The Complexity of Interactively Learning a Stable Matching by Trial and Error

Econ


Gale & Shapley ‘62

CS

Knuth ‘71

For any set of men and women, a stable matching **always exists**

Proof: constructive algorithm that requires **full access** to all preferences

But, starting with some matching and iteratively resolving one blocking pair at a time may **cycle** (and not reach a stable matching)

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But, if the blocking pair is chosen **uniformly at random**, a stable matching is reached w.p. 1

Also for many-to-many matchings

But (even for one-to-one matchings) this may take **exponentially many** steps

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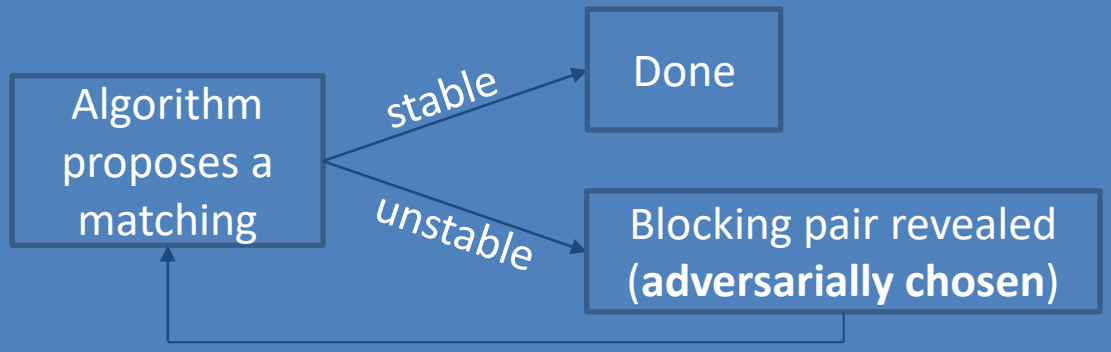
Is there a “smarter” #interactive_learning algorithm with better query complexity?

Must still work in the same query model:





Emamjomeh-Zadeh, Gonczarowski, Kempe, ’20 (#this_paper)

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Is there a “smarter” #interactive_learning algorithm with better query complexity?

Yes! $O(n^2 \log n)$ queries, poly runtime (Despite extremely coarse queries)

And this is essentially **tight!**

What about many-to-many matchings?

Still **yes!** Though much more delicate, and there is still an **open question** here about runtime. Talk to us for the details!



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