Abstract of "Introducing Virtual Futures Market System "U-Mart""

Yoshihiro Nakajima (Osaka City University), Isao Ono (University of Tokushima),   Hiroshi Sato (National Defense Academy), Naoki Mori (Osaka Prefecture University) , Hajime Kita (Kyoto University), Hiroyuki Matsui (Kyoto University), Kazuhisa Taniguchi (Kinki University), Hiroshi Deguchi (Tokyo Institute of Technology), Takao Terano (University of Tsukuba), Yoshinori Shiozawa (Osaka City University)

u-mart@u-mart.econ.kyoto-u.ac.jp

U-Mart is a generic name for an artificial futures market, related tools and activities. U-Mart is an artificial market in which Human Agents and Machine Agents may coexist and trade via LAN or Internet. In order to design a financial market system, we have to consider "cross-references" mechanism in which individuals and organizations with different abilities, technologies and experiences join and influence   each other while learning and creating. In order to resolve this difficult issue, we have to invite researchers from various fields such as engineering, economics or psychology to approach from various aspects such as artificial intelligence, artificial market, cognitive science, or learning theory in addition to conventional market research. U-Mart has been developed aiming at providing a common test bed that can be used by researchers who are interested in the motions of economical and social systems like the financial market or behaviors of economic entities under such systems.

Now we are almost ready to release second version of U-Mart System consists of 5 tools. Details are followings. These tools have almost same Look & Feel and help us to joint standalone developing environment and network experiment seamlessly.

Market Server: This is the core of the U-Mart System. It acts as a marketing tool (i.e. calculate total sum of orders to realize the trade) and as an agent's asset management tool. It sends various data including market conditions, individual agent's asset quality, and ordering trends via network. Also you can monitor condition of the market and agents' behavior.

Human Agent Trading Terminal: Human agents are able to log-in U-Mart Server by this tool. Human agents send their orders and they can monitor a variety of information from the server.

Market Simulator: It is used for training how to trade in the U-Mart as human agent. These tools have the same look & feel as the Human Agent Trading Terminal for network. You can compete with a built-in machine agent.

Machine Agent Adapter: Machine agents use this tool to access Market Server from client PCs. It also contain supporting tool for agent developing. We can make machine agents by only designing and coding trading strategy. Other method, for example, communication via network, collecting price data and account data and send orders, are already ready in the tool.

Machine Agent Viewer: It is used to let the user's self-made agent compete with a built-in machine agent within the user's own PC. You can use it to trace the self-made agent' s asset conditions and orders stepwise to check if it behaves as expected or you find any unexpected conditions.

Derivatively, we have been organizing 3 types of activities, that is   1) research, 2) education and 3) open experiment (competition). These 3 activities are associated with each other. Open experiment has been one of the most important events of U-Mart project. U-Mart Organizing Committee and U-Mart System Operating Committee were organized to plan and hold international open experiment.

Research: As one of artificial market research projects, many researchers join this project and do   various activities. The major objective of this project is to design a financial market system. More   specifically, we hope to establish market control methods by controlling the extent and scope of information disclosure   with elements such as circuit breakers including commission rate and price movement limits, market maker,   indicative price calculation   methods, and changes in information update intervals. We measure information value and information tradeoffs (e.g. liquidity or stability) to do basic research to use information disclosures timing and scope as   market control parameters.

Education: U-Mart System is used as an excellent courseware for engineering and economics. Engineering educational institutions use the U-Mart system for programming practices. Also the investment program is very useful for practice because it can actually be operated, is open to set objectives from very simple motivates students by providing opportunities for competitions and other events (open experiments).

Open Experiment (competition): Experiments open to the public inviting machine agents and human agents, and related discussions inviting experts from various fields are categorized as event activities. In recent years, UMIE 20xx series international open experiments and U-mart20xx series domestic open experiments are periodically held. Also, we have special for tutorial sessions at international and domestic conferences hosted by NAACSOS, ISAGA, and   Association for Evolutional Economics, and Information Processing Society of . At each event, we collect and report the results of U-Mart research as well as provide experts from various fields with discussion opportunities by having panel discussions.

These three types of activities are inseparably tied. Machine agents invited to open experiments are necessary to increase the diversity of agent sets used for research. The diversity motivates researchers from various fields to have symposiums and workshops to gather and it serves as a springboard for another open experiment or joint research. The set of tools developed for educational purposes are used for research and events. Many machine agents have been developed through educational courses and have contributed to agent sets used for further research. More economics students join U-Mart as human agents, and more experiment opportunities are given. Also, the students have proposed GUI improvement ideas and have contributed to help develop new tools used for event activities. As more open experiments are held, more problems must be resolved using the artificial market are found as well as logs to be analyzed. Also as the research progressed more, purposes of open experiments have become clearer, and rules & systems have changed.