Online and Matching-Based Market Design

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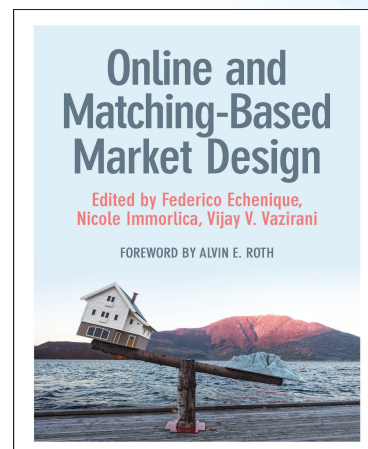*Microsoft Research New England*

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The rich, multi-faceted and multi-disciplinary field of matching-based market design is an active and important one due to its highly successful applications with economic and sociological impact. Its home is economics, but with intimate connections to algorithm design and operations research. With chapters contributed by over fifty top researchers from all three disciplines, this volume is unique in its breadth and depth, while still being a cohesive and unified picture of the field, suitable for the uninitiated as well as the expert. It explains the dominant ideas from computer science and economics underlying the most important results on market design and introduces the main algorithmic questions and combinatorial structures. Methodologies and applications from both the pre-Internet and post-Internet eras are covered in detail. Key chapters discuss the basic notions of efficiency, fairness and incentives, and the way market design seeks solutions guided by normative criteria borrowed from social choice theory.

1. Two-sided markets: stable matching; 2. One-sided matching markets; 3. Matching markets with transfers and salaries; 4. Objectives; 5. Applications of online matching; 6. Online matching in advertisement auctions; 7. Spectrum auctions from the perspective of; 8. School choice; 9. Kidney exchange; 10. Normative properties for object allocation problems: characterizations and trade-offs; 11. Choice and market design; 12. Combinatorics of stable matchings; 13. Algorithmics of matching markets; 14. Generalized matching: contracts and networks; 15. Complementarities and externalities; 16. Large matching markets; 17. Pseudomarkets; 18. Dynamic matching; 19. Matching with search frictions; 20. Unraveling; 21. Investment in matching markets; 22. Signaling in two-sided matching markets; 23. Two-sided markets matching design; 24. Matching market experiments; 25. Empirical models of non-transferable utility matching; 26. Structural estimation of matching markets with transferable utility; 27. New solution concepts; 28. Machine learning for matching markets; 29. Contract theory; 30. Secretaries, prophets, and applications to matching; 31. Exploration and persuasion; 32. Fairness in prediction and allocation.