Interacting with Electronic Institutions

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Abstract. A three-year research project is investigating the evolution of social (business) networks in an eMarket environment. To address this issue a complete, immersive, distributed virtual trading environment has been constructed. That environment is described here. Virtual worlds technology provides an immersive environment in which traders are represented as avatars that interact with each other, and have access to market data and general information that is delivered by data and text mining machinery. To enrich this essentially social market place, synthetic bots have also been constructed. They too are represented by avatars, and provide “informed idle chatter” so enriching the social fabric. They acquire their information with text and data mining machinery that continually scans market data and general financial news feeds. The middle-ware in this environment is based on powerful multiagent technology that manages all processes including the information delivery and data mining. The investigation of network evolution leads to the development of “network mining” techniques.

1 Introduction

Markets play a central role in economies, both real and virtual. One interesting feature of the development of electronic markets has been the depersonalisation of market environments. The majority of on-line trading today is conducted by “filling in pro formas” on computer screens, and by “clicking buttons”. This has created a trading atmosphere that is far removed from the vital atmosphere of traditional trading floors. What used to be the trading floor of the Sydney Stock Exchange is now a restaurant, although the trading prices are still displayed on the original board. All of this sits uncomfortably with work in microeconomics that has demonstrated both theoretically and in practice, that a vital trading environment provides a positive influence on liquidity and so too on clearing prices. See, for example, the work of Paul Milgrom, from his seminal “linkage principle” to his recent work [1].

This issue is being addressed by this project in which, virtual worlds technology, based on Adobe Atmosphere is being used to construct a virtual trading environment that may be “hooked onto” real exchanges. That environment is immersive and complete. It is “immersive” in that: an avatar that may move freely through those virtual trading areas in which it is certified represents each real player. It is complete in that each real player has ready access to all the information that she requires, including general information extracted from newsfeeds. The environment also contains synthetic characters that can answer questions like “how is gold doing today?” with both facts and news items. The environment may be seen at: http://research.it.uts.edu.au/emarkets/ — first click on “virtual worlds” under “themes and technologies” and then click on “here”. To run the demonstration you will need to install the Adobe Atmosphere plugin. Figure 1 shows a screenshot of
a market scenario in a virtual world. The avatar with its "back to the camera" is the avatar representing the agent on the workstation from which the "photo" was taken.

Fig. 1. A screen shot of one of the eMarkets, including the "chatterbot" avatars

Other related projects include the design of trading agents that operate in these information-rich environments [2], and an electronic institution framework that "sits beneath" the virtual environment. The design of this framework is influenced by the Islander framework developed in Barcelona [3]. Unstructured data mining techniques are being developed to tap real-time information flows so as to deliver timely information, at the required granularity [4]. Network mining techniques are presently a major focus.

2 The Virtual Trading Environment as a Multi-agent Virtual 3D World

A marketplace is a real or virtual space populated by agents that represent the variety of human and software traders, intermediaries, and information and infrastructure providers. Market activities include: trade orders, negotiations and market information seeking. These activities are intrinsically social and situated. There is a number of ways to implement an electronic market [5]. The virtual trading environment is a multi-agent virtual world [6]. In this environment every activity is managed as a constrained business process by a multiagent process management system. Players can trade securely via the process management system, in addition "chat channels" support informal communication. The technology of 3D virtual