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Title: Maximal Matching for Double Auction

Paper: [PDF](#)

Double Auction

Keywords: Market Clearing
Mechanism Design

Topics: AI Applications, Intelligent agents

Abstract: We study the problem of matching in a double auction market where multiple buyers and sellers buy and sell one commodity. We design and implement a matching algorithm that maximizes market liquidity, including the number of transactions and buy/sell-volume. We also prove that, given the number of matches, our algorithm can maximize the auctioneer's profit. Based on the CAT Tournament (Trading Agent Competition Market Design) platform, our experiments show that the new matching method not only increases market liquidity but also significantly improves market share and the auctioneer's profit, compared with the most commonly used matching method.

Time: Jun 21, 14:09 GMT

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Reviews

Review 1

Overall rating: **6** (accept)
 Confidence: **2** (medium)
 Relevance: from 1 (lowest) to 5 (highest) **5** (Highly Relevant)
 Originality: from 1 (lowest) to 5 (highest) **4** (Very Original)
 Significance: from 1 (lowest) to 5 (highest) **3** (Moderately Significant)
 TECHNICAL SOUNDNESS: from 1 (lowest) to 5 (highest) **4** (Sound)
 Presentation: from 1 (lowest) to 5 (highest) **3** (Acceptable)

Overall comments:

The authors developed a new matching approach, maximal matching for a double auction. The authors provided comparison with existing equilibrium matching to show the advantage of maximal matching. The authors also provided new theoretical, algorithm and implementation results to proof their maximal matching is sound and workable.

Two Strengths of the paper: The paper is theoretical sound and technically strong. The implementation provides further evidence for its soundness.

Review:

Two Weaknesses of the paper: The presentation need to be improved both literately and logically.

Detailed comments and suggestions to improve the paper: The paper provides sound theoretical and technical evidences to show that authors' maximal matching is good and workable. The implementation gives further support. if the presentation can be further improved, it would be even better.

Review 2

Overall rating: **6** (accept)
 Confidence: **2** (medium)
 Relevance: from 1 (lowest) to 5 (highest) **5** (Highly Relevant)
 Originality: from 1 (lowest) to 5 (highest) **4** (Very Original)
 Significance: from 1 (lowest) to 5 (highest) **4** (Very Significant)
 TECHNICAL SOUNDNESS: from 1 (lowest) to 5 (highest) **4** (Sound)
 Presentation: from 1 (lowest) to 5 (highest) **4** (Very Good)

Review:

Overall comments:

A new auction matching mechanism that is designed to maximize market liquidity.

Two Strengths of the paper:

Liquidity is a very important market property.

Matching method has some desirable properties (e.g. it is maximal, has as much profit as any other equally sized matching ... etc).

Two Weaknesses of the paper:

A concern I have with the experiments is that the trading agents were presumably designed with an equilibrium matching procedure in mind. It therefore appears problematic to let them operate in a maximal matching market? Perhaps they are making bids that they would not if they knew that we weren't equilibrium matching?

Some overlap with [7] (though this method does seem new as it starts from the equilibrium match, a property not used in [7]?)

Detailed comments and suggestions to improve the paper:

Address the above concerns

the uniform clearing price might prohibits =>
the uniform clearing price might prohibit

Overall rating:

Confidence:

Relevance: from 1 (lowest) to 5 (highest)

Originality: from 1 (lowest) to 5 (highest)

Significance: from 1 (lowest) to 5 (highest)

TECHNICAL SOUNDNESS: from 1 (lowest) to 5 (highest)

Presentation: from 1 (lowest) to 5 (highest)

Review 3

6 (accept)

2 (medium)

4 (Very Relevant)

4 (Very Original)

3 (Moderately Significant)

4 (Sound)

4 (Very Good)

Overall comments:

This paper deals with mechanisms for determining bid/ask matches in a double auction. A new algorithm is described which is able to maximize liquidity (the number/amount of items sold), but also improves a number of other measures

Review:

Two Strengths of the paper:

- A new algorithm is introduced that outperforms a commonly used method on a number of solution quality indicators.
- Theoretical proofs of superior performance are given.

Two Weaknesses of the paper:

- One indicator - the Incentive Compatibility is introduced but not discussed.
- An examination of the relationship with maximal matching from graph theory might be interesting.

Detailed comments and suggestions to improve the paper:

The paper presents a new algorithm for matching bids and asks in a double auction. The explanation of the algorithm and its benefits are clear.

I have only two minor concerns with the paper.

The concept of Incentive Compatibility is introduced in Section 2, and while it is explained that in some ways the objective of incentive compatibility is contradictory to the other objectives, the performance of the new algorithm relative to that measure is not discussed. I think it would be useful to report performance, even if it is not as effective.

Second, A "maximal matching" from graph theory is the matching with the largest number of edges. Since the matching in this paper is shown to be maximal, the standard greedy algorithm for maximal matching should give the same number of edges. What is the relationship between the two concepts of maximal matching? In what way is the algorithm presented superior to the simple greedy algorithm?

The maximum profit is achieved, by definition, by a maximum weight matching. In general, a maximal matching does not give a maximum weight matching, but in the context of double auctions it does. Some

of us would be interested in what property of double auctions gives this behaviour.

The markings on figures 2 and 3 are very difficult to differentiate.

Review 4

Overall rating:	6 (accept)
Confidence:	3 (high)
Relevance: from 1 (lowest) to 5 (highest)	3 (Moderately Relevant)
Originality: from 1 (lowest) to 5 (highest)	3 (Moderately Original)
Significance: from 1 (lowest) to 5 (highest)	3 (Moderately Significant)
TECHNICAL SOUNDNESS: from 1 (lowest) to 5 (highest)	3 (Seems Sound)
Presentation: from 1 (lowest) to 5 (highest)	3 (Acceptable)
	Overall comments:

Review:

Two Strengths of the paper:

Two Weaknesses of the paper:

Detailed comments and suggestions to improve the paper: