Knowledge Management and Intelligent Agents in an E-Business Environment

Radu Ioan MOGOŞ, Paula Liliana SOCOLL
Academy of Economic Studies, Bucharest, România
rmogos@yahoo.it, paula_socoll@yahoo.co.uk

This paper aims at applying intelligent agent technology to knowledge management in the new era of e-business. With relevant knowledge embedded in them, intelligent agents can help buyers and sellers cope with information overload and expedite the stages of the online buying process.
Keywords: *knowledge management, intelligent agents, e-business environment.*

Introduction

The World Wide Web has established itself an interactive mean for the collection of the information always becoming more and more popular especially for the e-business domain. The vastness of the Web, the heterogeneity of the calculators connected to it, the various architectures of data storage ant the speed through which these cab change have induced the research useful information in real time. As consequence, the researchers have developed active forms of data mining which have been added to the passive classical one.

The intelligent agent computing and intelligent agent – mediated e-business fields are also exciting research areas which are full of potential and challenges. Usually, the research is prompted by two natural observations. On the one side, there are many computing paradigms available to support multiple hosts to communicate over a network such as client – server remote procedure calling, remote evaluation, code – on – demand, and object migration. For a better mobility of the intelligent agents and a quick knowledge discovery, some data mining techniques may be used.

Knowledge discovery is defined as ``the nontrivial extraction of implicit, unknown, and potentially useful information from data" [1]. In [2], a clear distinction between data mining and knowledge discovery is drawn. Under their conventions, the knowledge discovery process takes the raw results from data mining (the process of extracting trends or patterns from data) and carefully and accurately transforms them into useful and understandable information. This information is not typically retrievable by standard techniques but is uncovered through the use of AI techniques [3].

E-Business and Knowledge Discovery

The demands of e-business for rapid response and agile adaptation to the marketplace necessitate the knowledge sharing among not only intra-organizational staff but also partners and customers in new and more efficient ways. Customers are looking for commitment, trust, and a sense of ownership for the outcomes of their dealings with an organization. They want to learn with every transaction in order to be more knowledgeable and self-reliant.

Knowledge Discovery addresses the issue of scaling data mining algorithms, applications and systems to massive data sets by applying high performance computing technology. With the commoditization of high performance computing using clusters of workstations and related technologies, it is becoming more and more common to have the necessary infrastructure for high performance data mining. On the other hand, many of the commonly used data mining algorithms do not scale to large data sets. Two fundamental challenges are: to develop scalable versions of the commonly used data mining algorithms and to develop new algorithms for mining very large data sets.

For example we can consider the composition of most development teams is a chance occurrence [7], usually determined by avail-

able staff, and you will rarely, if ever, be allowed the luxury of picking and choosing the people for the team. The project kickoff meeting will be the first time the team is assembled and your first opportunity to gauge the dynamics of this new amalgamation of talent. The internal dynamics of Web teams can be staggering in their complexity and scope. Managing the team, let alone the project itself, is an enormous task requiring energy and interpersonal skills. Before you can manage a Web development team you have to know the players. It's important to note that team composition is different from organization to organization, project to project, and process to process. Your Web development team may not exactly mirror the type that is described in this chapter (see the diagram in Figure 1), but there will undoubtedly be many similarities. The basic roles on a typical Web development team remain relatively constant and typically include the following: project stakeholder (also client or business owner), project manager, producer, editor/copywriter, information architect, graphic designer, html developer, developer, tech lead, database administrator, quality assurance engineer.

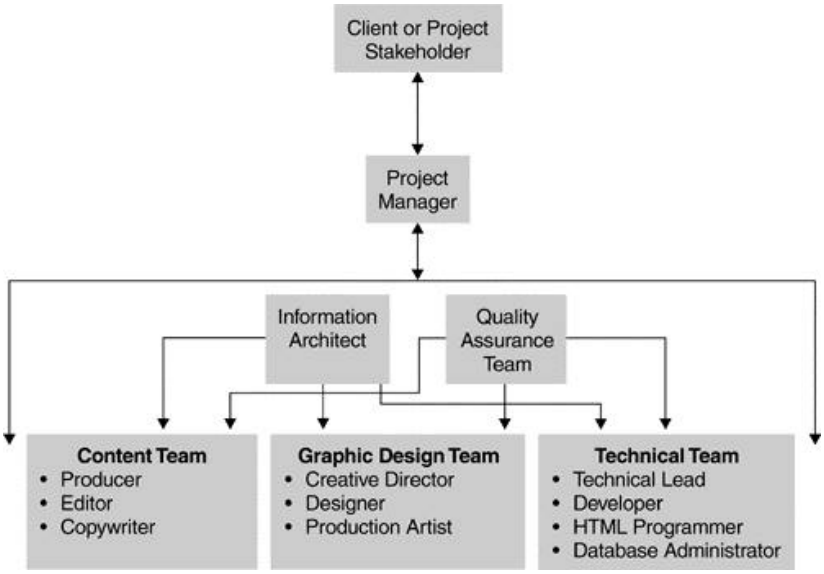

Fig.1. Diagram of a Web Development Team

Intelligent Information Agent

Information agents are special kind of so-called intelligent software agents. Software agent technology originating from distributed artificial intelligence is inherently interdisciplinary. Thus, the notion of agency is quite broadly used in literature; it might rather be seen as a tool for analyzing systems, not an absolute characterization that divides the world into agents and non-agents. However, *intelligent agents* are commonly assumed to exhibit autonomous behavior determined by its pro-activeness, means taking the initiative to satisfy given design objectives and exhibit goal-directed behavior, reactive or deliberative actions, means perceiving the environment and timely change management to meet given design objectives, and social cooperation in groups with other agents and/or human users when needed. It depends on the concrete application domain and view on potential solution for a particular problem what an intelligent agent in practice is supposed to do [8]. Today, intelligent agents are deployed in different settings, such as industrial control, Internet searching, personal assistance, network management, games, software distribution, and many others.

Agent technology is quite on its way to produce mature standards concerning software agent architectures and applications such as OMG MASIF (mobile agent system interoperability facility) and FIPA's agent-related specifications [4]. Further, the European

network of excellence for agent-based computing (AgentLink)[5] which has been set up in 1998, international workshop series, and conferences on the subject such as ATAL8, CIA (Klusch and Kerschberg, 2000), Autonomous Agents, PAAM, and ICMAS strongly pushes software agent technology since its public breakthrough around five years ago.

An agent program depends on possessed perceptions, actions that might be executed, agent objectives described by the performance metric, agent environment. An agent structure may be as follow:

```
Function Agent(perception): returns action
static: memory
memory:=Actualization (memory, perception)
action:=ChooseTheBestAction(memory)
memory:= Actualization (memory, action)
return action
```

An ideal rational agent is an agent that executes for every possible perceptions sequence that action that might offer a maximized performance based on element offered by the perception sequence and by the embedded knowledge into agent.

In [6], the author sustains that according to the definition and classification of information agents we can differentiate between communication, knowledge, collaboration, and rather low-level task skills as depicted in figure 2. In this figure, the corresponding basic key enabling technologies are listed below each of the different types of skills. Communication skills of an information agent imply either accessing information systems and databases, processing input from human users, or other agents. An agent naming service as well as an agent communication language (ACL) enable communication between intelligent agents on different levels. An ACL has to be considered rather on top of, for example, middleware platforms such as OMG's CORBA and Sun's Java RMI, or specific APIs such as JDBC (java database connectivity), ODBC (open database connectivity), or OKBC (open knowledge base connectivity).

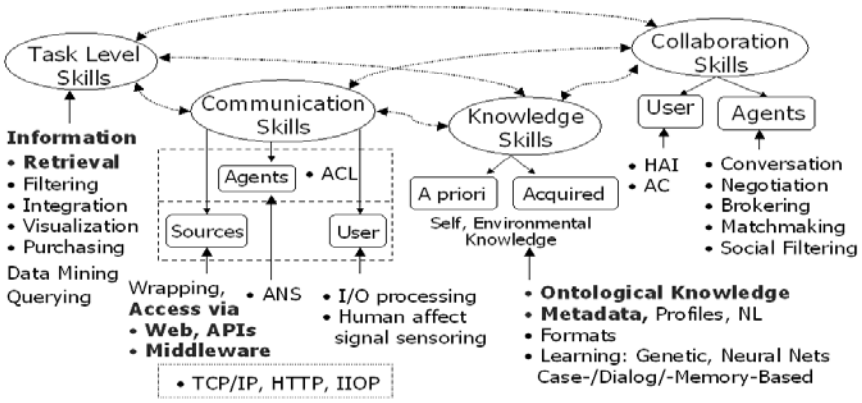

Fig.2. Basic skills of an information agent

In Figure 2 are represented some tools of ontological knowledge and metadata, user profiles and natural language input, translation of data formats as well as machine learning techniques enable an information agent to acquire and maintain knowledge about itself and its user, network, and information environment. High-level collaboration of an information agent with other agents can rely on methods for, for example, service brokering, matchmaking, negotiation, and collaborative (social) filtering, whereas collaborating with its human users mainly implies the application of techniques stemming from human-computer interaction and affective computing.

Conclusions

High performance knowledge management is still a very new subject with challenges. Some data mining algorithms can be characterized as a heuristic search process involving many scans of the data. Thus, irregularity in computation, large numbers of data access,

and non-deterministic search strategies make efficient parallelization of a data mining algorithms a difficult task. Research in this area will not only contribute to large scale knowledge management applications but also enrich high performance computing technology itself.

The perspective of using autonomous trading agents may have different impacts on Internet-based economy and business of the future. Such agents may make purchases up to a pre-authorized limit, filter information and solicitation from different merchants, and dynamically trade any type of good proactively on behalf of its users on markets and auctions. For this purpose a variety of basic enabling techniques are available. Ubiquitous e –business and e-marketplaces rationally brokered by heterogeneous, intelligent and life-like agents also strongly push R&D of related technologies such as generation and (re-)use of ontologies for electronic commerce, and the integration of mobile telecommunication and the Internet. Mobile commerce supported by personalized, rational information agents residing on WAP-enabled access devices such as pagers, organizers, (sub) notebooks, or UMTS cell phones, still is a vision for the common Internet user but is not too far away from realization.

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