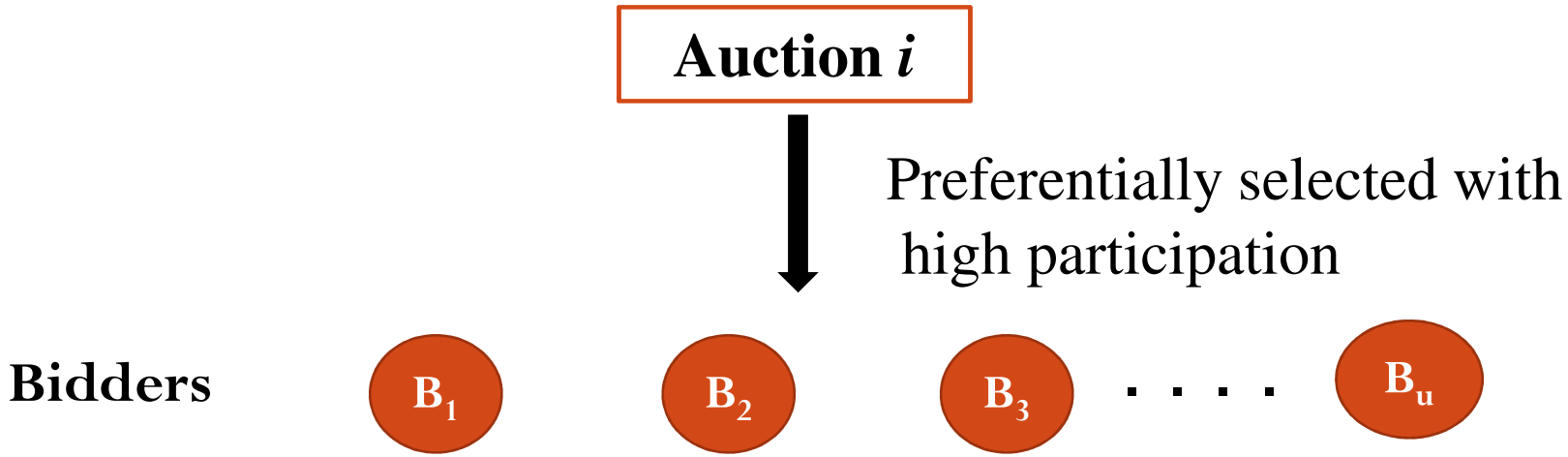
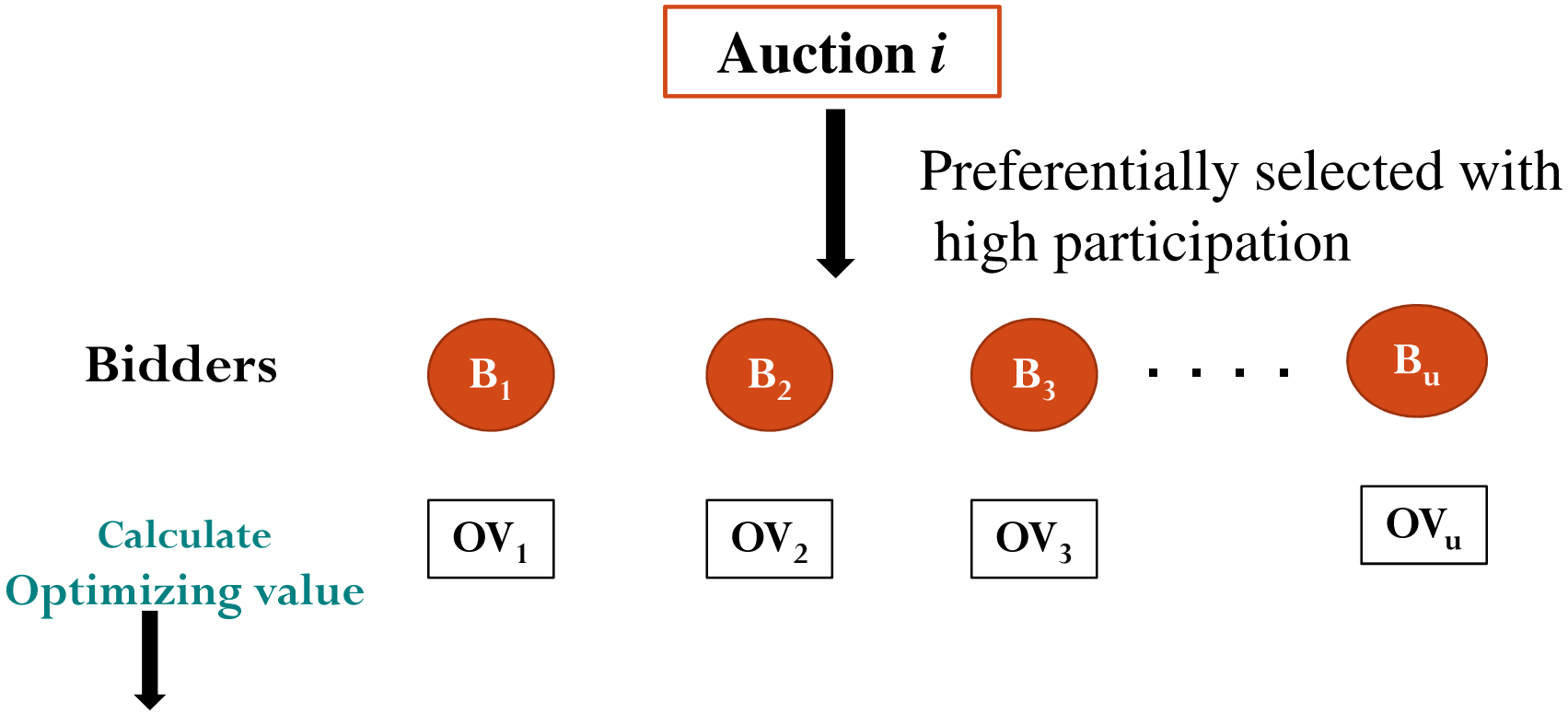
Memory-driven Agent Based Model

Auction *i*

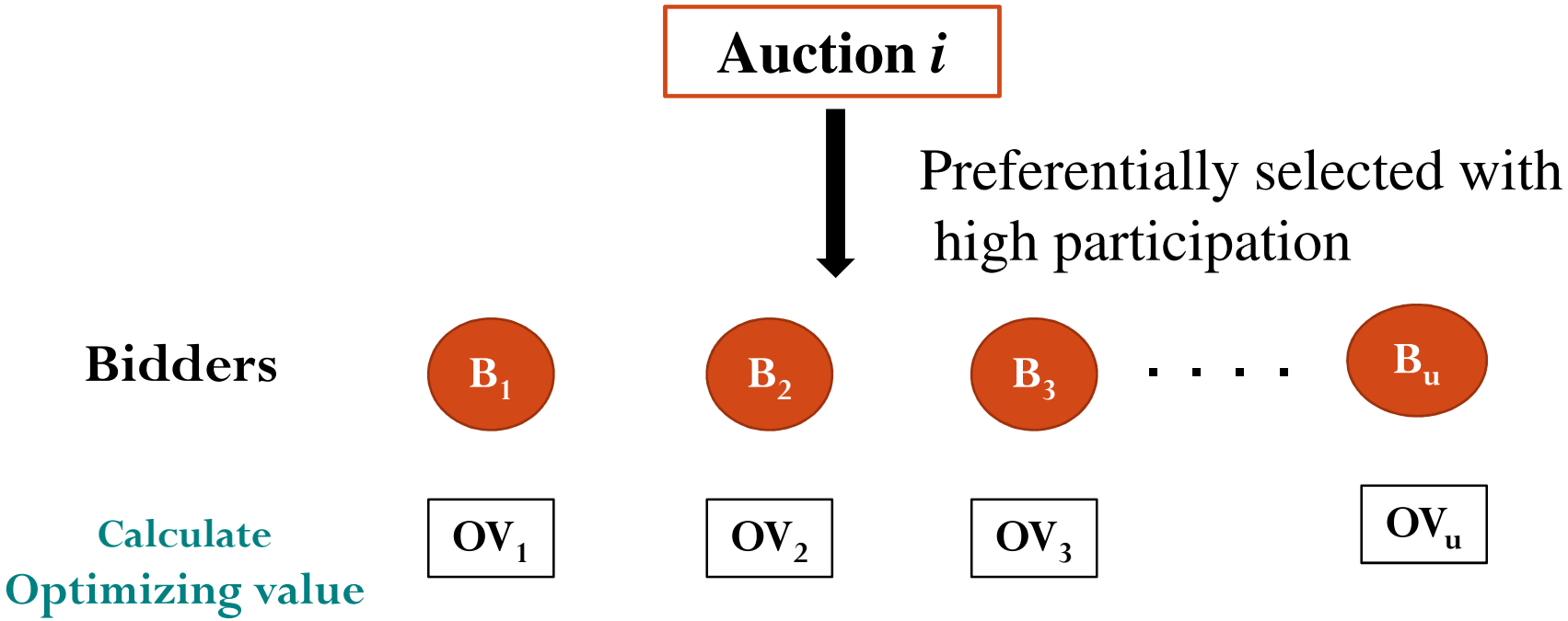
Memory-driven Agent Based Model



Memory-driven Agent Based Model

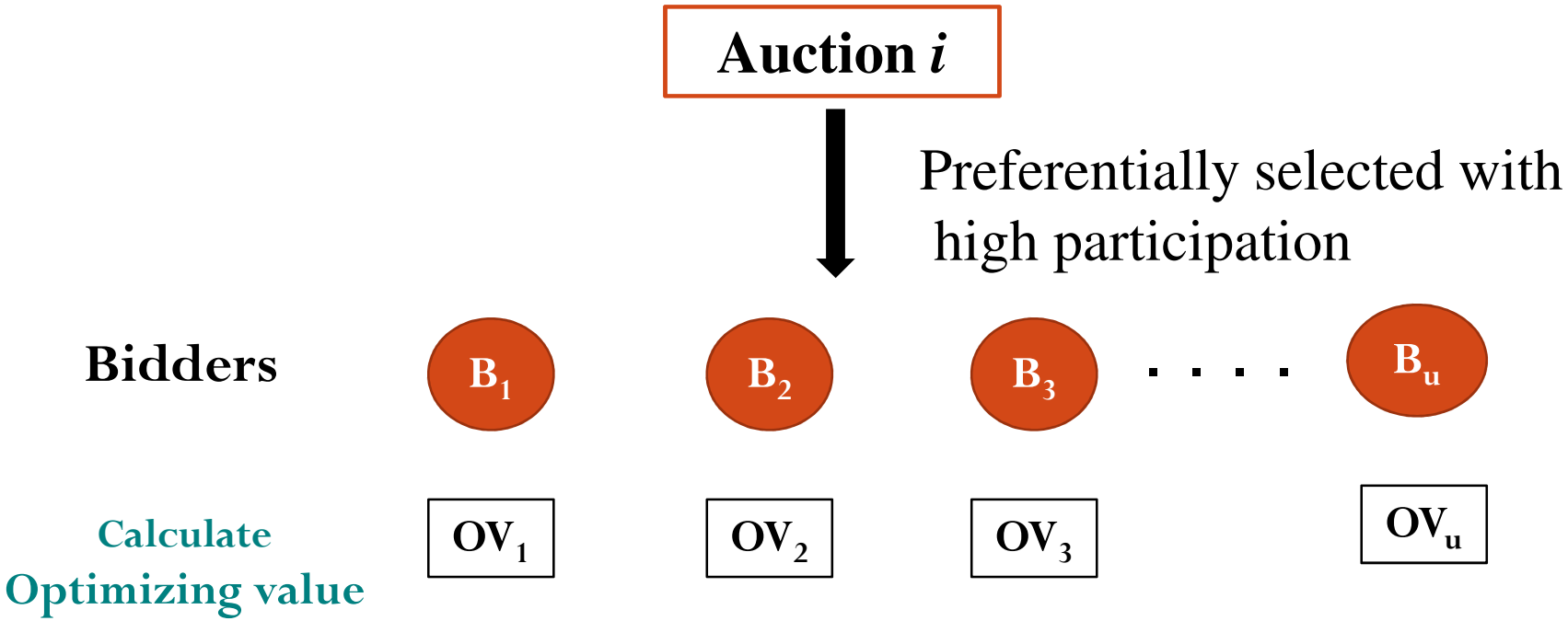


Memory-driven Agent Based Model



Start Bidding:

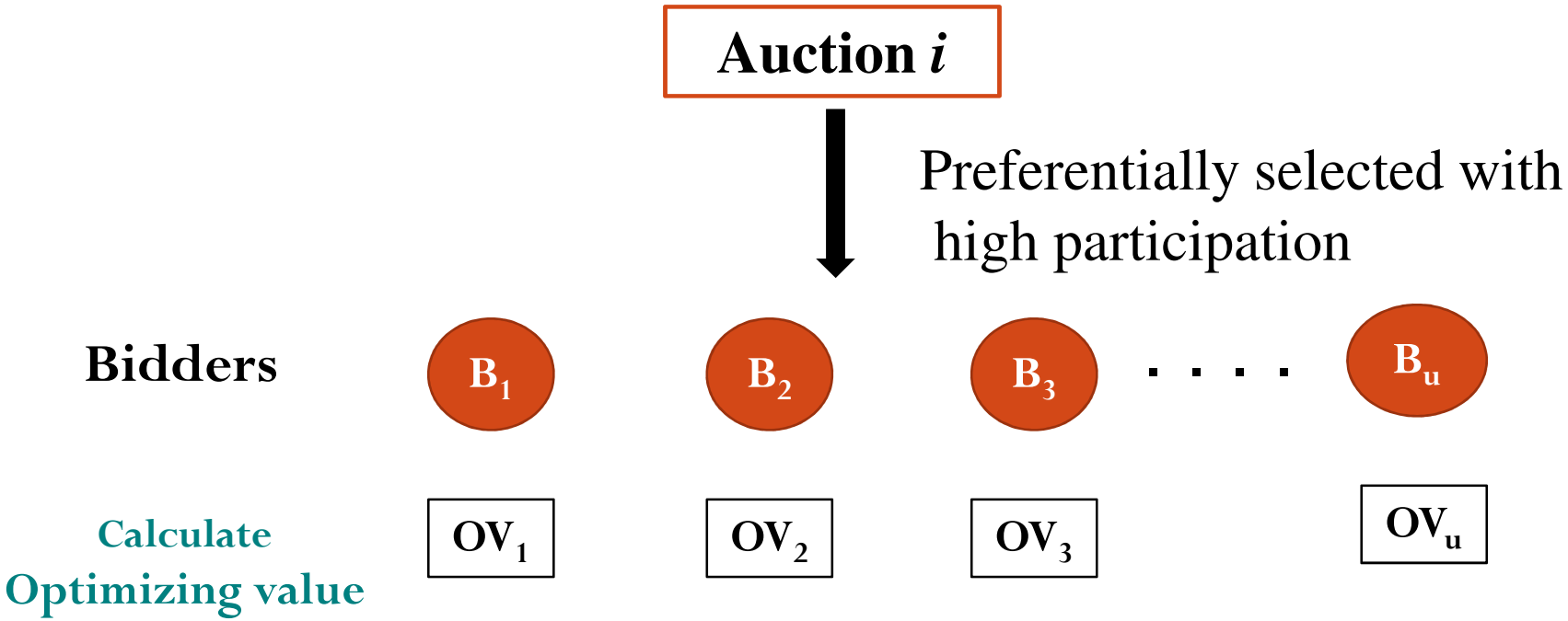
Memory-driven Agent Based Model



Start Bidding:

- **Preferentially select bidders based on OV**

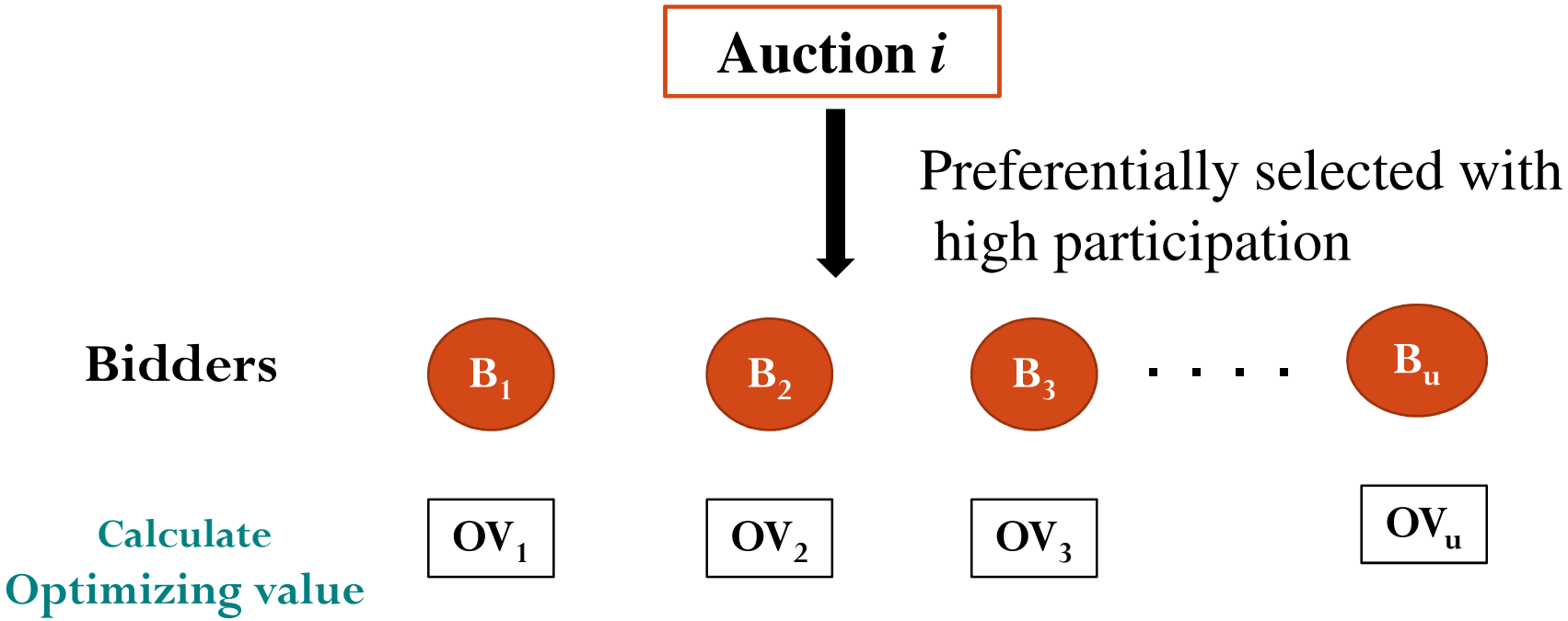
Memory-driven Agent Based Model



Start Bidding:

- **Preferentially select bidders based on OV**
- **Place random bid**

Memory-driven Agent Based Model

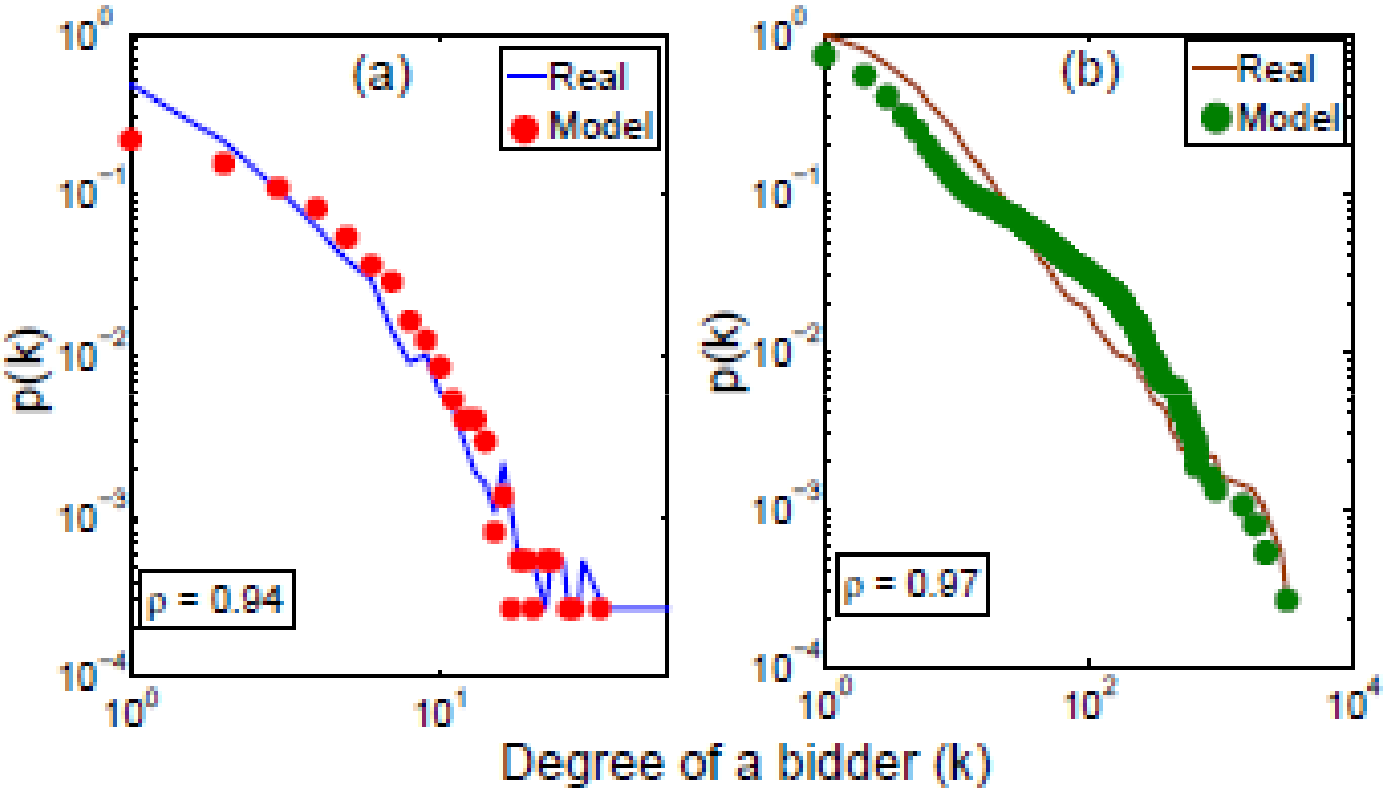


Start Bidding:

- **Preferentially select bidders based on OV**
- **Place random bid**

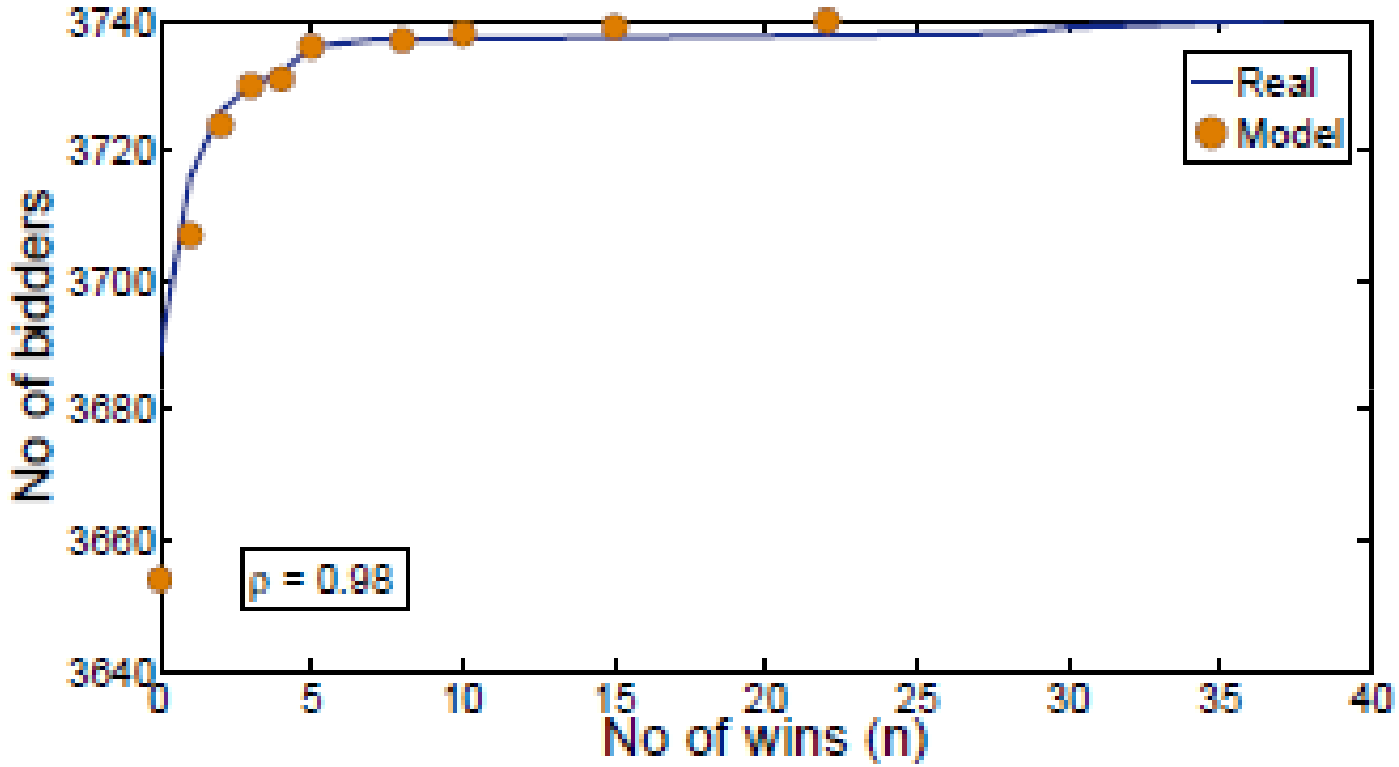
Stop when Stopping Condition encountered

Evaluation:
Comparing Degree Distribution



(a) Unweighted and (b) Weighted degree distributions of the bidders obtained from the model (circles) and from the real data (line).

Evaluation: Winning Distribution



The cumulative winning distribution of the bidders obtained from the model (circles) and from the real data (line).

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Conclusions

- 57% of the auctions are won by the top five winners (probably they learn from the previous wins)
- The bidder who participated in maximum number of auctions did not win a single one
- Top winners except the topmost winner participate in auctions with high item values
- Most surprisingly, about 99% of the bidders are in loss in terms of the net profit
- The stochastic agent-based model efficiently captures two fundamental characteristics of LUBAs

http://cse.iitkgp.ac.in/~tanmoyc/
http://cnerg.org/