New Advances in E-Commerce

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INTRODUCTION

Advances in computer architecture and communication technology have led to introduction of global, dynamic and intelligent e-business models and new tools for doing e-commerce. These models use artificial intelligence techniques and web2 technologies to perform online transactions between businesses and customers. As the number of clients over the Internet grows exponentially enhanced intelligent e-business models are needed to efficiently respond to clients with an optimum selection for their requests. Agent based e-business models use intelligent agents, mobile agents, evolutionary agents, rational agents, data-mining agents to develop agent-based e-commerce models. Recommender systems provide intelligent assistance to online customers is CBR-based or collaborative filtering based e-business models. In B2C models there are a large numbers of buyers and sellers where buyers specify their preferences and sellers specify their products and selling prices. The major role of AI techniques in B2C e-commerce is to come up with the best match between a buyer and seller. Examples of e-commerce systems in B2C using AI techniques are product selection and recommendation, negotiation and auction systems. In B2B the major role of AI techniques is supply chain management to help clients taking the right decisions. Modern tools used by intelligent E-commerce models include: algorithmic trading, decentralized autonomous corporations (DAC), crypto-currency systems, smart contracts, Internet of Things, cloud computing and big data analytics.

BACKGROUND

Intelligent Techniques

Intelligent techniques in E-commerce include:

Intelligent Agents

They are personalized software that function independently and use machine-learning algorithms to analyze data, adapt to their environment in order to achieve the goals on behalf of users. Main agents can use sub-agents to work under their supervision to achieve smaller tasks to help main agents achieve their pre-written goals. These agents can surf the Internet gathering information, searching e-market places looking for products and services satisfying users' preferences. With the help of intelligent agents customers can enter e-negotiations and take part in e-auctions. According to (Nwana, 1996), the intelligent agents important features include:

1. **Autonomy:** Agents achieve their goals independently and act proactively without human intervention.
2. **Cooperation:** Agents communicate with each other and negotiate on certain issues.
3. **Learning:** Agents are able to learn, react or interact with their environment and with other agents.

Intelligent agents allow sellers to track demand and market shares, perform knowledge mining, negotiate and learn from collaboration with buyer agents. Seller gents can gain money by selling

services, they may create children that may either survive or die depending on whether they can get enough business. Broker agents, provider agents and merchant agents sell products and services required by sellers while comparison shopping agents are required for buyers to comparison shop (Sinmao, 1999). These types of agents get the required information from retailers' web sites using semantic web.

Types of intelligent agents include:

1. **Rational Agents:** They are autonomous computer programs that are capable of a goal directed behavior (Rusell et al, 2003). The main goal of rational agents is to autonomously select the optimal outcome from possible preferences in a given situation. To achieve this goal the rational agents collect information about their environment which may be obtained from past experiences, they take actions considering obligations and duties then they evaluate the outcome to decide whether the final decision is the optimum one or not. If the final result is not optimum the rational agents adjust their behavior to improve results in the future.

2. **Evolutionary Agents:** They are agents that gain new knowledge from self-reasoning and through knowledge exchange with other agents. Evolutionary agents share information and knowledge with each other within a multi-agent environment regardless of their structures or objectives. The main task for each evolutionary agent is to fulfill one or more of its own goals. Agents are selected for growth from the current population to go into the mating pool. This mating pool is the basis for the next population. The growth mechanism is based on learning mechanism, fuzzy reasoning and ontological reasoning. The most fitting agent is selected based on a self-organizing map.

3. **Data Mining Agents:** They are agents designed to find specific data types and identifying patterns among this data. They generate alerts to organizations if any altera-

tion in the trend paradigm is discovered so effective strategies can be implemented to gain from this alteration or reduce its damage. Data mining agents perform one or more specific tasks, for example they can be programmed to monitor stock prices for a specific range of companies and alerting their users if significant aberrations from historical trends are discovered.

CBR Technique (Prasad, 1995)

Content based reasoning is a problem solving technique that retrieves solutions for previous similar cases from the case-base and adapt them to solve new problems. Each case has two parts: specification part and solution part. The specifications part describes the symptoms of the problem while the solution part describes the causes of this fault. CBR plays an important role in e-commerce applications for product recommendations by using context-sensitive information related to products to help users take the right decision quickly (Kumar et al., 2005). Content-based techniques make use of textual annotations describing products obtained from e-commerce websites (Abbattista, et al., 2002).

CBR works as follows:

1. Take customer preferences. Customers preferences may vague or rate their preferences ranging from 'must have' to 'not important'.
2. Retrieve products with similar offers from case base and submit them to the customer.
3. Customer may accept a similar offer or quit the process if he is no longer interested.
4. Customer may modify his preferences and go to step (ii). Similarity or disparity measures between two products are to identify similar products. Weighted Euclidean distance measure is used to retrieve the most similar product (Wettschereck and Aha, 1995). As an example a CBR-based recommender system in the sports domain is presented in (Prasad and Clementi 2002). Figure 1 shows a CBR e-commerce system.

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