

# Agents to Make Your Information Meaningful and Visible: An Agent-Based Visual Information Management System

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**Abstract:** The topic of the reported research concerns how the overall information management task is split into several sub-tasks that are distributed among team of information agents. We aim to design an architecture of a distributed agent-based system allowing co-ordination and communication between single agent entities according to the main tasks involved in information management. The work is based on a generic way of structuring the information, based upon conceptual mapping of the information domain. We model the relationships between attractive user-oriented visualisation of information and information structures and the effectiveness of information retrieval, search, and usage by users. In respect to these objectives a small system prototype, called AIMS - an Agent-based Information Management System, is under development.

## 1. Introduction

There are number of problems encountered in respect to the task of searching and finding relevant information in large scale information contexts. Some of them concern complexity of human-computer interaction, unstructured and dynamic searchable information, dominant mode (textual) of its presentation, lack of effective information management tools and support of collaboration in Information Search and Use (ISU) task. Due to these factors, the ISU task as situated in the Internet context involves extreme complexity.

Our research is purposed to find possible directions for overcoming the problems as mentioned. When discussing ways of solving them we do not consider a single-item technique, but a combination of methods and techniques in order to provide an integrated solution. This paper discusses some findings resulting from our research in respect to problem solving potential of combination of several technologies, like knowledge representation, automated-learning, graphical representation and visualisation, user modelling, collaborative work support, and agent-based technology. This could result in the construction of flexible, adaptive, user-oriented information management environments.

## 2. AIMS: Main Design Principles

Our paper discusses work in progress related to the design and development of an Agent-based Visual Information Management System (AIMS). It is resulting from several research projects involving the Department of Educational Science and Technology at University of Twente, The Netherlands, and the Department of Information Technology at the University of Sofia, Bulgaria.

The main design principle is based upon the 3A (Accessibility, Adaptation, Attractiveness) approach to organisational memory [Aroyo, De Diana, Diakov 98]. We do not conceive information manipulation as the mere application of simple search engines to collections of information items, but as a task that necessitates a concise system architecture bringing together the main functional modules for manipulating collections of resources situated within a knowledge- and information sharing environment. A 3-dimensional architectural framework is applied employing multi-agent support for intelligent information manipulation over a visual

representation of the information domain, and a conceptual organisation of resources involving semantic mapping techniques.

### 3. General System Architecture and Main System Modules

The main activities in AIMS are carried out by agent modules based upon theoretical and empirical results of current agents research [Maes 94, Mueller 96, Wooldridge, Jennings 95]. The system architecture is presented in [Fig1].

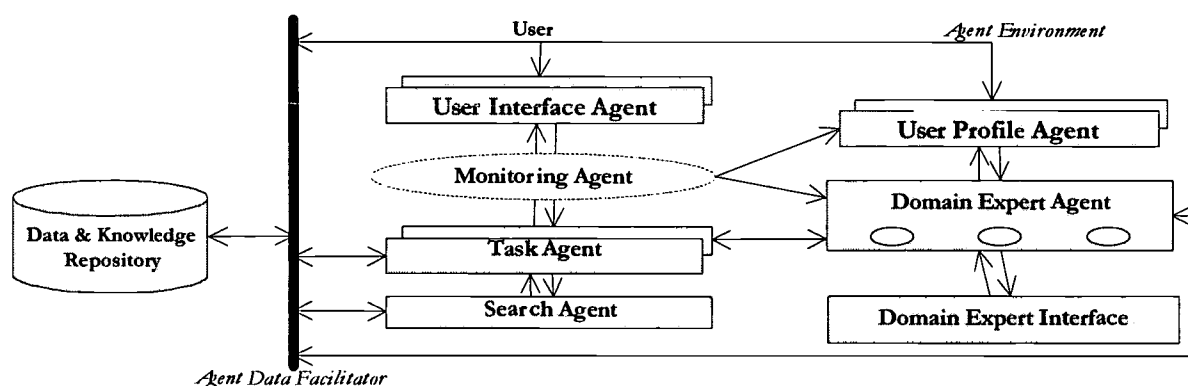


Figure 1: AIMS General Architecture.

The objective of the *search abilities* is to allow for mapping between users' specified needs and the items in the information domain that could be answers to the need. The Search Agent performs intelligent search activities over the given information domain by receiving well specified queries and finding the relevant documents. The working algorithm is based on relations among documents, keywords, synonyms, and domain terms.

The main goals for embedding *visualisation techniques* within AIMS are to facilitate the users' comprehension and to provide means for easy navigation and manipulation of large amounts of information by a conceptual knowledge-based structuring and organisation [Donald 83], and to provide an easy manipulating overview of search results, information domain and terms with their conceptual relations. that can make the search process more efficient for the user (VUI, Conceptual Dimensions, Inc.). The User Interface Agent in AIMS takes care of the direct system-user communication.

Our approach to *user modelling* is mainly based on observing users' actions (in interaction with the system) and collecting system and user information that is afterwards transformed into the system's knowledge about the user.

### 4. Conclusions and future perspectives

Future perspectives are aimed at development of functions that can assist users in finding valid and relevant answers to queries, coupled with the potential for application of answers to those queries in multilingual environments and not in the last place- the development of tools to support information visualisation. In respect to visualisation one of the prime issues is advanced adaptability of the user interface and related information presentation.

### 5. References

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