INTERNATIONAL CONFERENCE ON MULTIMEDIA FOR HUMANITIES

October 5 - 8, 1998

ABSTRACTS - ARTIFICIAL INTELLIGENCE AND HUMANITIES

The problem of retrieving deals with matching multimedia objects to queries based on some similarity measurement using intelligent pattern recognition techniques of specific media objects. Computers can be used as tools for understanding the macro measurement proportions etc. Experiments are being performed to support analytical activities such as dating and identification.

Towards Gaining Deeper Insights-An art historian's questions on some specific issues

Knowledge-based Retrieval of Multimedia documents

Towards Gaining Deeper Insights-An art historian's questions on some specific issues by B. N. Goswamy

It is exercises like that I would find most useful and stimulating. There is a whole body of material that one has - sliders, reproductions in books, etc. - and perhaps it can suffice to launch one into this area of inquiry which, in turn, might become an opening into still larger areas.

The second specific issue that I would like to address is the possibility of using the computer as tool for understanding the micro-measurements and the system of proportions of forms, figures etc. which artists in the tradition carried in their heads and worked with. When we identify the family-workshops of painters, as I have tried to do in my work, we know that individual artists had distinct preferences of their own, in respect of proportions, stances etc. The case of the four sons and two nephews of the 18th century Pahari painter Nainsukh, whom we group together as 'The First Generation after Manaku and Nainsukh' is of great interest. This generation turned out some of the greatest paintings produced in India, and yet at present we are unable to go beyond a point in isolating their individual hands. Can, I wonder, the computer assist us in doing this by carrying this kind of analysis our?

Knowledge-based Retrieval of Multimedia documents by Hiranmay Ghosh & Santanu Chowdhary

Multimedia and internet technologies offer a great potential for on-line dissemination of information pertaining to art and culture. With the growth of such collection across the network, an efficient retrieval mechanism becomes extremely important. It is more so for audio or video documents which cannot be easily browsed unlike text or picture documents, and puts more cognitive load on the users. In this paper, we describe a knowledge based retrieval method for multimedia documents from a distributed repository.

The problem of retrieval deals with matching documents to queries based on some similarity measures. A retrieval engine operating on multimedia document repository should be able to exploit the rich information content of the document both in textual as well as in non-textual media

forms in establishing the similarity measures. While there has been significant research on content-based retrieval of multimedia documents, the unique feature of our retrieval method is that it computes the similarity measure in terms of conceptual entities abstracted over multiple media forms. We model the retrieval problem as a problem of abduction. Abduction is a reasoning process for constructing an appropriate explanation for a set of observed patterns. Concepts are abstract entities which cannot be directly observed in the document. We define a set of observation mode for a concept in terms of perceptable media objects and their relationships. The recognition models for the media objects comprises a set of predicates involving elementary media patterns that are invariant over media specific transformations. In our abductive model of reasoning we identify the documents which can account for the expected observation patterns as candidates for retrieval.

We use multiple forms of knowledge at different levels of abstraction to provide the solution for a retrieval problem. Conceptual knowledge deals with the concepts and their observation models. Media knowledge encodes the recognition functions. Classification knowledge provides a set of supportive assumptions for abduction. Above all, a planning module coordinates the use of knowledge for an optimal retrieval. This method of partitioning and distributing the required knowledge-base is a distinguishing feature of our approach.

We present an agent-based architecture to support the reasoning framework. This architecture enables us to expoit the knowledge base possibly distributed over a network. It allows dynamic growth of the system by introduction of new agents and customising user interfaces. Another interesting aspect of our architecture is introduction of mobile agents which can move across an arbitrary network and perform requisite functions.

There has been considerable research interest on application of AI-based techniques for multimedia information retrieval in the recent past. Our approach is distinct in the following ways:

- We present a conceptual abstraction of the documents, which spans over multiple media forms and heterogeneous repository structure.
- We model the retrieval problem as an abductive model of reasoning and provide a framework for combining evidences from the content analysis of all possible media-forms as well as from nonmedia data (metadata).
- We partition the knowledge base required for retrieval and model retrieval as a problem of distributed AI. We implement a multi-agent architecture that can exploit different forms of knowledge distributed over an arbitrary network.