An Agent System to Manage Knowledge in CoPs

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ABSTRACT

This paper proposes a multi-agent architecture and a trust model with which to foster the reuse of information in organizations which use knowledge bases or knowledge management systems. The architecture and the model have been designed with the goal of giving support to communities of practices which are a means of sharing knowledge. However, members of these communities are currently often geographically distributed, and less trust therefore exists among members than in traditional co-localized communities of practice. This situation has led us to propose our trust model, which can be used to calculate what piece of knowledge is more trustworthy. The architecture's artificial agents will use this model to recommend the most appropriate knowledge to the community's members.

Keywords: agents; communities of practice; knowledge utilization

INTRODUCTION

The need to support knowledge processes in organizations has always existed. However, its importance has definitely increased in the last few years. Recently, the concept of knowledge management suggests a paradox since compared with traditional production factors knowledge is so complex, scattered and hidden that it is rather complicated to manage it.

On the other hand, traditional Knowledge Management Systems (KMS) have received certain criticism as they are often implanted in companies overloading employees with extra work; for instance, employees have to introduce information into the KMS and worry about updating this information. As a result of this, these systems are sometimes not greatly used by the employees since the knowledge that these systems have is often not valuable or on other occasions the knowledge sources do not provide the confidence necessary for employees to reuse the information. Reusing information and not reinventing the wheel are frequently heard arguments. For this purpose,
companies create both social and technical networks in order to stimulate knowledge exchange. An essential ingredient of knowledge sharing information in organizations is that of “community of practice”, by which we mean groups of people with a common interest where each member contributes knowledge about a common domain (Wenger, 1998). The ability of a community of practice to create a friendly environment for individuals with similar interests and problems in which they can discuss a common subject matter encourages the transfer and creation of new knowledge. Many companies report that such communities help reduce problems caused by lack of communication, and save time by “working smarter” (Wenger et al, 2002). In addition, communities of practice provide their members with the confidence to share information with each other. Moreover, individuals are frequently more likely to use knowledge built by their community team members than that created by members outside their group (Desouza et al, 2006). For these reasons, we consider the modelling of communities of practice into KMS as an adequate method by which to provide these systems with a certain degree of control to measure the confidence and quality of information provided by each member of the community.

In order to carry this out, we have designed a multi-agent architecture in which agents try to emulate human behaviour in communities of practice with the goal of fostering the use and exchange of information where intelligent agents suggest “trustworthy knowledge” to the employees and foster the knowledge flow between them.

The remainder of this work is organized as follows. The next section focuses on community of practice then in section 3 two important concepts related to our work are described: agents and trust. In Section 4 the trust model is presented. Later in section 5 the multi-agent architecture proposed to manage trustworthy KMS is described. In Section 6 a prototype developed to evaluate our architecture is explained in order to illustrate how it could be used. Section 7 describes a preliminary experiment carry out to test this prototype. Section 8 outlined related work and finally, conclusions are presented in Section 9.

COMMUNITIES OF PRACTICE

Intellectual capital and knowledge management are currently growing since knowledge is a critical factor for an organization’s competitive advantage (Kautz, 2004). This growth determines organizations’ performance by studying how well they manage their most critical knowledge. However, to manage this critical knowledge it has to be known what knowledge is, and although there is no consensus about a knowledge concept (Kakabadse, et al, 2001), there are several definitions of knowledge as in (Ackoff, 1989) and (Davenport et al, 1998). In our case, knowledge is going to be understood as in (Ackoff, 1989), that is, as an appropriate collection of information, such that its intent is to be useful. In order to manage knowledge an important instrument are communities (Gebert et al., 2004; Malhotra, 2000). A community can be defined as a group of socially interacting persons who are mutually tied to one another and regularly meet at a common place (Hillery, 1955). The development of Internet and groupware technologies led to a new kind of community “virtual communities” where members can or not meet one another face to face and they may exchange words and ideas through the mediation of computers networks (Geib et al., 2004).

This type of communities can be divided regarding their objectives and scope into socially-oriented, commercially-oriented and professionally-oriented. We focus our research on the last one which consists of company employees who communicate and share information to support their professional tasks. An special case of professionally-oriented communities are the “Communities of Practice” (CoPs) defined by Wenger et al. (2002) as groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge
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