Improving personalized content detection in audio-visual standards

Introduction

The POLYMNIA project aims to develop an intelligent cross-media platform for personalised leisure and entertainment, where it focuses on thematic parks. The project set out to provide high quality and personalized souvenirs – in which the visitor will appear him- or herself as the real protagonist in a preset reality scenario – by tracking and recording them individually through a multiple-camera system. When a visitor enters the venue, he or she is registered into the POLYMNIA system that will captures the visitor's face and personal data, after which this can be combined with his or her preferences regarding the artificial digital content of augmented reality scenarios to be used for the production of the souvenir.

Moreover, POLYMNIA will develop an intelligent cross media platform, through which content is distributed to multiple remote users, accessing it for example through the Internet and their PC, allowing remotely located friends or family members to enjoy the experience as well. In order to arrange this, the visitor will be able to notify them through their terminal device of the webcast tour, which is also enriched with artificial content. The final digital souvenir is produced when the visitor leaves the venue.

Standardization challenges

The results of POLYMNIA's work were expected to generate contributions in a number of technological areas, such as detection, localization and tracking of persons, real time content identification technologies, digital content extraction, representation & description, and media access, retrieval & searching at different media platforms. Consequently, the project expected to provide significant contributions to the further development of audiovisual networking standards, such as MPEG-7 and MPEG-21, as well as additions to XML. Therefore, it approached standardization in a bi-directional way, by following the international standards so that the system and infrastructure developed by the project would be compatible with the current state of the art in standardization, and by subsequently submitting its research results generated through the project's activities, as well as solutions found to the problems encountered, to the relevant standards organizations.

Standardization path

Responding to the standardization challenge, POLYMNIA planned to address the following areas & issues:

Non-linear organization and Decomposition of Video Sequences: transmission of digital video in a cost effective and quality guaranteed manner over low bandwidth networks (e.g. the Internet) remains a challenging issue. Video information is represented in a linear way, which supports sequential play, but is not appropriate for interactive navigation of video information over networks. Furthermore, performing video queries is complicated and efficient organization of large video archives presents challenges to most multimedia servers. For this reason new methods for efficient (non-linear) video content representation and summarization should also be implemented.

Spatio-temporal Representation of Visual Content using Hierarchical Graphs: it should be possible to indicate the spatial relationship of objects with their neighbours through a scheme. POLYMNIA aims at a content-scale decomposition scheme, which allows complicated image queries, that can be expressed at different description (resolution) levels.

Relevance feedback tools for personalized retrieval of visual content: relevance feedback is a necessary tool for many Content Based Image Retrieval (CBIR) architectures. Usually, relevance feedback schemes are distinguished into two different types of actions, either modifying the query originally issued by the user, or modifying the similarity measure used for ranking and retrieving image data in a CBIR system. POLYMNIA intends examine and evaluate the two approaches.

POLYMNIA set out to propose the new schemes to W3C consortium since the representation of the new tools will be XML-based. Thus, apart from the contribution to the MPEG-7 and MPEG-21, a simultaneous contribution to W3C consortium was planned to better and more effectively disseminate the POLYMNIA results.

Towards the end of its lifespan, POLYMNIA initiated processes that would allow it to make submissions as intended to processes in ISO/IEC through the national Greek standards organization ELOT, mainly focussing on Non-linear organization and Decomposition of Video Sequences.

In addition, with the support of COPRAS, it discussed options to make submissions in W3C as well, focussing on Non-linear organization and Decomposition of Video Sequences as well as on Spatio-temporal Representation of Visual Content using Hierarchical Graphs, and Relevance feedback tools for personalized retrieval of visual content.

In this respect, a number of Working Groups in W3C were identified as potential target constituencies, but at the end of the day it was decided to submit the contributions to the Semantic Web Deployment Working Group, focusing on the development of guidelines assist users of the Semantic Web in publishing data and vocabularies that describe data in the Semantic Web. A submission was made to the group early February 2007.

Key Learning Points

During the course of its standards work POLYMNIA encountered a number of issues that may help future projects in planning their activities, or may improve the overall research/standards interfacing process:

- Starting the process towards standardization of a project's results should be started at the earliest possible moment and preferably even before the actual start of a project. When combined with a strong determination to work towards standards, this offers the best guarantee that submissions can actually be made as planned, and the standardization gap between the end of a project's lifespan and the transformation of its deliverables into standards can be kept as small as possible.
- Finding the right standards organizations to work with, but specifically finding which standards are relevant to a project's activities takes a lot of time, and often leads to projects having to spend more of their resources on standardization than originally planned. This could be addressed, for example by having an entity or a project that could advise projects in this matter. COPRAS' support in arranging contacts with the relevant Working Groups has been quite helpful in this respect.
- Having consortium partners working in standards organizations can be an important pre-condition for being successful as a project in standards activities. However, ICT standardization is very diverse, and success is often only guaranteed if consortium partners have representatives in the same Technical Bodies or Working Groups that are targeted by the project.
- It could be beneficial to the success and result of standards activities, if – during the preparation of a project's technical Annex – advice could be made available indicating which contributions to existing standardization processes would be welcomed by standards organizations. This would make it easier to fine tune research towards standardization, and to build a constituency around it.
- Standards activities mostly require more time than a project has. Despite the fact that an early start of standards work may shorten the standardization gap, additional resources are necessary to continue and finalise standardization – and dissemination – activities beyond a project's lifespan.