

Intelligent Agent Based Business Intelligence

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Overview

In an Artificial Intelligence world, Agent-based technology is one of the most vibrant and important areas of R&D, emerging in Information Technology in the industry in recent years. Intelligent Agent (IA) is an autonomous entity which observes analyses and responds to an environment appropriate to achieve the expected objective. Business Intelligence (BI) Systems describes a form of data driven Decision Support Systems (DSS) that integrate a variety of concepts and technologies to gather, store and analyse data. Agent and Multi Agent System (MAS) is often mentioned as an approach to design and develop flexible and distributed software systems. Agent technology shows great potentials in advancing BI, resolving complex communication, integration and analysis problems.

1. INTRODUCTION

1. Intelligent Agents

Agent-based systems belong to the most vibrant and important areas of research and development to have emerged in information technology in the 1990s. Because of the lively extensive spreading of directions in research no publicly accepted solid definitions of agent-based systems and their elements – agents is provided. Hence, in context of this paper we will use some general definitions: Software agent is software that acts as an agent for another as in a relationship of agency. When several agents act they may form a multi-agent system.

Intelligent Agent (IA) refers to a software agent that exhibits some form of artificial intelligence. According to Wooldridge, intelligent agents are defined as agents, capable of flexible autonomous action to meet their design objectives. They must involve:

- **Reactivity:** to perceive and respond in a timely fashion to changes occurring in their environment in order to satisfy their design objectives. The agent's goals and/or assumptions that form the basis for a procedure that is currently executed may be affected by a changed environment and a different set of actions may have to be performed.
- **Pro-activeness:** ability to exhibit goal-directed behaviour by taking the initiative, responding to changes in their environment in order to satisfy their design objectives.
- **Sociability:** capability of interacting with other agents (software and humans) through negotiation and/or cooperation to satisfy their design objectives.

In context of intelligent agents other properties are also mentioned:

- **Self-analysis:** ability to analyze and explain its behaviour and detect error and success.
- **Learning,** adapting and improving through interaction with the environment.

2. Business Intelligence

Business intelligence (BI) is an ideology of rendering out the right information or decision to the people requiring them at the right time, to improve business situations and performance. It is an umbrella concept, which includes various soft wares, data structures, big data

concepts, algorithms etc., it is like the other data interpretation concepts, which requires data as its main object and undergoes usual processes such as data collection, storage, processing and extraction of information too. The information retained or decisions thus retained after the pre-processing are represented in the forms of reports, graphs, summaries, charts etc.

The results of BI have a direct effect on company's business operations, working strategies and tactics as the companies and organisations change their operating methods accordingly and adopt different strategies based upon the decisions of BI. So, it is mandatory for the decisions to be reliable and accurate as they are what going to decide the future of the company and helps the management to act before their competent.

2. MULTI-AGENT SYSTEMS APPLIED IN BUSINESS INTELLIGENCE

The strength writing isn't exceptionally liberal with regards to specialist based business insight applications. Erik Thompson, expert at Hyperion Solution Corporation characterized in 2002 five potential effect fields for clever operator on customary systematic frameworks:

- Agents ought to add to BI arrangement advancement from application-situated answer for process-driven arrangements and to offering a solitary passage to disseminated data. Specialists based frameworks must approach a self-portrayal of the individual modules and the client's close to home operator can question for explicit data all library specialists sensible for different informational collections.
- There is important a product client discourse with the goal that it can realize what the client's desires are and can foresee his future wants. The dynamic use of operators gives BI arrangements a more customization and knowledge other than the alternatives and inclinations offered by the application.
- Intelligent specialist can offer tweaked systematic help for significant level business forms, watching them, finding out about them and connecting with employments. Specialist based applications and a BPM (Business Process Management) stage could be associated with encoding level scientific information and area explicit information.
- For most Bi applications, the server side is significant in view of the progressions that happen in the stacking examples and it has a high number of physical settings. Savvy specialists for physical enhancement can assess their own physical association and, if essential, interface with a framework chairman before rearranging information.

3. BUSINESS INTELLIGENCE IN SUPPLY CHAIN MANAGEMENT USING MULTI AGENT

A typical supply chain may involve a variety of participants, such as (i) customers (ii) retailers (iii) wholesalers/ Distributors (iv) Manufacturers and (v) raw material supplier. The objective of every supply chain is to maximize the overall value generated, which is normally measured through profitability. Chopra et.al advocate that all processes in a supply chain can be broken down into the following four cycles:

- Customer order cycle - processes directly involved in receiving and filling customer's orders;
- Replenishment cycle - processes involved in replenishing retailer inventory with a distributor;
- Manufacturing cycle - processes involved in replenishing distributor inventory;

- Procurement cycle - processes necessary to ensure that materials/ components are available for manufacturing according to the schedule.

In a direct sales model, such as the one used by Dell Inc. the manufacturers fill customer orders directly. Retailers, wholesalers and Distributors are bypassed in this type of supply chain, which ends up with only three participants - Customers, Manufacturers and Suppliers. This is probably the most dynamic practice used by the market nowadays, and this is the main reason why we decided to implement our multiagent system based on this SCM model.

The architecture proposed uses a multi-agent approach in order to build a flexible and general design for a dynamic supply chain. Each agent can be implemented with a different AI technique, which permits a system designer to test many perse strategies and decide the optimal combination of these techniques. The agents also use a central knowledge base as a key component for collaboration. Agent store results and information in the knowledge base so that other agents can use it to solve their problems. The following figure 1 represents architecture of multi-agent system.

The main focus of the proposed design is to tackle separately important sub problems of a supply chain: (i) procurement of components (ii) production and delivery of finished items and (iii) direct sales of finished items to customers.

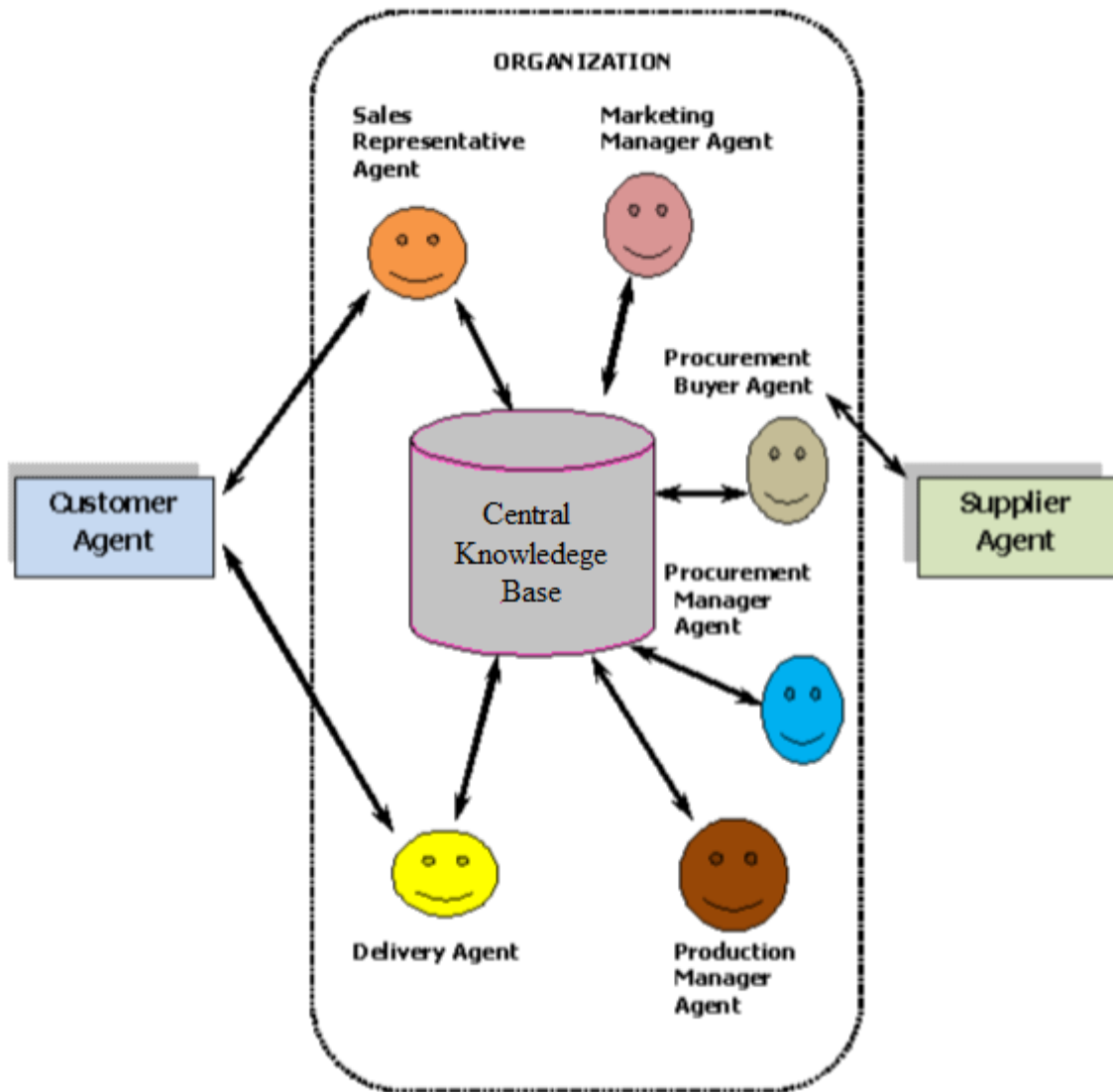


Figure 1: SCM Multi-agent architecture

The customer agent typically represents real customers and firms that are willing to buy finished items. This agent must implement a strategy for selecting finished goods based on its preferences. This decision affects all sup-problems, but has a stronger influence in the direct sales sub-problem.

4. CONCLUSION

The combination of business knowledge and programming operators can give answers for some business insight issues. For instance, business insight arrangements frequently face challenges when chipping away at disseminated information sources, conceivably situated in unstructured archives. To feature the capability of programming operators we began from the particular instance

of utilizing specialists with excellent outcomes for Supply Chain Management.

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