



APIDIS Annual Report 2008

www.apidis.org

Democratic and personalized production of multimedia content is one of the most exciting challenges that content providers will have to face in the near future. APIDIS plans to address this challenge by proposing a framework to automate the collection and distribution of digital content.

As a federating objective, APIDIS targets cost-effective autonomous production, so as to make the creation of audiovisual reports profitable, even in case of small- or medium-size audience.

First, APIDIS investigates the automatic extraction of intelligent content from networks of multi-modal sensors. Intelligence refers here to the identification of salient segments within the audiovisual content, using distributed scene analysis algorithms.

Second, APIDIS exploits that knowledge about segments of interest to automate the production of video content for controlled scenarios, e.g. most notably sports events or surveillance. It considers personalized and potentially interactive content summarization mechanisms to address heterogeneous user needs and access conditions.

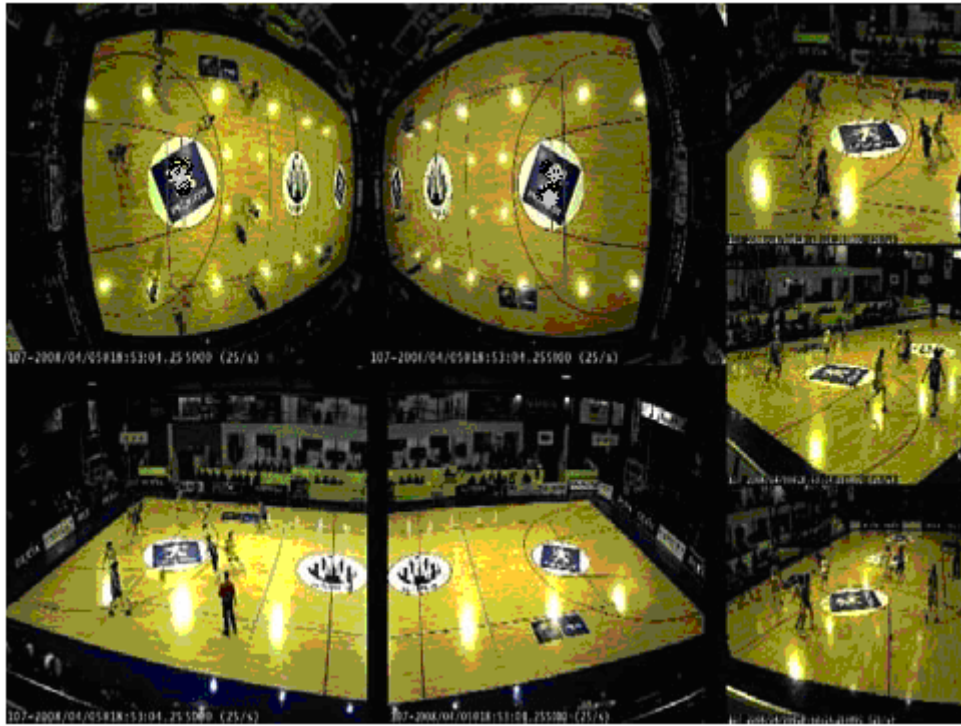
The potential applications of the integrated technology and methodologies developed within APIDIS are numerous, ranging from personalized access to digital media related to local sport events through a web portal or a mobile hand-set; cost-effective and fully automated production of content dedicated to small-audience, e.g. souvenirs DVD, university lectures, etc; but also browsing assistance for video surveillance.

Summary of Activities

Research partners - UCL, QMUL, EPFL and BM – are building on recent scientific and technological breakthroughs in the fields of user-centric design, signal processing, computer vision, machine learning, and also planning and optimized decision process. The developed technology will be tested against real life surveillance and sport events scenarios raised by APIDIS's industrial partners ACIC and Mediapro, as well as by the APIDIS User Group.

APIDIS started in January, 2008. Its major achievements thus far have been:

- The APIDIS User Group was formed and the user requirements, functional specifications, and system architecture defined. Effort was also focused on the definition of general rules to produce sport event video summaries.
- In the project's first quarter, the first version of the video acquisition system was setup. The system consists of multiple high resolution video streams captured by a network of 7 cameras distributed around a basketball court. The architecture involves both conventional and omnidirectional high-resolution cameras.



View from the APIDIS system's 7 cameras

- The raw data collected in April 2008 was augmented through the definition and collection of metadata. Those metadata are expected to support efficient browsing of the content, and automatic personalized summarization of the event captured by the distributed set of cameras. They include (1) low-level feature distributions, (2) object trajectories, and (3) events of interest attributes. The data and metadata are publicly available upon email request to the project partners (www.apidis.org).
- In the project's first year, scenarios and the associated measures of success for the three proof-of-concept trials scheduled at mid-project (mid 2009) have been defined. The trials respectively deal with automatic and personalized video summarization; with the generation of high resolution images based on an array of omniscams; and with the distributed extraction and analysis of features for camera view selection.
- At the end of 2008, software modules will be produced to 1.) generate an image in an arbitrary viewing direction from the output of the omnidirectional sensors and 2.) collect features and object trajectories. The project also reaches an important milestone in December 2008 when the initial version of the autonomous content production prototype is released.
- In November/December 2008 work started on a surveillance scenario that aims to facilitate browsing of recorded surveillance material. The current state-of-the-art is to view each video sequence individually. The goal of the project is to guide browsing by suggesting video sequences to the user that are related to the current sequence being viewed. Thus, the user no longer has to search through the video sequences by hand to find related sequences. The idea is to use techniques from artificial intelligence to estimate the probability of two video sequences being related to the same event, and use the probabilities to form a ranking of related sequences. The highest-ranked sequences are then suggested to the user, much like the highest-ranked webpages are presented to a user as a result of a web query. The proposed process is completely automated and does not require manual annotation of the video sequences to learn the probabilities.

In the first half of 2009, partners will carry out evaluation and validation tests of the autonomous production prototype.



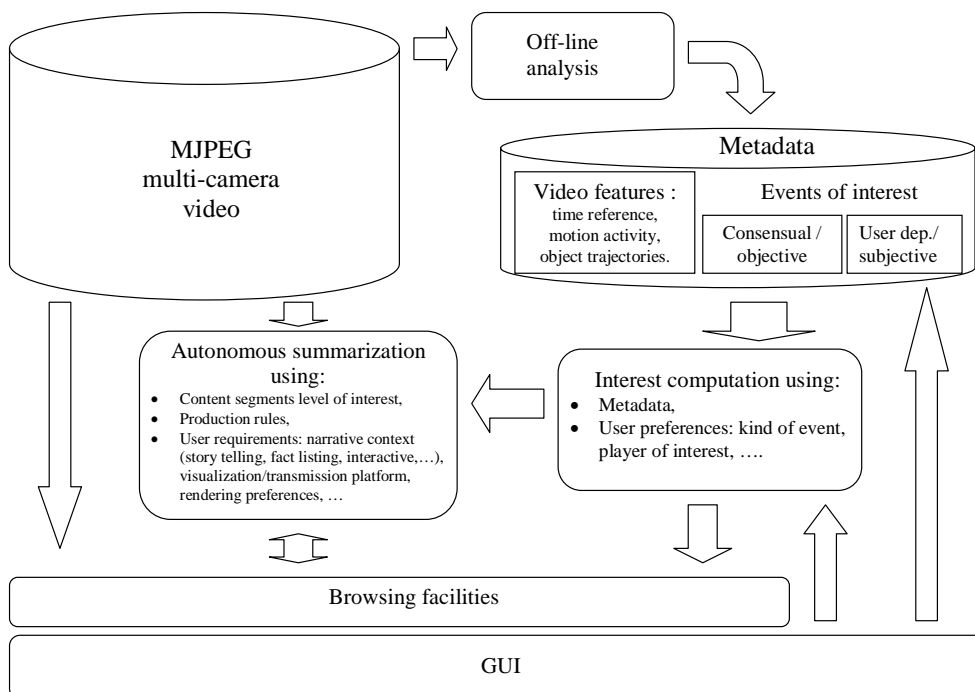
Acquisition cameras

Important work areas

User Cases, user requirements, architecture definition

Using a qualitative approach, in depth information was gathered from users about their expectations and requirements regarding the APIDIS framework. Relevant stakeholders ranged from TV producers, to end users like coaches, and experts in video surveillance areas.

The general framework for interactive browsing and personalized summarization of multi-camera content was defined. The acquisition setting and annotation methodology implemented for basketball events was also defined.



The APIDIS framework

The acquisition system and results of proof of concept trials

In the first half of 2008, a testbed platform for demonstrating and developing the APIDIS prototype was setup. The testbed was used to collect data from several basketball games in an arena in Namur, Belgium in April, 2008.

This common testbed platform guarantees coherence between the modules developed by each individual APIDIS partner. The prototype produced at the end of the first year relies on simple GUI plug-ins of the browsing and summarization tools.

Proof of concept trials for 1.) automatic and personalized video summarization 2.) the generation of high resolution images based on an array of omniscams, 3.) and the distributed extraction and analysis of features for camera view selection will be run in the first half of 2009.

Technological Innovations

Important work has been carried out to capture content (basketball games), so that it can be produced automatically, without the need for costly handmade processes. The sensing/acquisition platform has to meet a double objective. First, it has to collect the information required to analyze and interpret the scene at hand. Second, it has to be rich enough to support nice-looking and informative rendering.

Preliminary distributed analysis and interpretation of the scene has been exploited to decide what to show about an event, and how to show it, so as to produce a video composed of a valuable subset from the streams provided by each individual camera(s). Finally, the system will provide a solution to cover local (sport) events at low cost (no technical team or camera operator is involved anymore). More generally it can be used to report events that involve human-activity, for example in surveillance contexts.

To achieve this cost-effectiveness, the system relies on the following technological innovations:

- Exploitation of omnivision and distributed sensing to cover large areas with a limited number of static sensors. The static nature of sensors adds to cost-effectiveness because it permits to store all relevant content and to process it off-line. In contrast, the utilization of moving PTZ (Pan Tilt Zoom) cameras, automatically controlled to focus on the actions-of-interest in the scene, would require real-time processing and interpretation of the captured data.
- Automation of the production, to prevent most of human intervention in the content creation process. Production automation is made possible through the implementation of scene analysis capabilities that identify salient segments within the content, and exploit that knowledge to adapt and personalize content summary production according to the individual user needs. In that sense, we can say that production automation also enables content access personalization. Generating a personalized summary simply consists in (re) running the production process with input parameters corresponding to the specific constraints expressed by the client.

User Involvement, Promotion and Awareness

An important component of APIDIS is the User Group which is composed of both 1.) technologists - exploiting APIDIS technology to offer novel services and to tap new markets for their customers and 2.) endusers – viewers of the images produced by the APIDIS technology. The user-centred design approach adopted by APIDIS builds on a thorough understanding of the context of use, and relies on participation of users through an iterative analysis-design evaluation process.

The User Group includes experts in content delivery, content production, and sports event summarization. It also includes coaches, police and private surveillance experts. These experts guided the user cases definition. User feedback and requirements were collected via interviews and observation in order to understand professional work-practices, actual problems, constraints and expectations. End users, in particular coaches already using video, have given partners input on how APIDIS could help them. This input has been translated into relevant user cases. In 2009, the users will be consulted again to evaluate proof-of-concept trials, and refine user requirements. They will be particularly helpful in application scenarios for which there exists no solution on today's market, e.g. regarding the access to a personalized summary of a sport event.

Projects cooperating closely

APIDIS cooperates with similar or complementary projects, for example SEMEDIA, i3Media (Spanish National Project), WalCoMo (Walloon Region project). APIDIS has taken advantage of dissemination/exploitation opportunities by giving invited talks at other project meetings for example, my-eDirector-2012 and Caretaker. APIDIS plans to continue these activities and interactions with representatives of other projects for the duration of the project.

In 2008, APIDIS partners gave invited talks, presented papers, attended academic conferences and industry events. Past and planned activities are listed in the tables below.

Invited Talks

Planned/ actual Dates	Invited Talks	Partner responsible /involved
London, July 21-22, 2008	My e-director 2012 project	QMUL
Mountain View, CA, USA 7-11 Sept 2008	NASA Ames Research Centre	QMUL
Bari, Italy 15 May 2008	National Research Council (CNR) of Italy	QMUL
Madrid, Spain 22 May 2008	Autonomous University of Madrid (UAM) on (Andrea Cavallaro), invited talk	QMUL
Sicily, Italy, 14 July 2008	International Computer Vision Summer School (ICVSS) (Andrea Cavallaro), invited talk preliminary work on video ranking on 14 July 2008	QMUL

Industry events

Planned/ actual Dates	INDUSTRY EVENTS	Partner responsible /involved
Amsterdam, 11-16 Sept 2008	IBC	MP
Las Vegas, 11-17 April, 2008	NAB	MP
Amsterdam 24 - 26 June, 2008	TRANSEC 2008	ACIC
Essen, 7-10 October , 2008	Security Essen	ACIC
Paris, 4-7 November, 2008	Expoprotection	ACIC
Amsterdam, September, 2009	IBC 2009 (paper to be submitted)	UCL, MP
Amsterdam, September 2009	IBC 2010 (paper to be submitted)	UCL, MP

Publications

Planned/ actual Dates	PAPERS / POSTERS	Partner responsible /involved
London, January 21, 2008	FP6-IST Project Caretaker stakeholders meeting (flyer distribution) (attendee list available)	ACIC and QMUL
Stanford U, California, USA 7-11 Sept 2008	ACM/IEEE ICDCS	QMUL
Sydney, Australia 14-18 Sept 2008	ICAPS	BM
St.Malo, France 13- 15 Oct 2008	NEM Summit 2008	UCL, MP
Hannover, June 23-26, 2008	IEEE ICME 2008	EPFL
Sicily, Italy, 14 July 2008	(Fahad Daniyal) poster on preliminary work on video ranking on 14 July 2008 in ICVSS.	QMUL

Lyon 25-27 Nov 2008	ICT2008 (flyer made available)	BM
Lausanne, 25-29 August, 2008	EUSIPCO 2008	EPFL
Santa Fe, NM, USA, 1-3 Sept 2008	IEEE AVSS	QMUL
San Diego, October 12- 15, 2008	IEEE ICIP 2008	EPFL
Marseille, 18 Oct 2008	M2SFA2 2008 (Multi-camera Multi-sensor Fusion) Workshop on Multi-camera and Multi-modal Sensor Fusion Algorithms and Applications, held in conjunction with the ECCV conference	QMUL, APIDIS Workshop Sponsor and demonstration by UCL
Tampa, December 8- 11, 2008	ICPR 2008	EPFL
Miami, May 20-26, 2009	CVPR 2009 (submitted)	EPFL
London 6-8 May 2009	WIAMIS 2009 (paper to be submitted)	UCL
Cairo, Egypt Fall 2009	ICIP 2009 (paper to be submitted)	UCL

Future Work and Exploitation Prospects

A set of proof of concept trials is scheduled for the first half of 2009. The User Group members will be invited to evaluate those initial trials and based on their feedback the requirements for the final trials will be updated. The database of raw content (with manual annotations) that has already been collected will be updated as well. During 2009, the signal processing and content management components developed by APIDIS partners will be progressively integrated into a use case demonstrator. APIDIS plans to show its key achievements at IBC 2009.

Further Information

Data and results

Initial project results (from APIDIS data collected in April 2008) are available for download from <http://www.apidis.org/>

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APIDIS Administrative issues

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