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Agent-Mediated Electronic Commerce

Designing Trading Strategies and Mechanisms for Electronic Markets

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Revised Selected Papers

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AMEC/TADA 2012 Preface

The last few decades have seen a rapid development and widespread proliferation of electronic commerce. Advances in technology and increasingly ubiquitous connectivity allow businesses to perform transactions both with customers and with each other electronically, leading to ever faster and more efficient business processes. The far-reaching consequences of this shift in commerce are evidenced by the multitude of businesses that offer their goods and services through virtual shopfronts on the Internet, by the large-scale adoption of business-to-business (B2B) standards and systems, and by the rise of electronic marketplaces that connect buyers and sellers, facilitating the exchange of goods or the placement of online advertising.

In tandem with the development of electronic commerce, new autonomous software components have also started to emerge, which participate in electronic marketplaces on behalf of organizations or individuals. These so-called software or trading agents interact autonomously and proactively with electronic markets to meet the objectives of their owners, for example, by placing orders to replenish stocks within complex supply chains, buying and selling stocks for profit, or managing online advertising campaigns by bidding for ad placements on popular websites. Such agents are capable of handling and analyzing vast amounts of data, and can respond almost instantaneously to changing market conditions or operating constraints. Thus, they promise great improvements in efficiency over relying solely on human-mediated commerce.

Yet, a shift toward an increasing reliance on software agents creates a range of pressing new research challenges. These include the design of appropriate agent decision algorithms, approaches to predict the complex behaviors and interactions of multiple agents, including the computation of equilibria, and the engineering of protocols and mechanisms that ensure electronic markets behave in a stable manner or fulfil other desirable criteria. Drawing upon a diverse range of scientific disciplines, including computer science, economics, artificial intelligence, operations research and game theory, researchers have started to address some of these challenges, and the papers collected in this volume represent a cross-section of this work. They are revised and extended versions of papers first presented in 2012 at the Joint Workshop on Trading Agent Design and Analysis (TADA) and Agent-Mediated Electronic Commerce (AMEC), which was co-located with the AAMAS 2012 conference held in Valencia, Spain.

Specifically, the papers collected here cover a broad range of topics within the field of electronic markets, ranging from designing strategies for individual trading agents, to the design of markets and interaction protocols between agents, as well as a variety of applications.

The first paper, by Chapman et al., investigates the impact that social networks have on the performance of market traders and shows that communities of traders that share advice with each other can perform better, and indeed improve the overall market performance. The next two papers deal with the design of efficient trading strategies for single agents. Chatzidimitriou et al. use machine learning algorithms to design efficient trading strategies for an agent operating in an automated supply chain, and show that these allow the agent to respond to prevailing market conditions. Diamantopoulos et al. also consider trading agents, but in the energy domain, an emerging application area for autonomous agents. They consider the problem of designing broker agents within power markets, and discuss the advantages and disadvantages of various price formation policies.

Goff et al. describe a framework that allows the simulation of complex market settings, where not only multiple types of agents compete with each other, but also where several market mechanisms co-exist. In the context of energy markets, Haghpanah et al. focus on how consumers can exchange their experiences with different brokers and merge this with their personal preferences and observations to choose the best broker. While most work so far in this volume has focused on traditional electronic commerce settings, Jumadinova and Dasgupta consider the problem of fusing information within sensor networks. Here, they show that work on prediction markets can be applied to incentivize truthful reporting when sensors may be self-interested.

As many markets contain human participants, Kim et al. study settings where market participants do not behave rationally, and where an agent needs to conform to certain norms in order to perform well. For these settings, they design a software agent that performs better than human participants. In contrast, Papakonstantinou and Bogetoft take a more traditional view of rationality, and extend existing auction mechanisms to a multi-dimensional setting, where a seller of goods is incentivized to truthfully report both the cost of production as well as the quality of the goods.

Finally, several papers discuss applications within the topical domain of ad auctions. Schain et al. investigate how a simple model-free agent can be built that requires little domain-specific knowledge to achieve a high performance comparable to agents that use more specialized and tailored models. To encourage further research on the complexities of ad auctions, Schain and Mansour propose a new competition specifically for tackling the challenges faced by ad networks that have multiple contracts with advertisers and bid on their behalf on ad exchanges. Stavrogiannis et al. also consider ad networks, but focus on the problem arising when an advertiser needs to decide what ad network to participate in, and they characterize the equilibria that arise in these settings.

We hope that these papers offer readers a comprehensive summary of the state of the art in research on electronic markets. We would like to thank everyone who contributed to this volume, including the paper authors, the members of the Program Committee, who provided comprehensive reviews to ensure a high standard of quality for the selected papers, and the workshop participants, who engaged in lively discussions during the workshop.

April 2013

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