Embedded Video Content and Context Awareness

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1 Introduction

In modern computing, the user interacts with the computer through the control of tasks and the environment in which those tasks are inserted. Communication, dialogue, perception and cognition must be considered on evaluating the interaction [Preece, 1994; Pressman, 1995].

Traditionally, events and relationships are analysed and modelled to build interfaces. As computing is used ubiquitously [Abowd, 1999], the design of interfaces changes to demand further capabilities both from the designer and the infrastructure available.

This position paper speculates on the use of content-based distributed multimedia protocols features for the enhancement of human-computer interaction, providing means to improve interactivity. We consider this issue important for the workshop as the boundaries between the network and the applications which are supported by it get more and more complex.

2 Embedded Video Content

Adding meta-information about content to audio and video streams results in versatility for the application designer. Three facts support this statement:

- The integration of several medias is important in the process of development of hypermedia applications. For instance, in many application domains (e.g. in education, business and entertainment), the simultaneous presentation of multiple flow of data are expected and flexible (high level) means of synchronization are sought;
- The interaction of the user with the media objects being presented (be they natural or synthetic) is seen as a bonus and a important requirement for the success of an application;
- The above characteristics influence the whole process of coding, storing, distribution and presentation of medias.

3 MPEG-4 and Related Technologies

MPEG-4 [ISO, 1997c] has been designed to provide the description and management of media, as well as the control of synchronisation and retrieval of medias contained in a stream being transmitted. Other features like the interactivity management and the description of scenes in terms of temporal and spatial behaviour are also incorporated in the protocol.

In a stream, it is possible to, randomly, search for video sequences and its contents. Aspects like compression techniques, transparency coding and colour standards and resilience to errors have been specified. Through the specification of profiles, tools can be implemented for the components of the standard. Some of these profiles:

- Visual Profiles (e.g. Basic animated 2D)
• Audio Profiles (e.g. Low Rate Synthesis)
• Graphics Profiles (e.g. 2D Graphics)
• Scene Description (e.g. VRML Scene)

MPEG-4 also provides an API for the access to the media objects contained in the streams. It is Java-based and is called MPEG-J. Using this interface, applets can travel with the streams and can be used by the user (or user environment) to adapt the presentation of that particular information, possibly with inputs which will depend on the context. XML [Johnson, 1999] will certainly be very important in developing applications using these features of MPEG-4.

4 Open Questions

MPEG-4 is a technology under development. We envisage that its use can be useful to potentialise the infrastructure in order that context awareness be taken in consideration in the design of distributed multimedia applications. The questions that we put forward to discussion (supposing that some of the initial "W" questions have been answered):

• Which kind of context can be properly mapped into meta-information in media objects data stream;
• How this approach compares with possible alternatives;
• What is the overhead imposed on the system (coding, transmitting, decoding)? Does it pay off?
• How to structure the meta-information in order to ease the access in a generic way; MPEG-7 [ISO, 1997a] is a possibility.

References:


