Multi Agent Enhanced Business Intelligence For Localized Automatic Pricing In Grocery Chains

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Abstract

Business Intelligence Systems (BI) describe a form of data driven Decision Support Systems (DSS) that integrate a variety of concepts and technologies to gather, store and analyse data. Traditionally the focus of BI is on strategic and tactical decision support by providing decision makers a centralised and holistic view on organisational data. Today businesses are generating increasingly larger amounts of data due to regulatory requirements, business needs and new technologies. Managing and using this data in business decisions can be difficult because of the volume of the data, time pressure and general complexity of today's business problems. In recent years there is a trend to extend BI to an operational level and make BI capabilities available to more workers. In addition to the technological change, business literature suggests the increasing importance of focusing on local market characteristics instead of standardisation across markets. The traditional BI concept does not fully reflect these operational and local requirements and should adapt to this new environment and these requirements to better support businesses in their decision making activities.

Agent and Multi Agent technology is often mentioned as an approach to design and develop flexible and distributed software systems. The technology is used in this research to design the Multi Agent Enhanced Business Intelligence (MAEBI) framework that focuses on distributing decision making capabilities throughout an organisation. Core to the MAEBI framework is the so called Decision Unit (DU) that encapsulates BI functionality with the extension of a Decision Execution (DE) module that allows implementing (changing business process) a decision without human interaction. The agent based design allows embedding a DU in the problem domain to make decisions with a local perspective. Despite the local focus of the MAEBI concept some aspects of the "centralised" BI approach are still maintained.

A prototype, pMAEBI (p=pricing), was implemented in the context of multi store retail pricing. Pricing is an important and complex problem for retailers and it

allows demonstration of some of the capabilities of a MAEBI based system. To evaluate the pMAEBI system a simulation testbed was implemented to analyse the prototype in comparison to a traditional "centralised" system. Simulation results indicate that the pMAEBI managed stores performed better (in terms of profit) than the comparison stores. These results indicate that the MAEBI concept is viable.

Statement of Originality

This thesis represents my own original work towards this research degree and contains no material which has been previously submitted for a degree or diploma at this University or any other institution, except where due acknowledgement is made".

Alexander P. J. Loebbert

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