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VidiVideo

Interactive semantic video search with a large thesaurus of machine-learned audio-visual concepts

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Manual of the ViSOR system

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3. Introduction

This technical report is an user guide of the ViSOR system. It describes the work carried out until M16 by the UoM team in the VIDI-VIDEO project. The conducted activities are in the area of surveillance and include two main tasks in the WP7: the creation of a usergroup for the research community on videosurveillance and the sharing of a dataset for experimentation and evaluation.

TASK 7.7 VIDEO SURVEILLANCE *(from the VidiVideo Annex)*

Surveillance video collection

An important element of the task is to create a contact with user groups of surveillance enabling a higher impact of the results of VIDI-Video. Different sources of surveillance data video will be available, such as fixed indoor and outdoor cameras, mounted at high positions with a large field of view, moving cameras with pan, tilt and zoom capabilities, fixed indoor cameras, and mobile cameras, such as those mounted on board of cars of some private surveillance companies. At UoM tools and video analysis techniques have been developed, and could be used to further provide annotation for *a posteriori* logging. It could also be used as a searching system for activities detection in case the VIDI-Video system is too general in its capabilities.

The task will perform the following activities:

- Providing a large collection of security and surveillance videos, in order to create a complete set of views of a significantly wide area, covering a 24 hours time frame, with different, also non-overlapping, views. Videos will be provided about outdoor and indoor scenes, such as roads, public parks, offices and university campus. This allows potential queries such as *find me all sequences that contain a person pushing a stretcher from 6.00am to 6.30am* or *give me all the clips of video acquired in this area containing a person with a read coat.*
- Metadata annotation in MPEG-7 to ensure interoperability with Task 6.2 and 4.1, allowing us to provide additional features and metadata to the query engine.
- Testing the capability of the concept detection techniques developed in the project, by means of a sub-set of thesaurus such as people, face, car, bicycles, all providing insight in a surveillance setting. Videos will be provided about outdoor and indoor scenes, such as roads, public parks, offices and university campus.
- Compare the results obtained with the general-purpose features extractors and invariants, as defined in the Tasks 4.1, 4.2 and 4.3 with specific surveillance techniques that take into account additional information such as camera calibration data.

Surveillance User group

This as preparation to the aim of development of a forum for the surveillance community, able to attract user groups which will have the ability of providing new requests and use cases, sharing knowledge and annotated video and testing different approaches to the video surveillance application field.

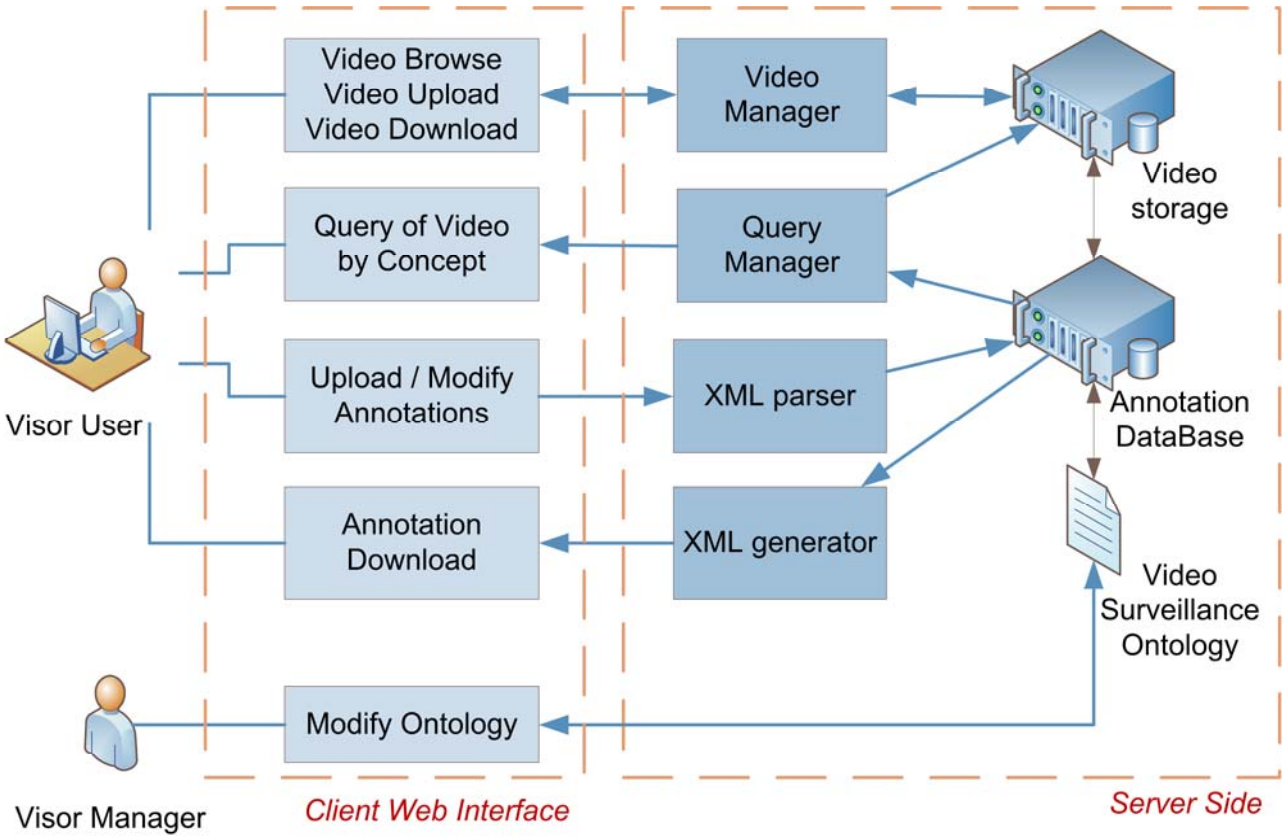


FIG. 1: USER SCHEMA

As above mentioned, first aim of ViSOR is to collect and share surveillance videos together with metadata annotations. A conceptual schema of the ViSOR framework is depicted in Fig. 1. The system has been conceived as a web application; thus, two main sections can be defined, one working at server side and the other one constituted by the client user interface.

The web interface will be presented in the following sections. The core of the system, instead, is the server repository which is composed by three different entities: the Video storage, the annotation database and the reference ontology (Fig. 2). The video storage subsystem contains not only the original uploaded videos, but also recoded versions of them (e.g., an MPEG1 version and a flash compressed preview version), associated textual keywords, relations between videos (e.g., it is possible to specify that two or more videos are different but synchronized views of the same place), and clip segmentation, if any. The ontology subsystem, instead, stores the reference ontology (a video surveillance ontology in our case) using the hierarchical schema fully described in the next section. This ontology can be modified only by the ViSOR manager in order to assure homogeneity and the uniqueness. Finally for each video one or more annotations can be provided, meaning with annotation a set of instances of the descriptor and the concepts defined in the reference ontology.

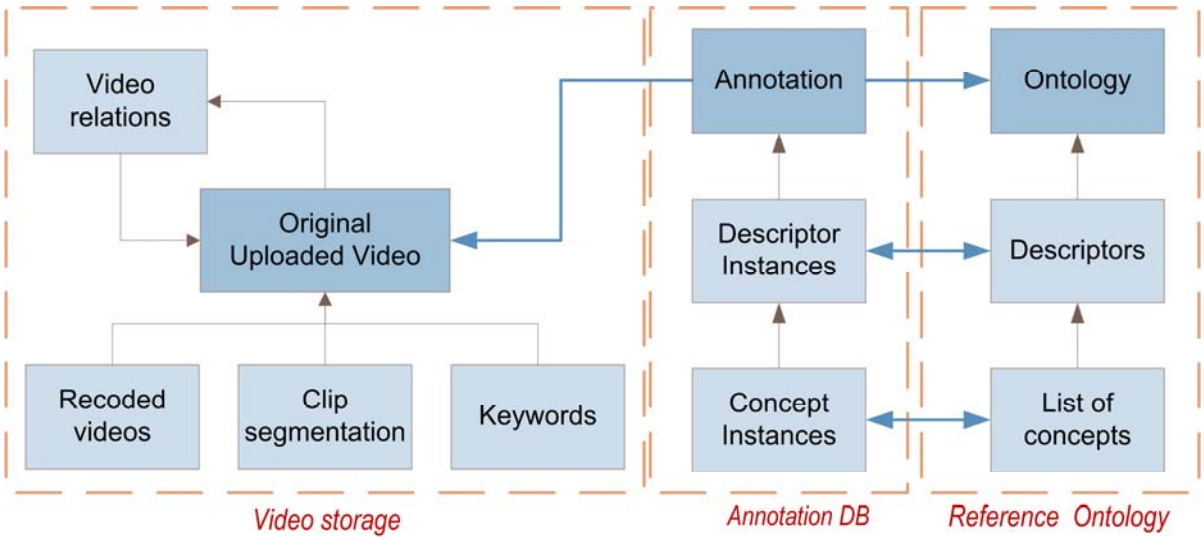


FIG. 2: SCHEMA OF THE VIDEO AND ANNOTATION STORAGE SYSTEM

3.1. Related projects

Some examples of available datasets are reported in the table of Figure 3. Most of these datasets have two main drawbacks. The first is their narrow focus on few specific problems of computer vision and pattern recognition. The PETS datasets, for instance, have been deeply exploited in some applications but they have been proposed within their a-priori annotation with the aim of coping a single or few video surveillance problems. The second limitation is the lack of user interaction; for example, user cannot share their own annotation data, or grow the dataset with other videos, or comment them, and so on. Moreover, the defined ontology is normally not available, and there are not graphical tools or querying systems to select only the subset of videos useful for a given application. The Video Surveillance Online Repository (ViSOR) for annotation retrieval has been conceived to meet these needs.

Dataset		Website	Topics	Ground-Truth	Size
BEHAVE		http://homepages.inf.ed.ac.uk/rbf/BEHAVE/	Unusual activities	yes	8 with ground truth
CANDELA		http://www.multitel.be/~va/candela/	Indoor left-luggage and traffic monitoring on road intersection	no	16 indoor
CAVIAR		http://homepages.inf.ed.ac.uk/rbf/CAVIARDATA1/	Different scenarios of interest. These include people walking alone, meeting with others, window shopping, entering and exitting shops, fighting and passing out and last, but not least, leaving a package in a public place	yes	60 videos
Etiseo		http://www-sop.inria.fr/orion/ETISEO/	Object Detection, Object Localization, Object Tracking, Object Classification.	yes	86 video clips
i-Lids (AVSS 2007)		ftp://motinas.elec.qmul.ac.uk/pub/iLids/	Stopped vehicles and abandonded luggage	yes	14 sequences
ObjectVideo Virtual Video		http://development.objectvideo.com/	Tool to generate virtual video sequences for surveillance purposes.	yes	-
PETS	2001	http://www.cvg.cs.rdg.ac.uk/PETS2001/pets2001-dataset.html	Outdoor people and vehicle tracking	yes	5 sequences
	2002	http://www.cvg.cs.rdg.ac.uk/PETS2002/pets2002-db.html	Indoor people tracking (and counting)	yes	6 sequences
	2004	http://www-prima.inrialpes.fr/PETS04/caviar_data.html	People tracking and activity recognition	yes	28 sequences, 6 scenarios
	2006	http://pets2006.net/	Surveillance of public spaces, detection of left luggages	yes	7 datasets (4 camera views each one)
	2007	http://pets2007.net/	Multisensor sequences containing loitering, attended luggage removal (theft), and unattended luggage	yes	8 datasets (4 camera views each one)
SELCAT		http://www.multitel.be/~va/selcat/	Level crossing monitoring for stopped vehicles detection.	yes	8 sequences
SPEVI		http://www.spevi.org	Face detection and tracking	partial	10 sequences
Traffic datasets by Institut für Algorithmen und Kognitive Systeme		http://i21www.ira.uka.de/image_sequences/	Traffic surveillance in particular on road intersections	no	14 sequences
VISOR		http://imagelab.ing.unimore.it/visor	Indoor and outdoor surveillance sequences; annotation data for object detection, tracking, events, and much more.	yes	162 sequences at 01/07/2008 (in progress)
VSSN		http://imagelab.ing.unimore.it/vssn06/	background subtraction competition	no	7 sequences

FIG. 3: AVAILABLE SURVEILLANCE DATASETS

4. Video Surveillance Ontology

Some proposals of ontologies for event detection in surveillance have been carried out. An example is the ontology defined in the Etiseo project [14] or the result of the "Challenge Project on Video Event Taxonomy" sponsored by the Advanced Research and Development Activity (ARDA) [13]. In [12] a Video Event Representation Language (VERL) is presented which describes an event ontology, associated with Video Event Markup Language (VEML) for event instance annotation. ViPER-GT [10], instead, is a very spread graphical tool for manual annotation of objects and frame-based events, exploited in video-surveillance community.

Here we start from the ViPER framework and propose an open simple ontology structured as a simple "concept list": this taxonomy is a basic form of ontology where concepts are hierarchically structured and univocally defined. The concept list can be dynamically enriched by users under the supervision of the ViSOR moderator to ensure the homogeneity and the uniqueness. The goal is to create a very large concept list avoiding synonymy and polysemy drawbacks.

4.1. Video Surveillance Concepts

We defined a basic taxonomy to classify video shapes, objects and highlights meaningful in a surveillance environment. A "concept" can describe either the context of the video (e.g., indoor, traffic surveillance, sunny day), or the content which can be a physical object characterizing or present in the scene (e.g., building, person, animal) or a detectable action/event occurring (e.g., falls, explosion, interaction between people).

The defined concepts can be differently related with the time space. Thus, we defined a time based taxonomy of the concepts depending on its span, e.g. the time interval during which the object is visible or the event/action is occurring. A concept can be associated to the whole video (e.g.: indoor, outdoor), to a clip/temporal interval (e.g., person in the scene), or to a single frame/instant (e.g., explosion, person entering the scene).

A first reference concept list has been obtained as a subset of two different predefined sets, respectively the 101-concept list of UvA[15] and LSCOM[16]. Since these lists have been defined for generic contexts, only a subset of the reported concepts have been elicited for video surveillance. Moreover, UvA and LSCOM lists are key-frame based only and are not enough to describe activities and events. An extension of the base LSCOM list have been considered (LSCOM Revised Event/Activity Annotations: video-based re-labeling of 24 LSCOM concepts [16]), but only few concepts refer to surveillance. Thus, we have collected and reported other concepts we are interesting on; most of them are defined at a very high abstraction level. Actually, a preliminary list of more than 100 surveillance concepts has been defined.

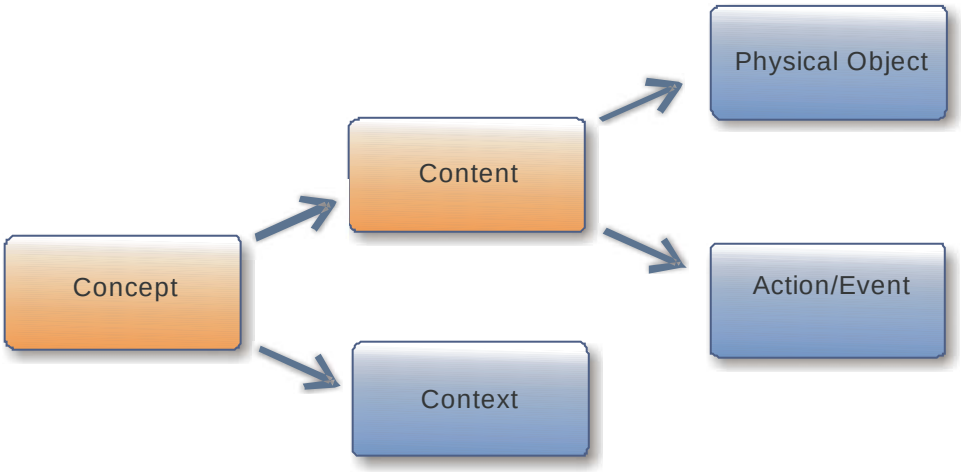
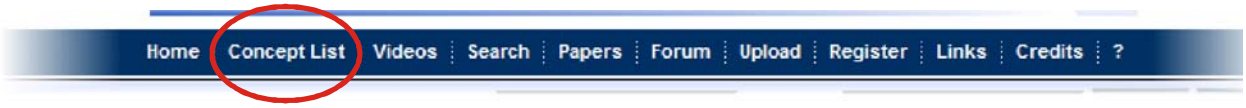


FIG. 4: VIDEOSURVEILLANCE CONCEPT TAXONOMY

The video surveillance concepts can belong to three semantically different categories (Physical Object, Action/Event, Context) (see Fig. 4). More precisely, the ViSOR ontology is structured in several classes, each of them belonging to one of the previously defined categories as reported in Table 1. A video annotation can be considered as a set of instances of these classes; for each instance a list of related concepts are assigned. Some of them directly describe the nature of the instance, i.e., they are connected to the entity with a "IS-A" relation (e.g., concepts like man, woman, baby, terrorist can be a sort of specialization of the "person" class and thus they can be use to describe instances of that class). Other concepts, instead, describe some characteristics or properties of the instance, in a "HAS-A" relation with it (e.g., the contour, the color, the position, the bounding box can be descriptive features of FixedObject instances).

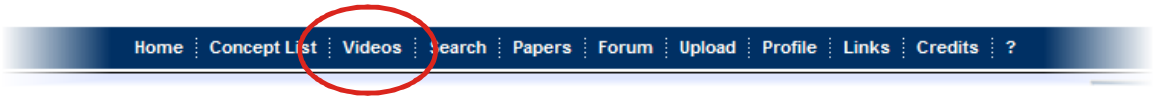
Specialization relations are always static, i.e, they do not change during time; for example, a person can be a man or a woman, but reasonably it cannot switch between them during the video clip. Differently, some "HAS-A" relation can be dynamic; for example, the position and the color of the person can be different frame by frame. Thus, we have distinguished the "HAS-A" concepts in static and dynamic. In other words, the appellation dynamic indicates that the concept has a dynamic evolution of some of its visual properties, and thus may be recognized performing an analysis that goes beyond a single key-frame description, or may provide more information if this evolution is taken into account. A complete list of the video surveillance concepts is reported in Section 21 can be browse from the *Concept list* menu.



Class	Description	Category
1. Person	Kind of person, appearance, age, sex	PhysicalObject
2. BodyPart	legs, arms, and so on	PhysicalObject
3. GroupOfPeople	more than one person	PhysicalObject
4. FixedObject	buildings, furniture, trees, and so on	PhysicalObject
5. MobileObject	moving or mobile object, like chair, pack, luggage	PhysicalObject
6. ActionByAPerson	Action by a single person	Action/Event
7. ActionByPeople	action by a group of people, like meeting	Action/Event
8. ObjectEvent	events related to objects, like AbandonedObject	Action/Event
9. Event	generic events, like fire	Action/Event
10. Location	everithing describing the video location	Context
11. Animals	cats, dogs, and so on	PhysicalObject
12. Weather	sun, cloud, rain	Context
13. Shot	shot detection	Context
14. Transition	transition type, like cut, fade, dissolve	Context
15. Clip	clip segmentation	Context
16. Video	global video information	Context

TABLE 1: SET OF SURVEILLANCE CLASSES

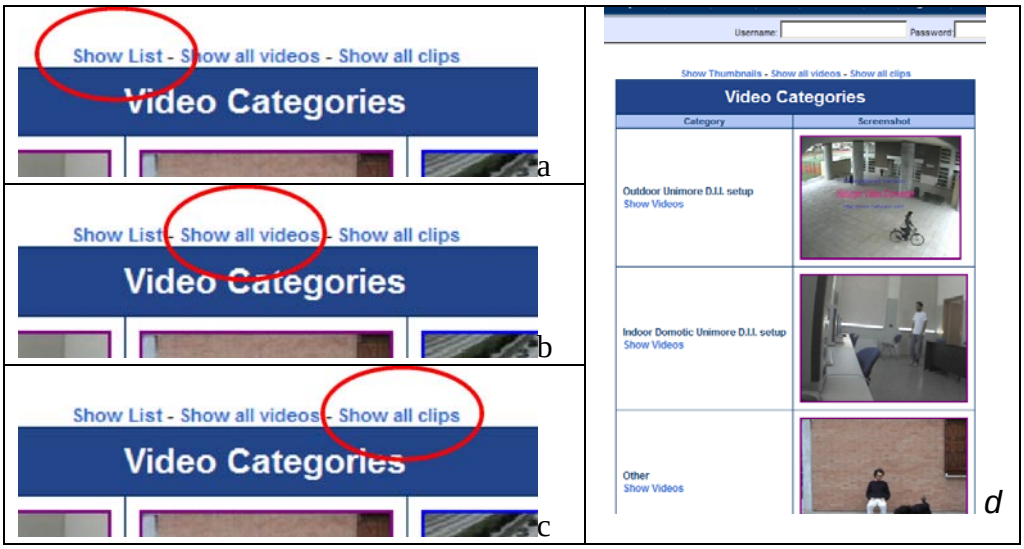
5. Video browse



The video browsing is available selecting the *Video* menu item. Videos are divided into a set of categories, as shown in Fig. 5.a After selecting a category, a list of videos belonging to it is reported (Fig. 5.b). As default, the categories and the video are shown using the thumbnails modality. Selecting show list from the menu on the top of the client area the same information are reported in a list style (Fig. 6.a and 6.d). The complete list of videos without selecting a particular category can be obtain selecting *All videos* as in Fig. 6.b. From the same menu it is possible to switch to a clip level details (Fig. 6.c).

a *b*

FIG. 5: VIDEO BROWSE INTERFACE. A) VIDEO CATEGORIES. B) VIDEO THUMBNAILS OF THE INDOOR DOMOTIC UNIMORE CATEGORY



a *b* *c* *d*

FIG. 6: VIDEO BROWSE INTERFACE. VIEW SELECTION

6. Video details

Once a video has been selected, a web page with details and operations is presented (Fig. 8). Each section of this page can be shown or hidden. On the top of the page there is a preview of the video; the user can select one of the three implemented modalities: video preview, based on a flash compressed stream, single screenshot (a representative frame of the entire video) or a summary view, in which clip level screenshots are reported (Fig. 7).

FIG. 7: THREE MODALITY FOR VIDEO PREVIEW: SINGLE SCREENSHOT, FLASH PREVIEWS, CLIP LEVEL SCREENSHOTS

Below the preview, some video information grouped by categories are listed. Follows a complete description of the reported fields for each category.

Video Information:
Contains generic metadata describing the video, such as author, frame size, compression, copyright statements and so on.

File Name:	File name as stored in the ViSOR system
Title:	Title of the video chosen by the Uploader
Description:	Desription of the video chosen by the Uploader
Video Details:	Frame size, Frame Rate, Frame Coun, Compression
Author:	Real author of the video
Uploaded by:	ViSOR user that uploaded the video in the repository
Creation date:	Creation date of the video
Copyright statement:	If the video owner require a copyright to use his own data, the statement will be reported here. In addition, for each video the following default copyright is shown: “If you publish results using the data, please acknowledge the data as coming from the ViSOR repository, found at URL: http://imagelab.ing.unimore.it/visor”
Permission:	Free: the video can be download by everyone. Logged in User: Only registered user can download the video/annotation

Download section
Allow users to download the original video or the recoded versions automatically produced by the ViSOR system.

Camera Information
In this section a description of the capture device is given as provided by the uploader.

Camera Description	free text description of the camera
Type	Static /Moving Camera
Constrained Motion	yes/no
Infra Red capabilities	yes/no
Omnidirectional camera	yes/no

Other Information

Forum Topic:	Quick link to the Forum Topic related to this video
Keywords:	Free text keywords supplied by the uoploader
Other Related Videos in ViSOR:	The selected video can have relations with other videos in ViSOR, such as other videos taken in the same place at the same time from synchronized cameras. In these cases a link to the other related video can be provided.
Related Files:	Other files given by the authors of the video related to it, such as calibration data, maps of the area, and so on.

Annotations
Allow users to browse, preview or download annotations. More details will be given in the next section.

Papers
List of the references related to the video. See Section 13 for more details.

Operations
Depending on the user rights, in this section are reported the operation buttons.

Download Main Video:	Quick link to download the original video
Download All	Allows to download the original video together with all the annotation. *(Not available yet)*
Upload Annotation:	Using the upload manager subsystem (see Section 10), users can upload annotations in ViPER format. See Section 19 for details.
Upload Related Files:	The owner of a video che upload related files. The uploaded files will be available in the “Other Information” section.
Edit	The owner of the video can edit most of the above described details, such as author, copyright statement, creation date and so on.
Base Annotation	Create or modify the base annotation for the video. See Section 7 for details.
Papers	Add or modify the reference list related to the video. *(Not available yet)*

FIG. 8: VIDEO DETAILS: SINGLE SCREENSHOT VIEW, VIDEO INFORMATION, CAMERA INFORMATION, ANNOTATION DOWNLOAD, OPERATIONS

7. Annotations

7.1. Annotation types

For each video, a set of annotations are provided, both ground truth and automatic annotations. Four different main types of annotation can be available.

- **Structural Annotation:** video size, authors, keywords, etc. This annotation is automatically generated by the ViSOR system exploiting both information provided by the uploader and directly extracted from the video. Thus, the structural annotation is always available for all videos and can bu used as basis for more detailed annotation. The ViPER format includes the config part, i.e., the concept list. Thus, it can be used as input file for ViPER-GT annotation tasks.
- **Base Annotation**: ground-thruthed, with concepts referred to the whole video. Uploder are strongly invited to provide at least a base annotation for their videos. An online annotation tool is provided and described later in this section (Fig 11).
- **Normal GT Annotation:** ground-thruthed, with a frame level annotation; concepts can be referred to the whole video, to a frame interval or to a single frame. There is no online tools to create this kind of annotation. Indeed, the recommended annotation tool is Viper-GT [10].
- **Automatic Annotation:** are outputs of automatic surveillance system. To be imported into ViSOR, the system should export the output in ViPER format or a conversion tool should be exploited. These annotations can be useful to compare results and to assert the performance of particular algorithms or system. Related to this kind of annotation, references to published papers describing the applied methos are appreciated.

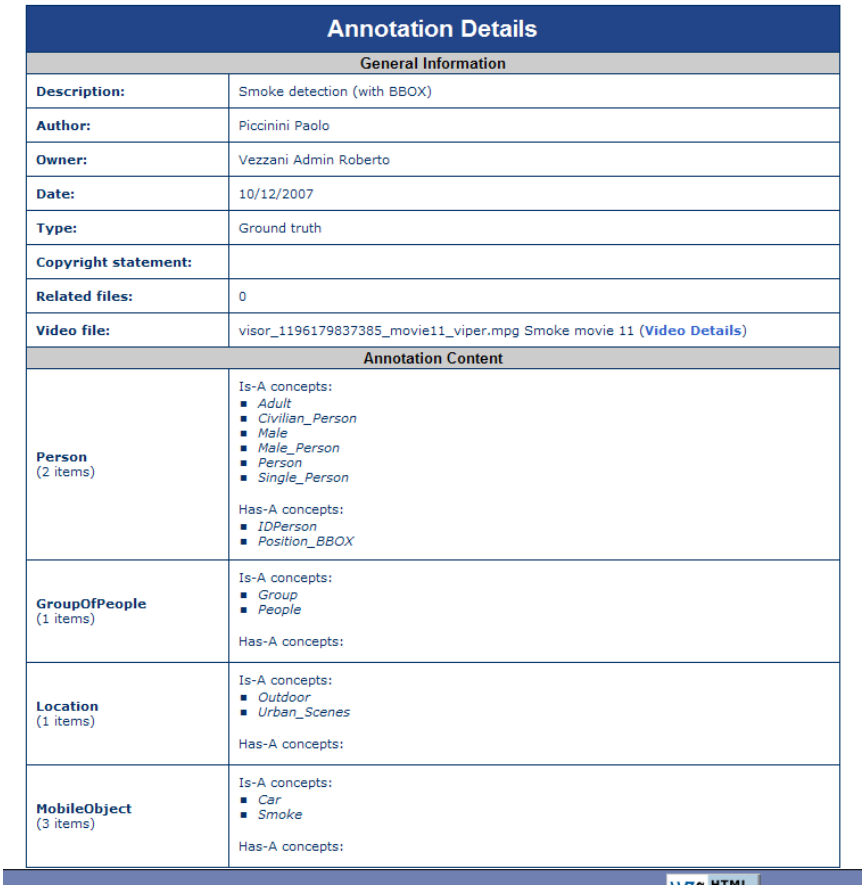
7.2. Annotation Management

For each uploaded annotation, a list of details and operation are available (Fig. 10). First of all, the title, author and creation date as provided by the owner are reported. Then, the following operation are listed:

- **View - Info & structure:** shows all the annotation details with a summary list of the annotation content in terms of descriptors and concepts (Fig. 9).
- **View - Flash preview:** A flash annotation player has been integrated in ViSOR in order to have a look of the video content together with the annotation (Fig. 14). The player

download the flash recoded version of the video and the ViPER annotation. Thus, it plays the video superimposing Has-A concepts using graphical elements; for example rectangles are adopted to represent bbox data types. Is-A concepts are instead reported in a text area on the bottom of the video. A tree with the annotation content is drawn on the right. The output of each descriptor can be enabled or disabled and a quick link to the first frame of each descriptor is available through the “Show In Video” button.

- **Download – Entire ViPER file:** this operation allows to download the complete annotation in ViPER format. See Section 19 for the ViPER format specification.
- **Download –ViPER file with field selection:** the interface allows to download the entire annotation as well as a subset of the annotation fields, filtering by frame number, descriptor or single attribute. In Fig. 12 the criteria specification form is reported.
- **Download – Mpeg7 concept annotation:** this operation allows to download the annotation in Mpeg7 format. Only the Is-A concepts will be included in the output. See Section 20 for the Mpeg7 format specification.
- **Related files:** The owner of the annotation can upload related files, such as pixel based ground truth, additional material, and so on.
- **Performance evaluation:** the selected annotation can be compared with other annotations of the same video in order to evaluate system performances. In Fig. 15 the form used to select the reference annotation and the performance metric framework is shown. The performance evaluation system integrated in ViSOR is based on ViPER-PE [10].



Annotation Details

General Information	
Description:	Smoke detection (with BBOX)
Author:	Piccinini Paolo
Owner:	Vezzani Admin Roberto
Date:	10/12/2007
Type:	Ground truth
Copyright statement:	
Related files:	0
Video file:	visor_1196179837385_movie11_viper.mpg Smoke movie 11 (**Video Details**)
Annotation Content	
Person (2 items)	Is-A concepts: ▪ *Adult* ▪ *Civilian_Person* ▪ *Male* ▪ *Male_Person* ▪ *Person* ▪ *Single_Person* Has-A concepts: ▪ *IDPerson* ▪ *Position_BBOX*
GroupOfPeople (1 items)	Is-A concepts: ▪ *Group* ▪ *People* Has-A concepts:
Location (1 items)	Is-A concepts: ▪ *Outdoor* ▪ *Urban_Scenes* Has-A concepts:
MobileObject (3 items)	Is-A concepts: ▪ *Car* ▪ *Smoke* Has-A concepts:

FIG. 9: ANNOTATION DETAILS

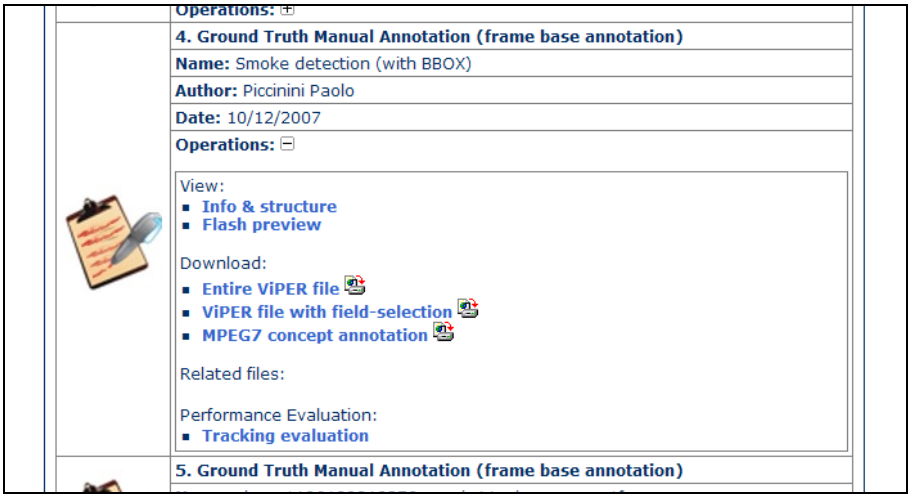


FIG. 10: LIST OF DETAILS AND OPERATIONS FOR EACH ANNOTATION

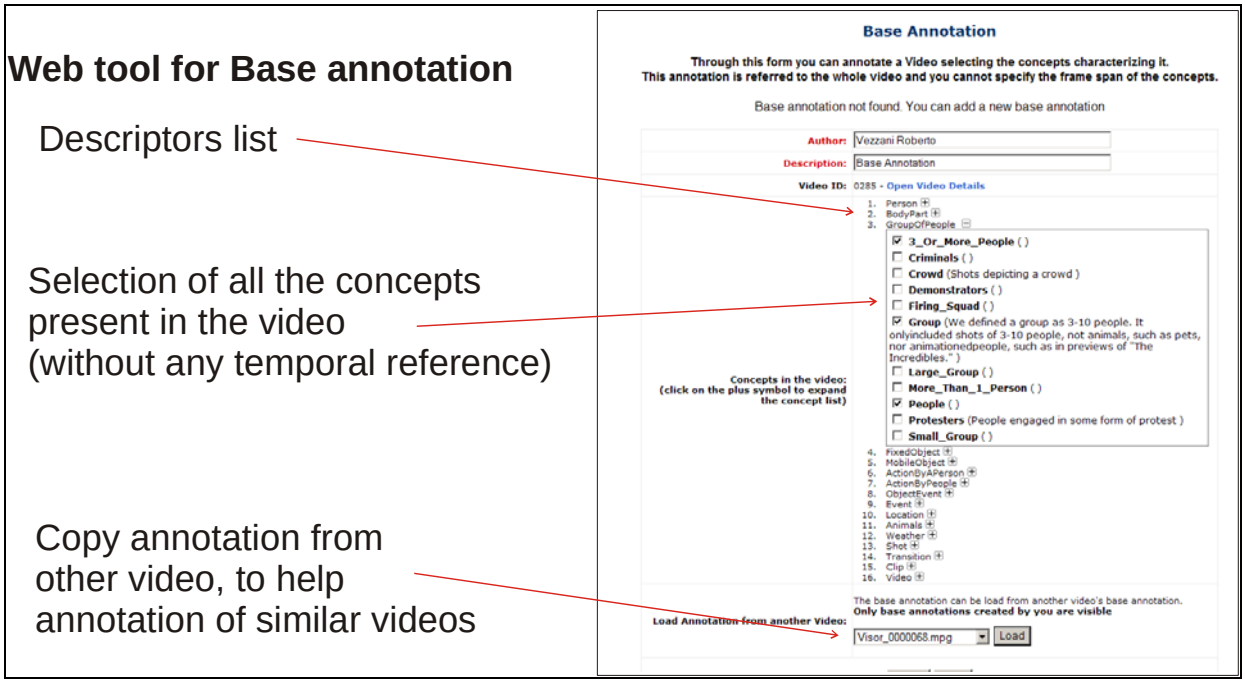


FIG. 11: WEB TOOL FOR BASE ANNOTATION

FIG. 12: CRITERIA SELECTION FOR ANNOTATION DOWNLOAD

FIG. 13: EXAMPLE OF AN ANNOTATION EXPORTED USING VIPER AND MPEG7 FORMATS

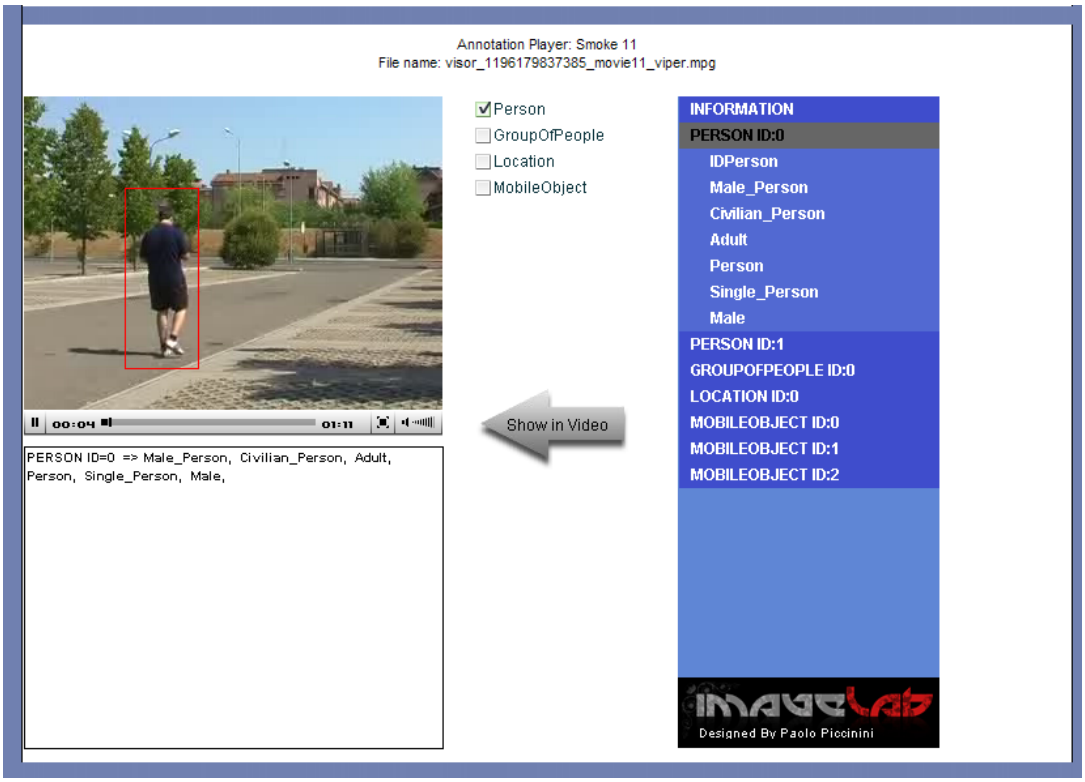
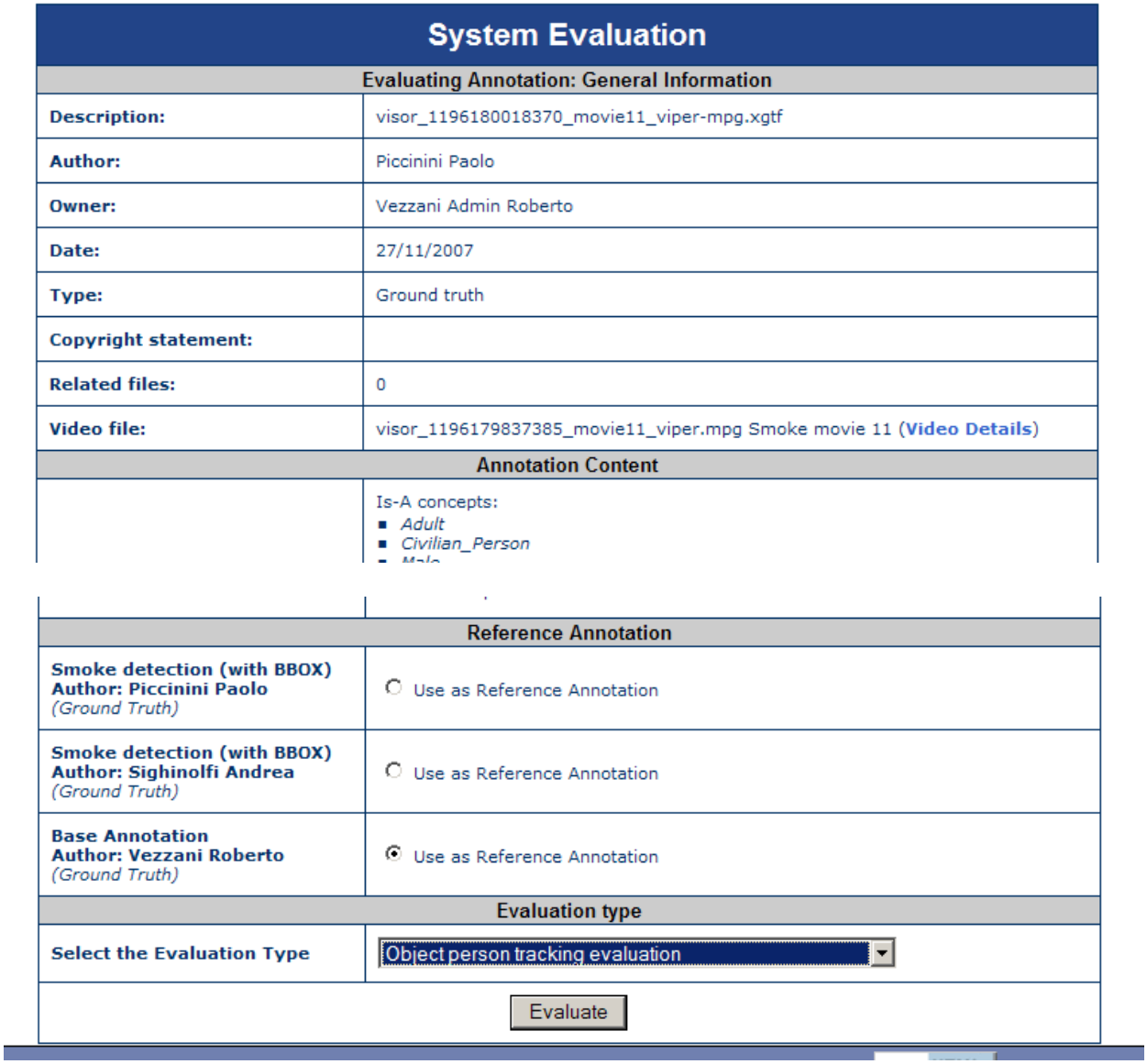


FIG. 14: THE VIDEO AND ANNOTATION FLASH PLAYER



System Evaluation

Evaluating Annotation: General Information	
Description:	visor_1196180018370_movie11_viper-mpg.xgtf
Author:	Piccinini Paolo
Owner:	Vezzani Admin Roberto
Date:	27/11/2007
Type:	Ground truth
Copyright statement:	
Related files:	0
Video file:	visor_1196179837385_movie11_viper.mpg Smoke movie 11 (**Video Details**)
Annotation Content	
	Is-A concepts: ▪ *Adult* ▪ *Civilian_Person*

Reference Annotation	
Smoke detection (with BBOX) **Author: Piccinini Paolo** *(Ground Truth)*	○ Use as Reference Annotation
Smoke detection (with BBOX) **Author: Sighinolfi Andrea** *(Ground Truth)*	○ Use as Reference Annotation
Base Annotation **Author: Vezzani Roberto** *(Ground Truth)*	◉ Use as Reference Annotation
Evaluation type	
Select the Evaluation Type	Object person tracking evaluation

Evaluate

FIG. 15: PERFORMANCE EVALUATION FORM

8. Performance Evaluation

Performance evaluation is still a key task for research communities working on surveillance. Techniques of performance evaluation are needed, of course, to measure progress of research in this area, and to compare, for example, different tracking methods. However, there is another, equally important reason for creating evaluation metrics and techniques. In the course of research on a tracking method there is the need to compare different versions, approaches, or even results of different settings of control parameters. With automated, quantitative evaluation techniques, system results coming from different versions or different settings are formally compared. Performance evaluation is thus very important in the context of people tracking as it is not easy to obtain shared videos and the corresponding reference data for tracking i.e., the ground-truth. The ViSOR framework, instead, make freely available both videos and ground-truth annotations. Moreover, we have integrated in the ViSOR framework the performance evaluation tool named ViPER-PE [10].

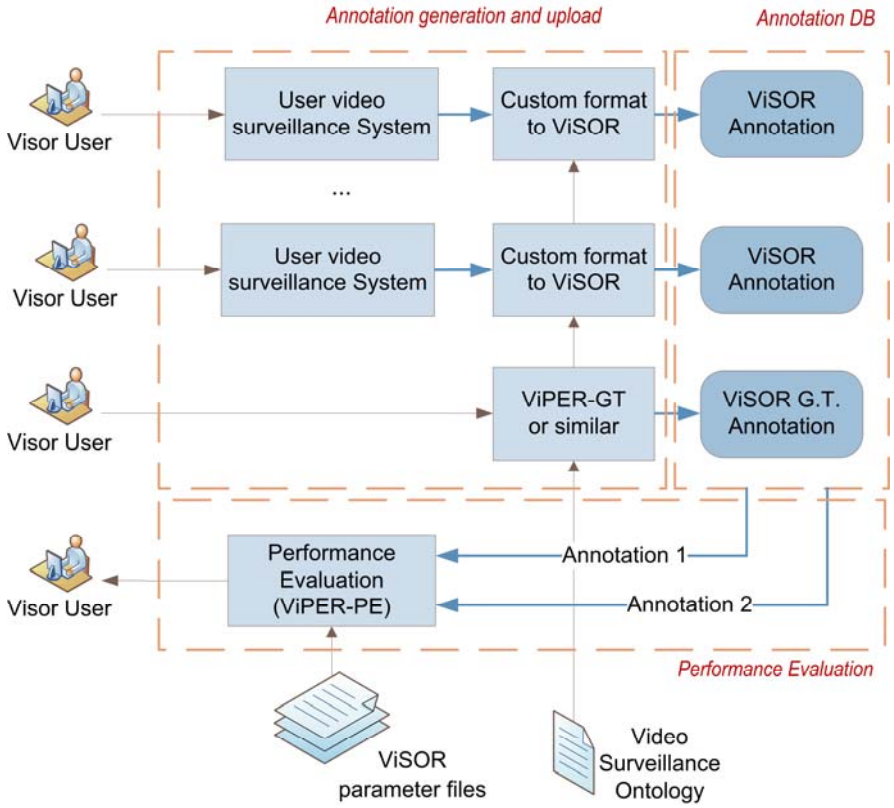


FIG. 16: PERFORMANCE EVALUATION SCHEMA

ViPER-PE allows to compare two different annotation files and to report performance results. If the two annotations are coming from system outputs, then the evaluation results can be

considered as a system comparison and exploited to choose which system performs well on the selected video. Otherwise, comparing a system output with the video ground-truth, the results will be an objective measure of the system efficacy. In both cases, since both videos, annotation, and performance metrics are the same for each ViSOR users, the performance evaluation is fair and objective.

Figure 16 contains the block diagram of the performance evaluation procedure embedded in ViSOR. Users can upload the annotation generated by their video surveillance systems. These annotations should be written using the XML ViPER format as in Section 19 and the reference ontology described in Section 21. At the same time, ground truth annotations can be provided for the same set of videos using the ViPER-GT tool or a similar one. Once more than one annotation is available for the same video, performance evaluation tests can be carried out selecting two annotations and a performance schema, i.e. a particular ViPER-PE configuration file selected among the set provided by the web interface of ViSOR. The descriptors to be considered for the evaluation (e.g., person descriptors), the distance measure, the tolerance thresholds, and some filters are specified in these configuration file. For example, the evaluation schema for people tracking included in ViSOR takes into account only the Person descriptors and compares frame by frame the bounding box of them, reporting both metrics on the detection and the localization of the targets. A screen-shot of the ViSOR output obtained with the described schema is reported in Figure 17 while the correspondent configuration files are shown in Figure 18.

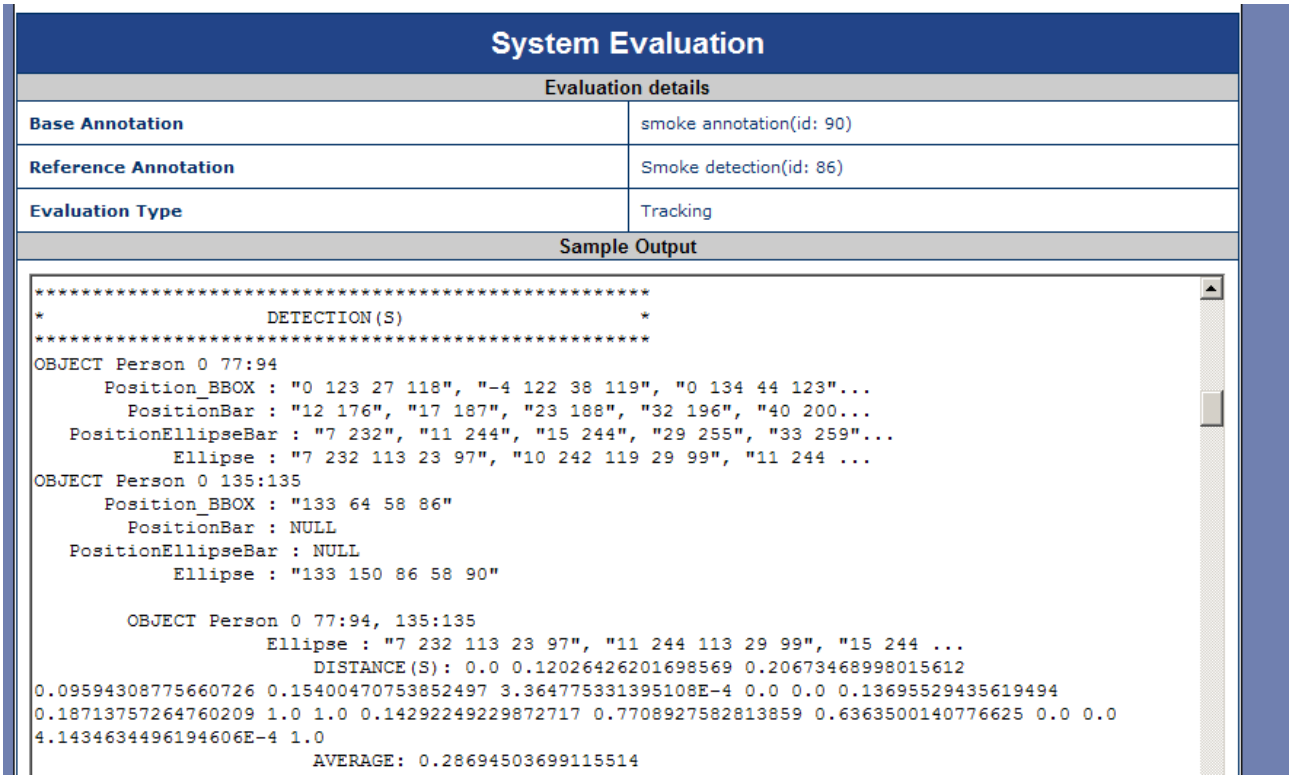


FIG. 17: PERFORMANCE EVALUATION SAMPLE OUTPUT

- Evaluation Parameters File (epf file) -

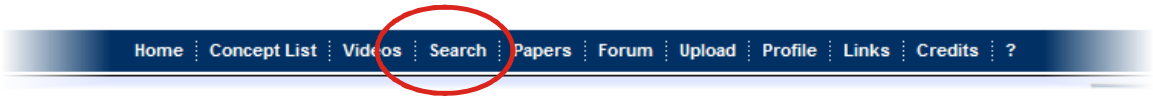
```
#BEGIN_OBJECT_EVALUATION
OBJECT Person [- -]
   Position_BBOX : [dice -]
   Ellipse : [- -]
#END_OBJECT_EVALUATION

#BEGIN_FRAMEWISE_EVALUATION
OBJECT Person
Position_BBOX : dice overlap matchedpixels missedpixels \
falsepixels [arearecall 0.6] [areaprecision 0.7]
Ellipse : dice overlap matchedpixels missedpixels \
falsepixels [arearecall 0.6] [areaprecision 0.7]
#END_FRAMEWISE_EVALUATION
```

- Properties file (pr file)-

```
# Level of analysis
# 3=statistical comparison
level = 3
target_match = MULTIPLE
# Range Distance Metric
# dice = Dice coefficient
range_metric = dice
# String Distance Metric
# L = Levenshtein (Edit distance)
string_metric = L
# Level Specific Metrics
level3_metric = mean
#####################################################################
# Default Tolerance Configuration [0 = exact match]
#####################################################################
# Temporal Range
range_tol = 0.2
# Attributes, <attribute type>_tol
bbox_tol = 0.25
ellipse_tol = 0.99
# Level Specific
level3_tol = 0.3
#####################################################################
# Presentation Parameters
#####################################################################
verbose = true
attrib_width = 50
```

FIG. 18: PERFORMANCE EVALUATION CONFIGURATION FILES

9. Video Search



Instead of browsing by categories and videos as reported in the previous section, the Web interface allows query of videos basing on the annotated concepts or assigned keywords (Fig. 19). In the first case, after selecting a concept from the ViSOR concept list by means of a droplist control, the system will report a list with all the video having at least one annotation (base, GT or automatic) containing that concept. For example, Fig. 20 reports a partial output of the system obtained selecting the *chair* concept.

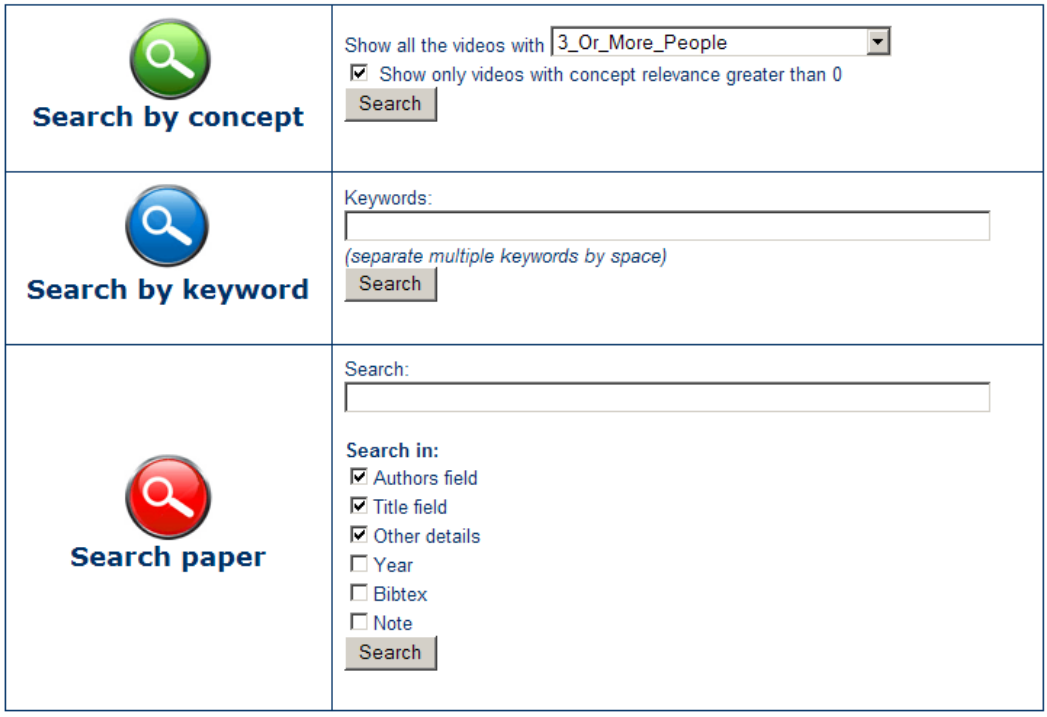


FIG. 19: VIDEO SEARCH: SEARCH BY CONCEPT, BY KEYWORD OF BY PAPER

Search by Concept: Chair

Video	Screenshot	Annotation
Domotica_federico *Details*		1. Domotica_federico GT *(Stradi Federico)* **Download Annotation** 2. *()* **Download Annotation**
Man with a dog *Man with a dog* *Details*		1. Base Annotation *(Vezzani Admin Roberto)* **Download Annotation** 2. *()* **Download Annotation**
prova.avi *Test Video* *Details*		1. Base Annotation *(Vezzani Admin Roberto)* **Download Annotation**
Tying shoes 1 *A person crouchs to tie the shoe laces (1/5)* *Details*		1. Base Annotation *(Prati Andrea)* **Download Annotation**
Tying shoes 2 *A person crouchs to tie the shoe laces (2/5)* *Details*		1. Prati Andrea *(Base Annotation)* **Download Annotation**

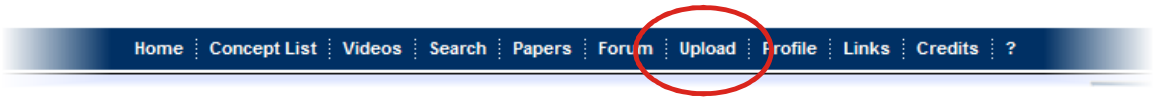
FIG. 20: EXCERPT FROM THE OUTPUT OF THE QUERY BY CONCEPT USING THE CHAIR CONCEPT

Another way to search for a video is exploiting the free keywords assigned to the video from the uploder. The system will return all the video containing at least one of the input keywords.

10. ViSOR Upload Manager

ViSOR include an upload Manager based on the jClientUpload component. Video, Annotation and related files can be upload by selecting the files using the component's menu or simply by drag and drop. Multiple uploads are allowed. The upload is performed using an FTP connection to the ViSOR server (port 9000). After the upload, a suitable form will guide the user to insert details about the uploaded media. Some of the contents require the ViSOR manager approval. In such a case, the user will receive a confirmation email for each file with all the information required. A detailed explanation on how to upload a video follows.

10.1. Howto upload a Video



1. Drag and drop your video/videos here

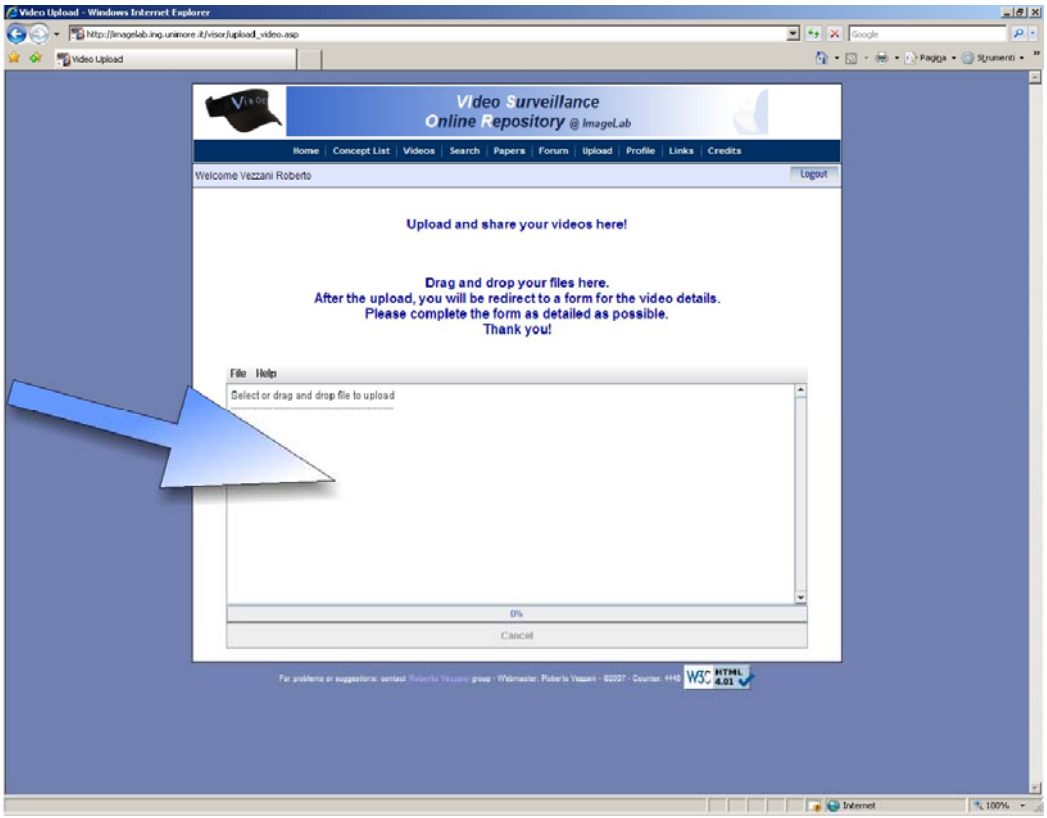


FIG. 21: DRAG AND DROP COMPONENT FOR VIDEO UPLOADS

2. Wait until the upload is finished. If your upload is broken, you can try again and the upload will be resumed.

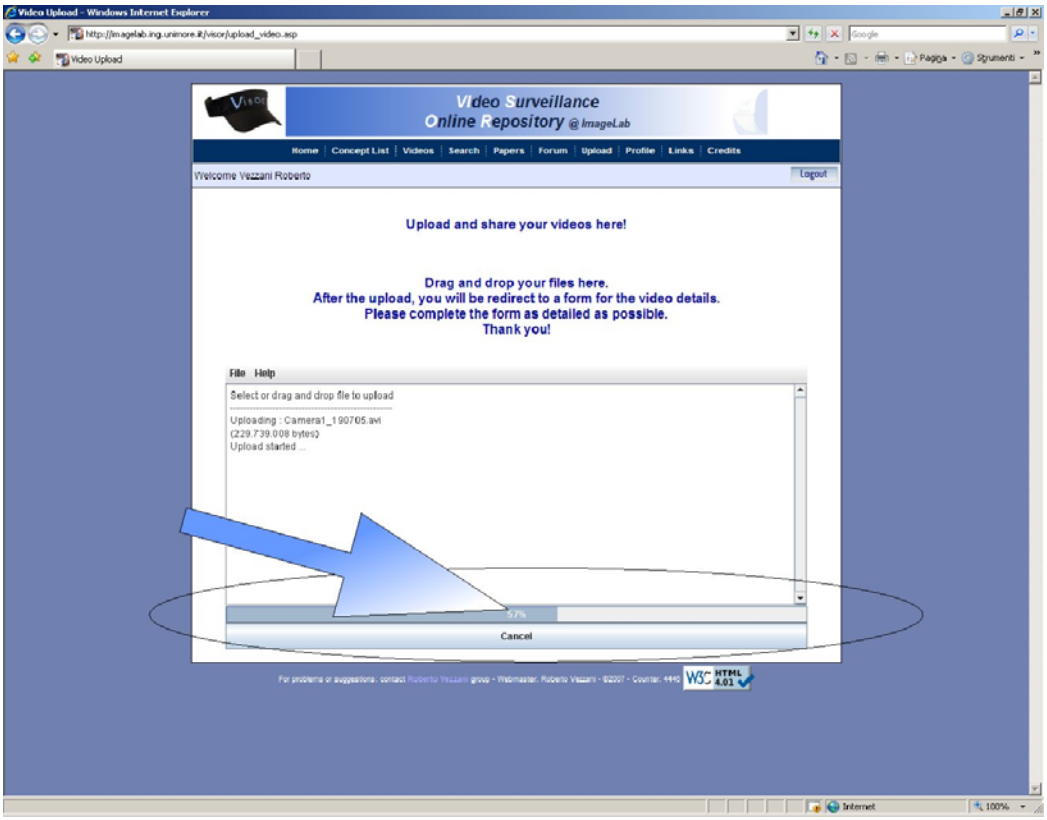


FIG. 22: PROGRESS BAR OF THE UPLOADER COMPONENT

3. Please, fill in the form with the following information

- Title and description
- Creation Date
- Author (if different to the uploader)
- Camera description and type
- Free text keywords (used for queries)
- Copyright statement, if any

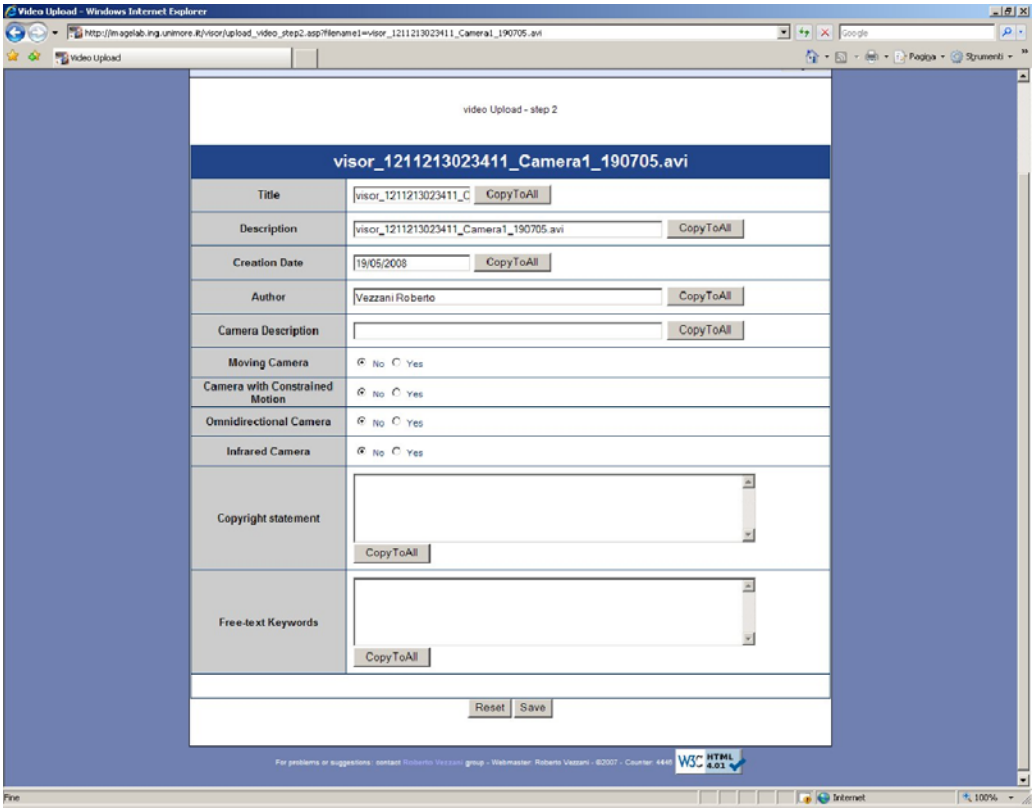


FIG. 23: FORM USED TO PROVIDE BASIC INFORMATION AFTER VIDEO UPLOAD

If you are uploading more than one file at a time, a table for each video will be generated. Use the 'CopyToAll' button to copy the current field value to all the other videos.

4. Video check and approval

The video will be checked by the ViSOR manager. After approval, the video will be visible;you will receive an email with the result of the check.

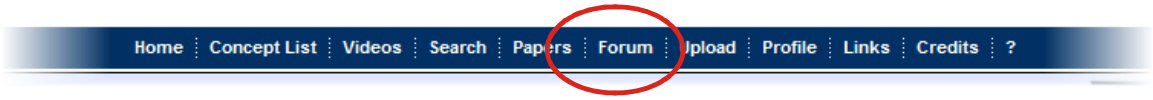
When a video is uploaded into the ViSOR system, the Moderator can change the provided description and attributes and then he can approve the media.

Thus, the file is automatically processed in order to generate:

- a compressed flash version for video preview
- an MPEG1 version principally used for VIPER-GT annotations
- a JPEG screenshot (from the first frame)
- a clip segementation (fixing the number of clips or the number of frames per clip) and a clip screenshot (first frame of the clip)

All these tasks are performed exploiting the command line version of FFMPEG [11]. Thus, the video formats supported by the ViSOR system are the same of the FFMPEG library (a list is reported in Table 2).

11. Forum



Another important aspect for a research community is the information exchange and the opportunity to share opinions, requests, comments about the videos and the annotations, and so on. Thus, the online portal of Visor includes a forum in which one topic for each video, generic topics on video surveillance, and topics on VISOR (e.g., call for videos) are already active. In addition, each registered user can create his own topics.

The forum is Powered By: Snitz Forums 2000.

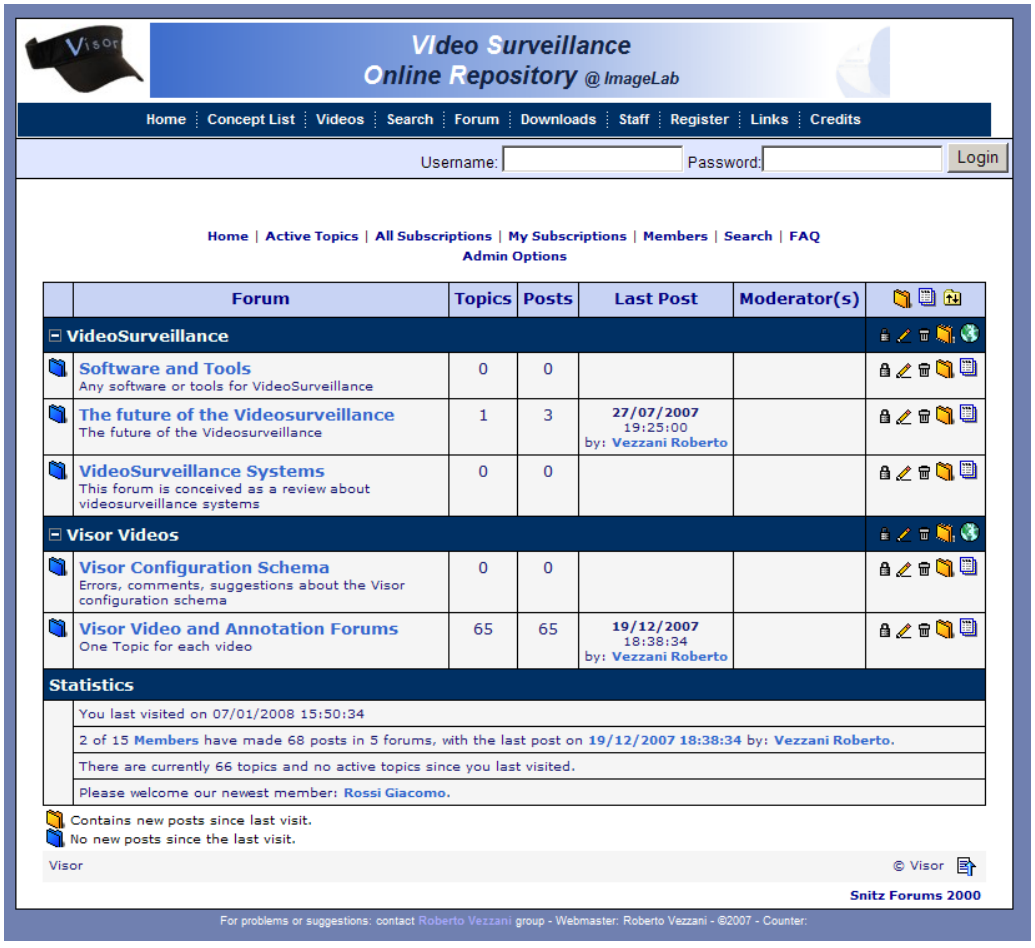


FIG. 24: FORUM SCREENSHOT

12. User registration

Due to privacy and copyrights issues, the web access to some resources has been protected by a user level login. To this aim, a registration form is available from the *Register menu* (See Fig. 25) . The registrations are sent to the visor administrator that can allows user to login into the system. An email with the temporary password will be sent to the granted users.

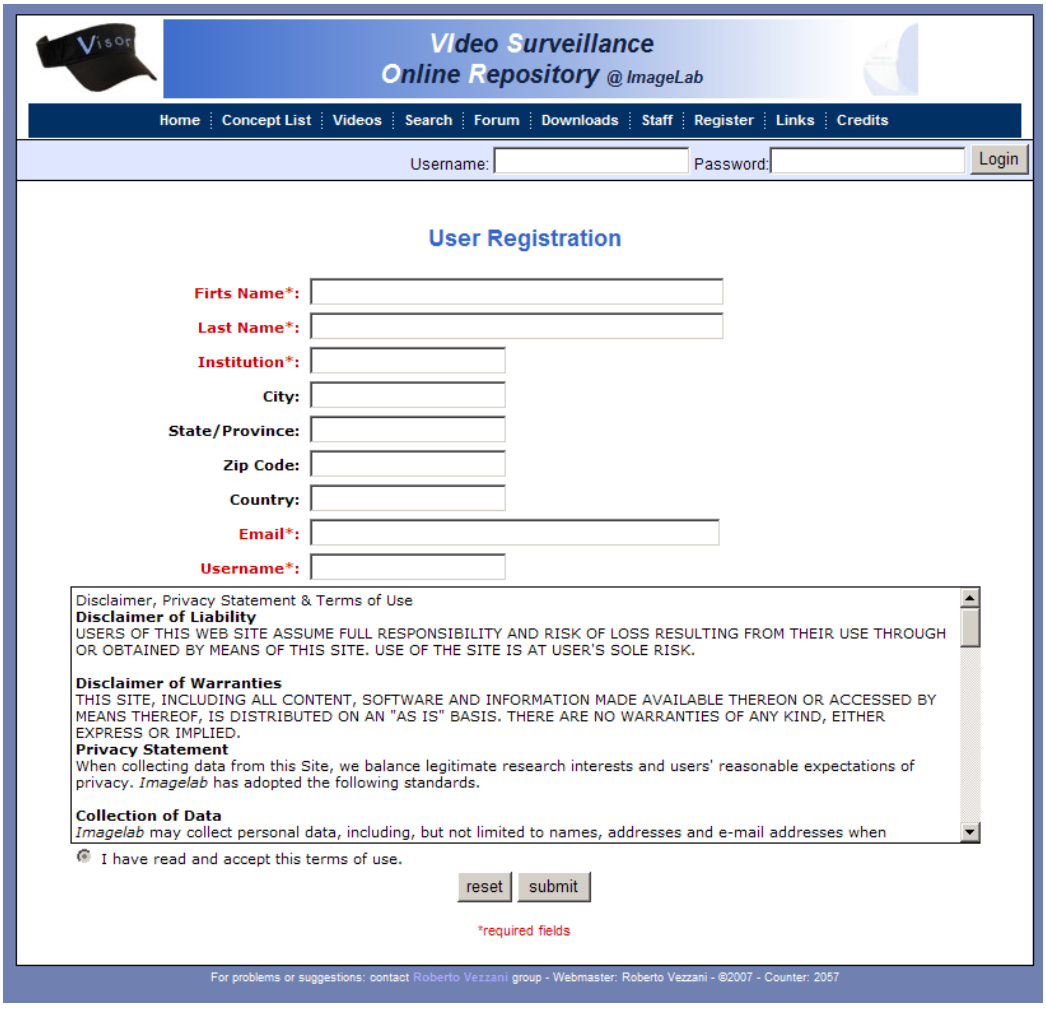
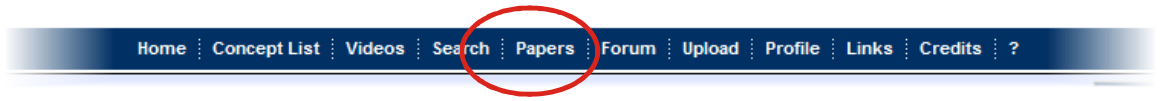


FIG. 25: USER REGISTRATION

13. Papers



Videos uploaded in ViSOR or downloaded from it are hopefully used in research activities to perform experimental activities. Thus, references to papers exploiting ViSOR videos as test or training set can be useful for the ViSOR community. Through the Paper page, users can reach the paper entry form as in Fig. 26. Due to copyright issues, only reference to papers can be added to the system. Full text of the papers (in word, latex or PDF formats) cannot be upload to ViSOR, but it is possible to provide a link to digital version stored on own servers or public repositories.

FIG. 26: PAPER WEB PAGE WITH THE PAPERS COLLAPSED AND THE TWO QUICK LINKS FOR QUERING PAPERS AND ADDING NEW ONES

Mandatory information on each paper are author list, paper title, publiching year and other (which includes all the other paper information such as booktitle, pages, and so on). An optional reference in bibtex format can be added, as well as notes and an additional link (see Fig. 27).

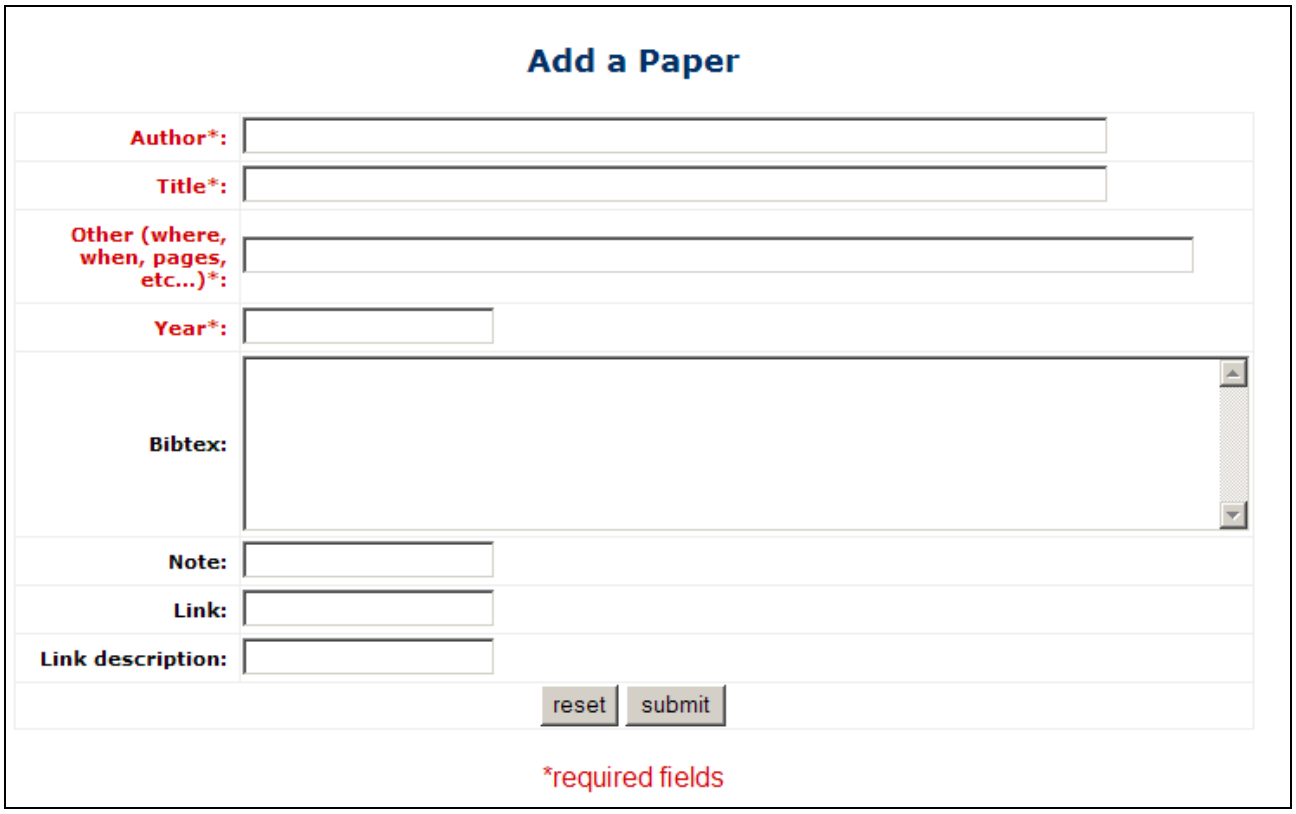
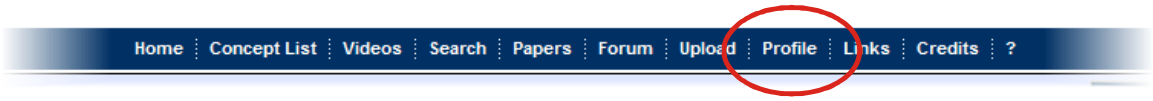


FIG. 27: NEW PAPER FORM

Once the paper references are added to the ViSOR system, they can be related to videos and annotation directly from the video detail page (this functionality is not avaliable jet).

14. Edit Profile



Using this form it is possible to change the user details provided during the registration. In particular, it is possible to change the current password. Since the first password has been automatically generated by the ViSOR system and sent as clear text by email, it is strongly recommended to change the password at the first login.

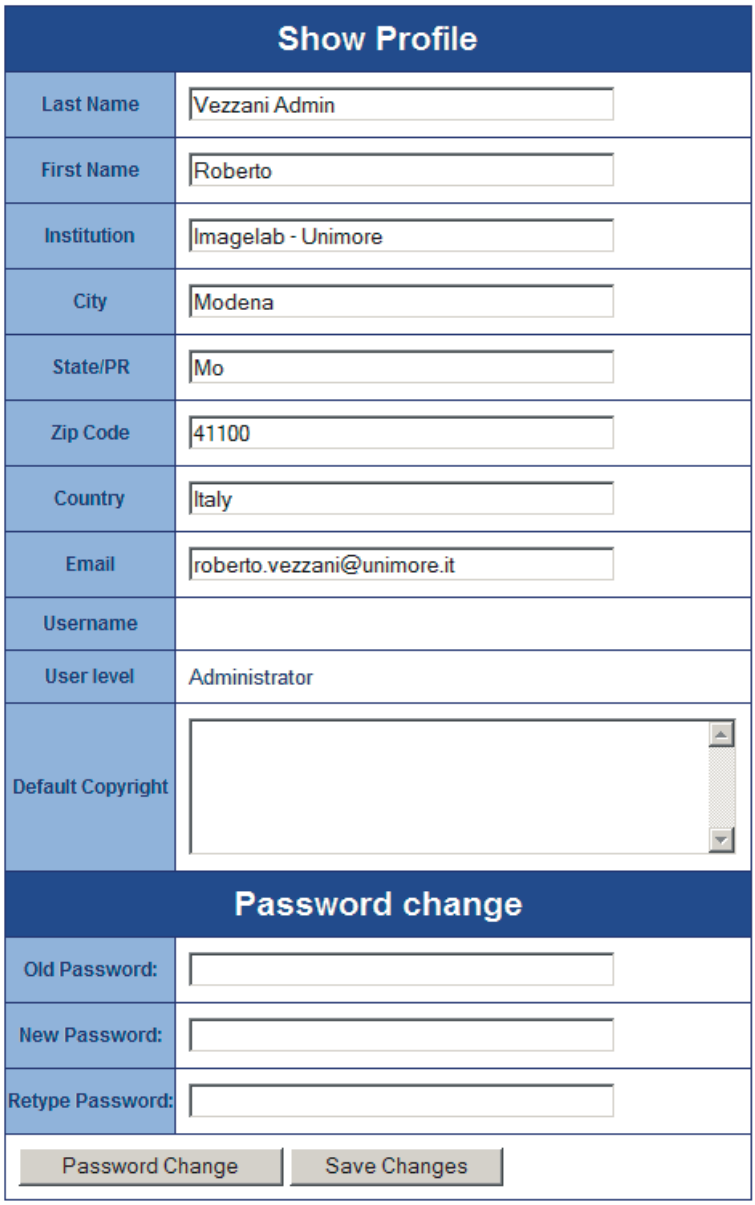


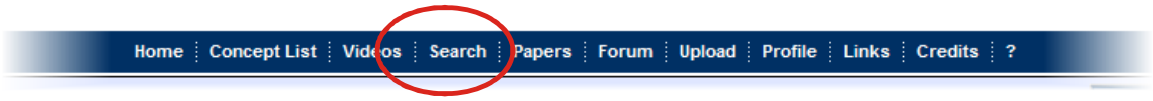
FIG. 28: EDIT PROFILE FORM

15. Examples

In this section some practical examples will be presented. Starting from some common tasks or questions that users commonly want to solve, a step by step description will be provided in order to guide users thorugh the ViSOR interface.

15.1. "I want all the videos containing a chair"

This common query can be solved starting from the "search" menu (See section 9)**Errore. Il segnalibro non è definito.**:



In the search by concept frame, select the "chair" concept (Fig. 29) and then press Search. The system will return the list of all the video having at least one associated annotation containing the concept "chair". Make sure that the "Show only videos with concept relevance greater than 0" checkbox is selected, otherwise the system will return also videos having annotations that state no chairs are in the scene. For example, Fig. 20 reports a partial output of the system obtained selecting the *chair* concept.

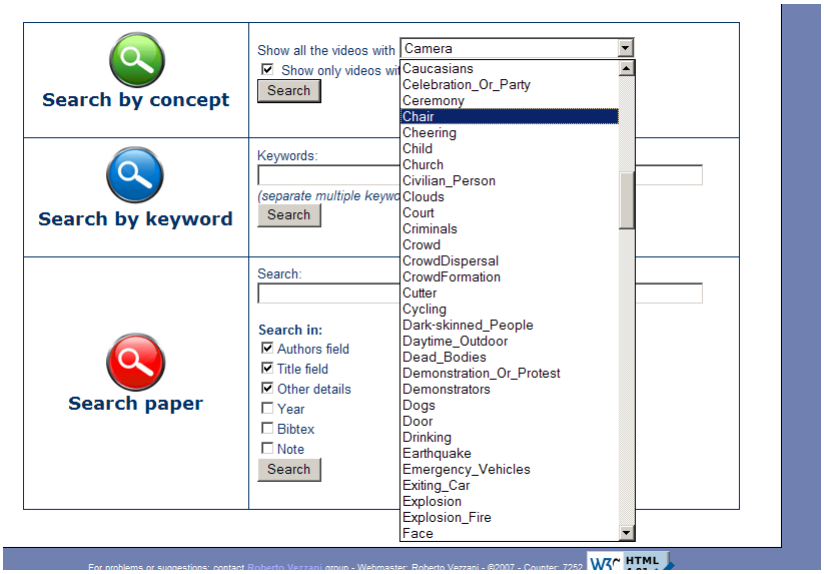


FIG. 29: VIDEO SEARCH: SEARCH BY CONCEPT "CHAIR"

15.2. "I like the video *Smoke_video_11* from the *Videos for Smoke detection* section. Which kind of annotations this video contains? How can I download them?

Selecting the Video menu and then the desired category, you can see below each video a feature list indicating if the video has some annotations.

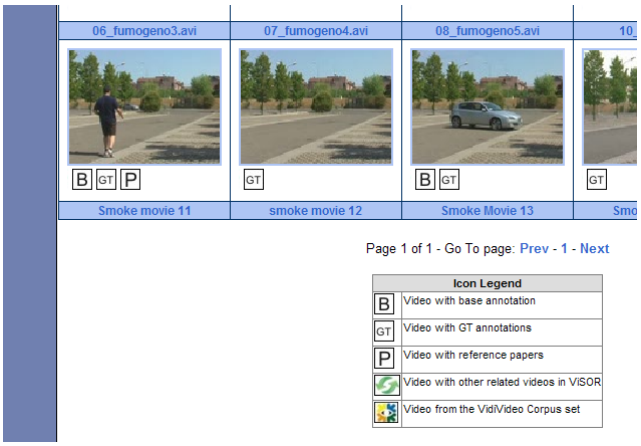


FIG. 30: EXAMPLE 2 – VIDEO FEATURE LIST

In particular, for the video cited in the question, a base annotation and at least one GT annotation are available. Moreover, users have added some interesting reference about the video.

Selecting the video and expanding the annotation section of the video details, you can better see which kind of annotations are available.

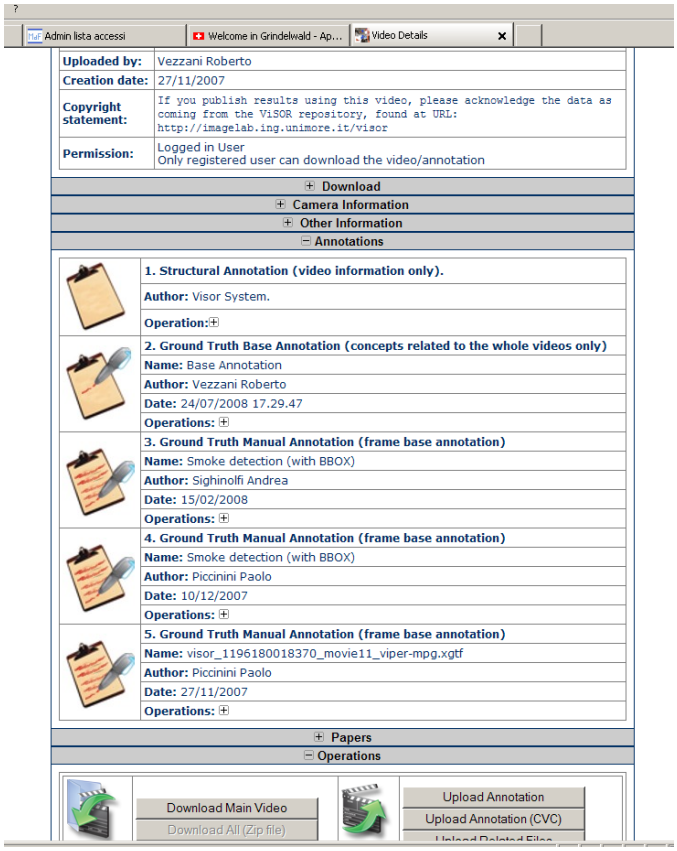


FIG. 31: EXAMPLE 2 – ANNOTATION LIST

For this particular video, 4 different annotations are given (plus the automatic structural annotation). For example, selecting the number 4 and expanding the relative operation section you can access to the annotation content.

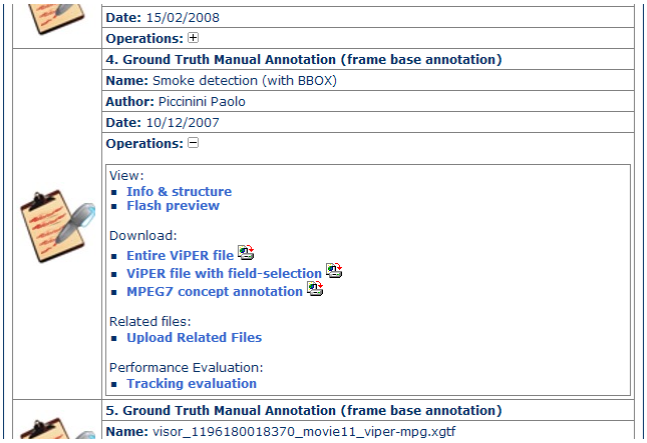


FIG. 32: EXAMPLE 2 – ANNOTATION OPERATIONS

The *Info&Structure* command gives you a look of the annotation summary: the video contains 2 people, 1 group of people, and 3 mobile objects. These last ones are classified as cars or smoke. The video is captured outdoor in an urban environment (location).

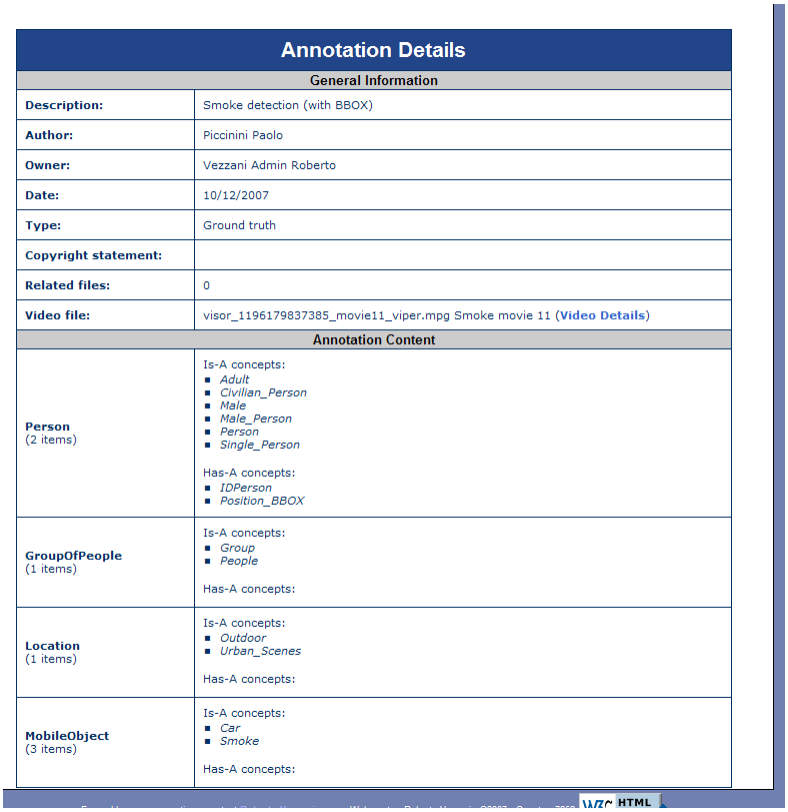


FIG. 33: FIG. 34: EXAMPLE 2 – ANNOTATION SUMMARY

If you need the entire annotation you can download it from the “Entire Viper File” link (see section 23 for the corresponding file) or from the “Mpeg7 concept annotation” (see section 24 for the corresponding output). As reported in section 7, the Mpeg7 output contains the IsA concepts only and not the HasA ones such as the bounding box of the people.

15.3. “The ViPER annotation file is too big; I don’t need so many details.”

Once you have found a suitable annotation, you can download only a subset of the concepts so that the ViPER output can be smaller.

From the operation section of the selected annotation, click on the *“ViPER file with field-selection”* link. A selection form will ask you which descriptors, concepts, and attributes you are interested on. Moreover, you can download the annotation of a subset of frames.

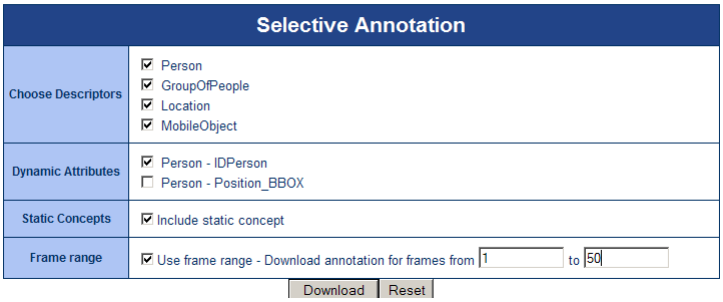


FIG. 35: EXAMPLE 3 – SELECTIVE ANNOTATION

For example, in Fig. 35 the frame by frame bounding box of the people are skipped and the annotation is downloaded for the first 50 frames only.

16. System features Summary

Video Storage
- Multiple video format support
  (Mpeg1, Mpeg2, Mpeg4, Avi, Flv)
- Free-text Keywords
- Video metadata (e.g., author, creation date, ...)
- Camera information
  (e.g., camera type, motion, IR,
  omni-directional, calibration)

Video Management
- Flash Video Preview
- Video Download (registerd users only)
- Summary (clip-level screenshots;
  automatic clip extraction)
- Video Format selection (automatic transcoding)
- User based Access control

Video Surveillance Ontology
- Two level ontology: descriptor – concept/attribute
- 16 main descriptor types
- about 300 surveillance concepts

Annotation
- Stored on a DBMS
- Both ground truth and automatic annotations
- Two level annotation:
  descriptor – concept/attribute
- Customizable descriptor and concept list
- Customizable annotation attributes
- LSCOM and MediaMill concepts included

Annotation Management
- Viper-format “config” and “data” export
- MPEG7 export
- Partial annotation export
- Merge of multiple annotations

Queries
- Query by concept
- Query by keyword

- Query by video or camera metadata

Scientific Papers

- List of seminal surveillance papers
- Papers by the ViSOR members

ViSOR features and requirements	
Webserver	IIS 5
Database	Microsoft Access 2003
Server Side Script Language	ASP 1.0 - VB script
Client Side Script Language	Java
Additional Server side CGIs	Written in C++ and compiled under Microsoft Windows.
FFMPEG	FFmpeg version SVN-r10461, Copyright (c) 2000-2007 Fabrice Bellard, et al. libavutil version: 49.5.0 libavcodec version: 51.43.0 libavformat version: 51.12.2 built on Sep 11 2007 01:20:02, gcc: 4.2.1-sjlj (mingw32-2)
Forum	Powered by Snitz Forums 2000 Version 3.4.06

TABLE 1: VISOR FEATURES AND REQUIREMENTS

17. Supported codec list

Supported Codec	Encoding	Decoding	Comments
MPEG-1 video	X	X	
MPEG-2 video	X	X	
MPEG-4	X	X	
MSMPEG4 V1	X	X	
MSMPEG4 V2	X	X	
MSMPEG4 V3	X	X	
WMV7	X	X	
WMV8	X	X	not completely working
WMV9		X	not completely working
VC1		X	
H.261	X	X	
H.263(+)	X	X	also known as RealVideo 1.0
H.264		X	
RealVideo 1.0	X	X	
RealVideo 2.0	X	X	
MJPEG	X	X	
lossless MJPEG	X	X	
JPEG-LS	X	X	fourcc: MJLS, lossless and near-lossless is supported
Apple MJPEG-B		X	
Sunplus MJPEG		X	fourcc: SP5X
DV	X	X	
HuffYUV	X	X	
FFmpeg Video 1	X	X	experimental lossless codec (fourcc: FFV1)
FFmpeg Snow	X	X	experimental wavelet codec (fourcc: SNOW)
Asus v1	X	X	fourcc: ASV1
Asus v2	X	X	fourcc: ASV2
Creative YUV		X	fourcc: CYUV
Sorenson Video 1	X	X	fourcc: SVQ1
Sorenson Video 3		X	fourcc: SVQ3
On2 VP3		X	still experimental
On2 VP5		X	fourcc: VP50
On2 VP6		X	fourcc: VP60,VP61,VP62
Theora	X	X	still experimental
Intel Indeo 3		X	
FLV	X	X	Sorenson H.263 used in Flash
Flash Screen Video	X	X	fourcc: FSV1
ATI VCR1		X	fourcc: VCR1

ATI VCR2		X	fourcc: VCR2
Cirrus Logic AccuPak		X	fourcc: CLJR
4X Video		X	Used in certain computer games.
Sony Playstation MDEC		X	
Id RoQ	X	X	Used in Quake III, Jedi Knight 2, other computer games.
Xan/WC3		X	Used in Wing Commander III .MVE files.
Interplay Video		X	Used in Interplay .MVE files.
Apple Animation	X	X	fourcc: 'rle '
Apple Graphics		X	fourcc: 'smc '
Apple Video		X	fourcc: rpza
Apple QuickDraw		X	fourcc: qdrw
Cinepak		X	
Microsoft RLE		X	
Microsoft Video-1		X	
Westwood VQA		X	
Id Cinematic Video		X	Used in Quake II.
Planar RGB		X	fourcc: 8BPS
FLIC video		X	
Duck TrueMotion v1		X	fourcc: DUCK
Duck TrueMotion v2		X	fourcc: TM20
VMD Video		X	Used in Sierra VMD files.
MSZH		X	Part of LCL
ZLIB	X	X	Part of LCL, encoder experimental
TechSmith Camtasia		X	fourcc: TSCC
IBM Ultimotion		X	fourcc: ULTI
Miro VideoXL		X	fourcc: VIXL
QPEG		X	fourccs: QPEG, Q1.0, Q1.1
LOCO		X	
Winnov WNV1		X	
Autodesk Animator Studio Codec		X	fourcc: AASC
Fraps FPS1		X	
CamStudio		X	fourcc: CSCD
American Laser Games Video		X	Used in games like Mad Dog McCree
ZMBV	X	X	Encoder works only on PAL8
AVS Video		X	Video encoding used by the Creature Shock game.
Smacker Video		X	Video encoding used in Smacker.
RTjpeg		X	Video encoding used in NuppelVideo files.
KMVC		X	Codec used in Worms games.
VMware Video		X	Codec used in videos captured by VMware.

Cin Video		X	Codec used in Delphine Software games.
Tiertex Seq Video		X	Codec used in DOS CDROM FlashBack game.
DXA Video		X	Codec originally used in Feeble Files game.
AVID DNxHD	X	X	aka SMPTE VC3
C93 Video		X	Codec used in Cyberia game.
THP		X	Used on the Nintendo GameCube.
Bethsoft VID		X	Used in some games from Bethesda Softworks.
Renderware TXD		X	Texture dictionaries used by the Renderware Engine.
AMV		X	Used in Chinese MP3 players.

TABLE 2: SUPPORTED VIDEO FORMATS

A table reporting some ViSOR statistics is depiceted in Fig. 36. They refer to the period of nov-dec 2007. The number of video and contact is growing.

Users	
Registered	23
Staff	8
Videos	
Sequences	65
Annotated	28
Clips	430
Concepts	
Total Videosurveillance IS-A concepts	96
IS-A concepts used	60
HAS-A concepts	36
Counters	
Web Accesses	8092
Video Downloads	629

FIG. 36: SYSTEM STATISTICS AT 31/12/2007

18. ViSOR Database architecture

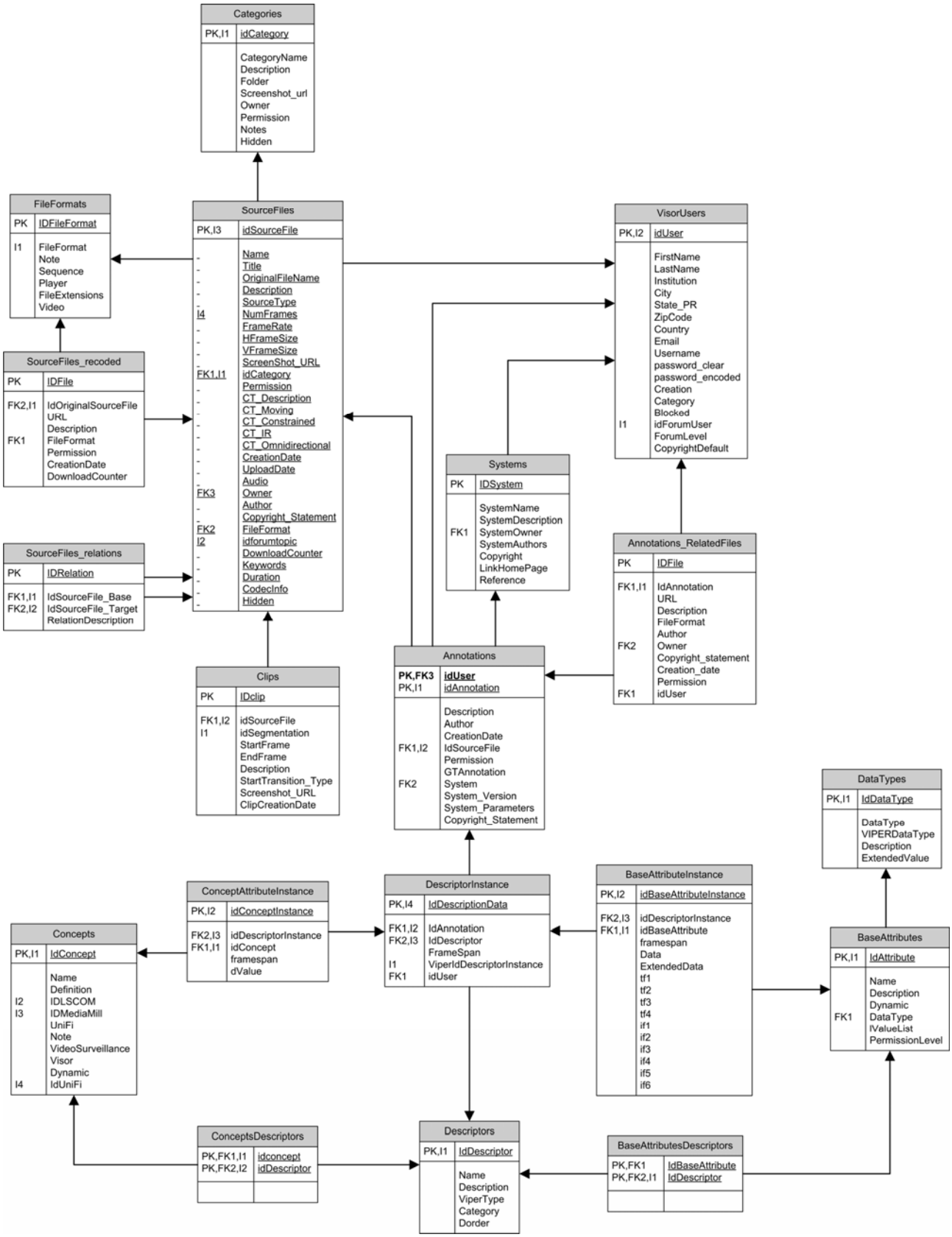


FIG. 37: DB INTERNAL ARCHITECTURE

19. ViPER Annotation format

The native annotation format supported by ViSOR is ViPER[2], developed at the University of Maryland. The choice of this annotation format has been made due to several requirements that ViPER satisfies: it is flexible, the list of concepts is customizable; it is widespread avoiding the difficulties to share a new custom format (e.g., it is used by Pets and Etiseo); it is clear and easy to use, self containing since the description of the annotation data is included together with the data. Differently from other existing tools working only on textual annotation, a set of data types which can be used for annotate has been defined (see Table 3). Moreover, an annotation tool has already been developed by the same authors of the standard (namely, ViPER-GT [13]). Finally, it is possible to achieve a frame level annotation that is more appropriate than the clip level annotation adopted by other tools. The annotation data is stored as a set of records. Each record, called descriptor, annotates an associated range of frames with a set of attributes. To inform applications of the types of descriptors used to create the data file and the data-types of the associated attributes, users must provide configuration information at the beginning of file. To this aim, ViPER files are basically composed by two sections; the first one is called config part and explicitly outlines all possible descriptors in the ViPER file. It defines each descriptor type by name and lists all attributes for each descriptor. From the ViSOR portal a predefined config file containing the video surveillance concept list described in the previous section can be obtained. The second section of each ViPER file, namely data part, contains instances of the descriptors defined in the config part. For each instance, the frame span (i.e., range) of the descriptor visibility together with a list of attributes values are reported. For more details refer to the ViPER manual [13] or directly to the ViSOR portal [14].

Data Type	Description
bbox	A bounding box; it is a rectangle on the image.
bvalue	A Boolean value: either “true” or “false”.
circle	A circle, in terms of center point and radius.
ellipse	An ellipse, in terms of its bounding box.
fvalue	A floating point number.
lvalue	An enumeration type. In the config part the list of allowed values must be defined.
obox	An oriented bounding box.
point	Some specific pixel in the image.
polygon	A polygon or polyline, given as a list of points.
svalue	A string value. Strings must be xml-escaped.

TABLE 3: VIPER DATA TYPES

20. MPEG-7 annotation format

The MPEG-7 export follows the VIDIVIDEO guidelines proposed by CVC (here reported).

20.1. Common part

All Mpeg7 files have the same structure in the following we describe this structure:

1.	<?xml version="1.0" encoding="UTF-8"?>
2.	<Mpeg7 xmlns="urn:mpeg:mpeg7:schema:2001" xmlns:mpeg7="urn:mpeg:mpeg7:schema:2001" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.	<Description xsi:type="ContentEntityType">
4.	<MultimediaContent xsi:type="VideoType">
5.	<Video>
6.	<MediaLocator>
7.	<MediaUri>BG_22677.mpg</MediaUri>
8.	</MediaLocator>
9.	<MediaTime>
10.	<MediaTimePoint>T00:00:00:0F25</MediaTimePoint>
11.	<MediaDuration>PT00H10M26S18N25F</MediaDuration>
12.	</MediaTime>
13.	<TemporalDecomposition gap="true" overlap="false">
14.	<VideoSegment>
15.	<MediaTime>
16.	<MediaTimePoint>T00:00:00:0F25</MediaTimePoint>
17.	<MediaDuration>PT00H00M02S14N25F</MediaDuration>
18.	</MediaTime>
19.	<!—info about the shot -->
20.	</VideoSegment>
21.	<!—more VideoSegment definitions-->
22.	</TemporalDecomposition>
23.	</Video>
24.	</MultimediaContent>
25.	</Description>
26.	</Mpeg7>

Line 7
The value of the MediaUri indicates how to find the video, starting from the current .xml file.

Line 11
Indicates the length of the video[1].

Line 13
Definition of the shots. We use gap=true, and overlap=false.

[1] See appendix I for how to define this value.

Line 14 to 20
Definition of a video segment

Line 16
Indicates when the shot starts (See later for how to define this value).

Line 17
Indicates the duration of the shot (See later for how to define this value).

Line 19
The information about the shot should be included here. The contents of this line will be different depending on the Mpeg7 file.

Line 21
More VideoSegment should be described here.

20.2. VideoSegment definition

1.	<VideoSegment id="shot2_1_RKF">
2.	<TextAnnotation relevance="1" confidence="7.24001e-05">
3.	<KeywordAnnotation>
4.	<Keyword>Airplane</Keyword>
5.	</KeywordAnnotation>
6.	</TextAnnotation>
7.	<MediaTime>
8.	<MediaTimePoint>T00:00:00:23F25</MediaTimePoint>
9.	<MediaDuration>PT00H00M00S01N25F</MediaDuration>
10.	</MediaTime>
11.	</VideoSegment>

Line 2
Relevance is 1 implies that the concept is present, relevance is 0 implies that the concept is not present. Also, sometimes the annotator is not sure and may want to say that confidence is 0.5 or even 0.

Line 4
Indicates the concept being described (from the ViSOR concept list).

20.3. MediaDuration datatype semantics

Describes the duration of a time interval according to days and day time of a notion of time encoded in the media without specifying a difference in the TZD (see also duration datatype). The time interval is defined as a half open time interval with the closed end being at the beginning.
A simpleType representing a duration in time using a lexical representation of days (nD), time duration and a fraction specification (TnHnMnSnN) including the specification of the number of fractions of one second (nF):

(-)PnDTnHnMnSnNnF

The `mediaDuration` datatype is derived from `basicDuration` datatype by restriction. The regular expressions which are pecified within the Pattern facet are explained in detail in Annex E ofXML Schema Part 2 (XML chema).

20.4. MediaTimePoint datatype semantics

Describes a time stamp of the media using Gregorian date and day time without specifying the TZD.
YYYY-MM-DDThh:mm:ss:nnnFNNN
The following lexicals are used for digits of the corresponding date/time elements:

- Y: Year, can be a variable number of digits,
- M: Month,
- D:Day,
- h: hour,
- m: minute,
- s: second,
- n: number of fractions, nnn can be any number between 0 and NNN-1 (NNN and with it nnn can have an arbitrary number of digits).
- N: number of fractions of one second which are counted by nnn. NNN can have a arbitrary number of digits and is not limited to three.

Also delimiters for the time specification (T) and the number of fractions of one second are used (F).

21. Concept List (updated to 31/07/2008)

21.1. Person - Kind of person, appearance, age, sex

Static concepts (Is-a)

Concept	*Definition*	*ID ViSOR*	*ID LSCOMM*	*ID MediaMill*	*ID UniFi*	*Note*
1.Adult	Shots showing a person over the age of 18.	182	181			
2.Agent	Secret service agents. Presidential bodyguards.	183	182			
3.Aggressor		462	461			
4.Armed_Person	Any person carrying a weapon.	117	116			
5.Asian_People	people of asian ethnicity	247	246			
6.Baby	images of babies (children that are tooyoung to walk)	248	247			
7.Backpackers	people who are carrying a backpack	249	248			
8.Beggar	Beggars are defined as people who are asking for money on the streets, panhandlers	256	255			
9.Boy	One or more male children.	184	183			
10.Caucasians	People of Caucasian descent/ethnicity	272	271			
11.Child	images of children	274	273			
12.Civilian_Person	One or more persons not in the armed services or police force.	106	105			
13.Dark-skinned_People	People who are dark skinneddue to African or african/american descent(ethnicity)	259	258			
14.Dead_Bodies	One or more dead bodies.	193	192			
15.Female_Person	One of more female persons.	104	103			
16.Fighter_Combat	Shots showing military fighterplanes engaged in combat missions.	179	178			
17.Firefighter	A person whose job it is to extinguish fires.	118	117			
18.Girl	One or more female children.	185	184			
19.Glasses	people wearing regular (non-tinted)glasses	315	314			
20.Ground_Combat	Soldiers engaged in fighting onthe ground.	201	200			
21.Guard	Any non-military guard or watchman.	137	136			
22.Hispanic_Person		620	619			
23.Indian_Person		636	635			
24.Individual	Shots showing only one person.	181	180			
25.Infants	pictures of infants, are children that are barely walking [separate from babies]	327	326			

26.Launcher		650	649			
27.Male_Person	One or more male persons.	105	104			
28.Medical_Personnel	people who appear to belong toa medical profession, such as paramedics, first aid workers, doctors, nurses,anyone with a stethoscope, etc.	342	341			
29.Men_In_Women's_Clothing		677	676			
30.Motorcyclist		689	688			
31.Old_People	Seniors or elderlypeople	360	359			
32.People_Crying	One or more people with visible tears.	8	7			
33.People_With_Disabilities		723	722			
34.Person	Shots depicting a person. The face may bepartially visible	218	217			
35.Police/security		929		42		
36.Police_Private_Security_Personnel	Shotsdepicting law enforcement or private security agency personnel	229	228			
37.Prisoner	Shots depicting a person imprisoned, behind bars, in jail or in handcuffs	235	234			
38.Prostitute		747	746			
39.Rioter		765	764			
40.Single_Person	one person only isvisible	411	410			
41.Soldiers	Military personnel without visibledistinguishing rank.	414	413			
42.Street_Vendor		817	816			
43.Sunglasses	People wearing or holding sunglasses	423	422			
44.Terrorist		831	830			
45.Traffic_Cop		840	839			
46.Vandal		846	845			

Dynamic concepts (Has-a)

Concept	***Description***	***DataType***	***ViperDataType***	***Extended***	***Dyn***
47.Position_BBOX		bbox	bbox	True	True
48.PositionBar	2D Position of the gravity center	point	point	True	True
49.Contour	Contour of the object	polygon	polygon	True	True
50.IDPerson	Application defined ID	reference	dvalue	False	False
51.RealHeight	Real height of the person	fvalue	fvalue	False	False
52.PersonName*	Name of the person	svalue	svalue	False	False
53.FeetPosition	x,y coordinates of the feet	point	point	True	True
54.HeadPosition	x,y coordinates of the head	point	point	True	True
55.ObjectMaskFileName_CVC	Name of the file containing the mask in cvc format	svalue	svalue	False	True
56.Position_Ellipse		ellipse	obox	False	True

21.2. BodyPart - legs, arms, and so on

Static concepts (Is-a)

Concept	*Definition*	*ID ViSOR*	*ID LSCOMM*	*ID MediaMill*	*ID UniFi*	*Note*
57.Body_Parts	parts of a human body	340	339			
58.Face	shots depicting a face	215	214	2		
59.Hand	A close-up view of one or more hands, wherethe hand is the primary focus of the shot.	157	156			
60.Head_And_Shoulder	A view of a person showingonly the torso and head. Both the torso and head must bevisible.	151	150			
61.Leg		981				UoM
62.Noses		702	701			
63.Trunk		980				UoM

Dynamic concepts (Has-a)

Concept	*Description*	*DataType*	*ViperDataType*	*Extended*	*Dyn*
64.Position_BBOX		bbox	bbox	True	True
65.PositionBar	2D Position of the gravity center	point	point	True	True
66.Contour	Contour of the object	polygon	polygon	True	True
67.IDPerson	Application defined ID	reference	dvalue	False	False
68.Owner_ID		reference	dvalue	False	False
69.Position_Ellipse		ellipse	obox	False	True
70.FaceTilt	Tilt Angle of the face (0:frontal - 90: lateral -180:rear) *Values:* 0_front 30 60 90_side 180_rear	lvalue	lvalue	False	True
71.Side	Side (0: Left, 1: Right)	dvalue	dvalue	False	False

21.3. GroupOfPeople - more than one person

Static concepts (Is-a)

Concept	*Definition*	*ID ViSOR*	*ID LSCOMM*	*ID MediaMill*	*ID UniFi*	*Note*
72.3_Or_More_People		451	450			
73.Criminals		551	550			
74.Crowd	Shots depicting a crowd	203	202	10		
75.Demonstrators		554	553			
76.Firing_Squad		588	587			
77.Group	We defined a group as 3-10 people. It onlyincluded shots of 3-10 people, not animals, such as pets, nor animationedpeople, such as in previews of "The Incredibles."	317	316			
78.Large_Group		649	648			
79.More_Than_1_Person		687	686			
80.People		926		1		
81.Protesters	People engaged in some form of protest	383	382			

82.Small_Group		793	792			

Dynamic concepts (Has-a)

Concept	Description	DataType	ViperDataType	Extended	Dyn
83.Position_BBOX		bbox	bbox	True	True
84.PositionBar	2D Position of the gravity center	point	point	True	True
85.Contour	Contour of the object	polygon	polygon	True	True
86.IDGroup		reference	dvalue	False	False
87.NumberOfPeople		dvalue	dvalue	False	True

21.4. FixedObject - buildings, furniture, trees, and so on

Static concepts (Is-a)

Concept	Definition	ID ViSOR	ID LSCOMM	ID MediaMill	ID UniFi	Note
88.Barge	shots ofbarges	252	251			
89.Barrier		492	491			
90.bench		990				UoM
91.Building	Shots of an exterior of a building	227	226	16		
92.Chair		874		56		
93.Church		533	532			
94.Furniture	TV is not furniture. Tabletop isfurniture (if it is a main part of the scene), Patio umbrella is furniture,Voting booth tables are furniture, Frames where people were sitting on a sofawere counted as containing furniture as long as the sofa was easily vis	313	312			
95.House	A freestanding single family home.	165	164	67		
96.Monument		685	684			
97.Office	Office environment with desks, chairsand/or white-collar workers.	86	85	33		
98.Table		944		52		
99.Tower	any structure that is a tower, skyscrapersdo not count as towers	435	434	53		
100.Waste_bin		991				UoM
101.Windows	An opening in the wall or roof of a building or vehicle fitted with glass or other transparent material.	110	109			

Dynamic concepts (Has-a)

Concept	Description	DataType	ViperDataType	Extended	Dyn
102.Position_BBOX		bbox	bbox	True	True
103.PositionBar	2D Position of the gravity center	point	point	True	True
104.Contour	Contour of the object	polygon	polygon	True	True
105.IDObject	ID of who/what undergo the action/event	reference	dvalue	False	False

21.5. MobileObject - moving or mobile object, like chair, pack, luggage

Static concepts (Is-a)

Concept	*Definition*	*ID ViSOR*	*ID LSCOMM*	*ID MediaMill*	*ID UniFi*	*Note*
106.Backpack	Backpacks must visually apparent i.e.in the foreground. At least the strap must be visible. we did not include otherpacks, like handbags, fanny packs, purses etc. Only backpacks that are beingworn were counted. We included utilities backpack like leaf blo	250	249			
107.Bicycle	A person riding abicycle.	198	197	74		
108.Boat		503	502	49		
109.Bomb		506	505			
110.Briefcases	shots of briefcases used for carrying papers, laptop computers or lunches)	262	261			
111.Bullet		511	510			
112.Bus	Shots of a bus	228	227	59		
113.Camera	images on which a camera is visible	266	265			
114.Car	Shots of a car	222	221	19		
115.Chair		874		56		
116.Cutter	shots of cutters (typical in coastaltraffic)	350	349			
117.Emergency_Vehicles	police, fire and ambulances are the typical emergency vehicles, also included UN vehicles, but nothing military.	300	299			
118.Fire weapon		892		61		
119.Handguns	hand-heldguns	318	317			
120.Knife		646	645			
121.Machine_Guns	Machine guns include assaultrifles	341	340			
122.Motor_Scooter		688	687			
123.Motorbike		918		94		
124.Motorcycle	motorcycles, mopeds and motorscooterinclude any two-wheeled vehicle with an engine	348	347			
125.Overlayed text		925		3		
126.Shotgun		783	782			
127.Smoke	Shots with smoke present.	162	161	38		
128.Suitcases		819	818			
129.Table		944		52		
130.Truck	any kind of truck	233	232	36		
131.Vehicle	Any thing used for transporting people or goods, such as a car, bus, truck, cart, plane,etc.	109	108	15		
132.Waste_bin		991				UoM
133.Weapons	Considered weapons: Spent cases, Nonaccidental explosions, Molotov cocktails. Not considered weapons: PaintballGuns/Tasers, Insecticide guns/helicopters, Exploded cars, Bullet holes, UnarmedMilitary aircrafts, Concealed weapons, Weapons not used for harm(	446	445			

Dynamic concepts (Has-a)

Concept	*Description*	*DataType*	*ViperDataType*	*Extended*	*Dyn*
134.Position_BBOX		bbox	bbox	True	True
135.PositionBar	2D Position of the gravity center	point	point	True	True
136.Contour	Contour of the object	polygon	polygon	True	True
137.ObjectMaskFileName_CVC	Name of the file containing the mask in cvc format	svalue	svalue	False	True
138.IDObject	ID of who/what undergo the action/event	reference	dvalue	False	False

21.6. ActionByAPerson - Action by a single person

Static concepts (Is-a)

Concept	*Definition*	*ID ViSOR*	*ID LSCOMM*	*ID MediaMill*	*ID UniFi*	*Note*
139.Abused_Child		454	453			
140.Abused_Woman		455	454			
141.Cheering	One or more people cheering or applauding	34	33			
142.Cycling		881		78		
143.Drinking	A person drinks	995				UoM
144.Greeting	Two or more people greeting each other (includes shaking hands, hugging and waving)	35	34			
145.Guarding		611	610			
146.Jumping	A person jumps	997				UoM
147.Oscillating	A person oscillates back and forth	999				UoM
148.PersonEntersArea		967			UniFi A.1	
149.PersonEntersObject		966			UniFi A	
150.PersonExitsArea		969			UniFi A.3	
151.PersonExitsObject		968			UniFi A.2	
152.PersonFallsDown		983				UoM
153.PersonFiringWeapon		979			UniFi E	
154.PersonInteractsObject		970			UniFi B	
155.PersonLeavesObject		972			UniFi B.2	
156.PersonTakesObject		971			UniFi B.1	
157.Raising up an arm	A person raises up his/her arm	998				UoM
158.Running	One or more people running.	4	3			
159.Shooting	A person shooting agun	37	36			
160.Sitting	One or more people sitting down.	107	106			
161.Standing	One or more people standing up.	108	107			
162.Taking off part of his/her	A person takes off one piece of his/her	994				UoM

clothes	clothes					
163.Talking	One or more people engaged in discourse	28	27			
164.Throwing	A person throwing someobject	36	35			
165.Tying shoe laces	A person crouching to tie the shoe laces	993				UoM
166.Walking	One or more people walking.	13	12			
167.Wearing glasses	A person wears the glasses	996				UoM

Dynamic concepts (Has-a)

Concept	*Description*	*DataType*	*ViperDataType*	*Extended*	*Dyn*
168.IDPerson	Application defined ID	reference	dvalue	False	False
169.Description		svalue	svalue	False	False
170.IDObject	ID of who/what undergo the action/event	reference	dvalue	False	False
171.ActionDescription		svalue	svalue	False	False

21.7. ActionByPeople - action by a group of people, like meeting

Static concepts (Is-a)

Concept	*Definition*	*ID ViSOR*	*ID LSCOMM*	*ID MediaMill*	*ID UniFi*	*Note*
172.CrowdDispersal		974			UniFi C.2	
173.CrowdFormation		973			UniFi C.1	
174.Handshaking	Two people shaking hands. Does not include hugging or holding hands.	3	2			
175.Meeting	Scenes of meeetings. We did not considerspeeches/talks to be a meeting. We did not consider anchor meeting with expertsto be a meeting.	221	220	20		
176.People walking		928		8		
177.People_Marching	Shots showing one or more peoplemarching (TRECVID definition)	216	215			
178.PeopleAggregation		984				UoM

Dynamic concepts (Has-a)

Concept	*Description*	*DataType*	*ViperDataType*	*Extended*	*Dyn*
179.Description		svalue	svalue	False	False
180.ActionDescription		svalue	svalue	False	False
181.IDGroup		reference	dvalue	False	False

21.8. ObjectEvent - events related to objects, like AbandonedObject

Static concepts (Is-a)

Concept	Definition	ID ViSOR	ID LSCOMM	ID MediaMill	ID UniFi	Note
182.CarAccident		978			UniFi D.4	
183.CarRunsRedLight		977			UniFi D.3	
184.CarStarts		976			UniFi D.2	
185.CarStops		975			UniFi D.1	
186.Exiting_Car	A car exiting from somewhere, such as a highway, building, or parking lot.	2	1			
187.Smoke	Shots with smoke present.	162	161	38		

Dynamic concepts (Has-a)

Concept	Description	DataType	ViperDataType	Extended	Dyn
188.IDObject	ID of who/what undergo the action/event	reference	dvalue	False	False

21.9. Event - generic events, like fire

Static concepts (Is-a)

Concept	Definition	ID ViSOR	ID LSCOMM	ID MediaMill	ID UniFi	Note
189.Accident		456	455			
190.Bomber_Bombing	An airborne bomber dropping bombson some target	39	38			
191.Car_Crash	One or more cars which have had collisions with other cars or stationary objects	30	29			
192.Car_Racing	shot of scenes at carraces	269	268			
193.Earthquake	Wreckage from an Earthquake.	6	5			
194.Explosion		889		57		
195.Explosion_Fire	Shots of an explosion or a fire	204	203			
196.Violence		954		13		

Dynamic concepts (Has-a)

Concept	Description	DataType	ViperDataType	Extended	Dyn
197.Description		svalue	svalue	False	False
198.EventDescription		svalue	svalue	False	False

21.10. Location - everithing describing the video location

Static concepts (Is-a)

Concept	*Definition*	*ID ViSOR*	*ID LSCOMM*	*ID MediaMill*	*ID UniFi*	*Note*
199.Airport	Exterior shots of an airport, showingone or more buildings (such as the air traffic control tower or the terminals).	41	40			
200.Airport_Terminal	Interior shots of airport terminals, including ticket counters, waiting areas, and security checkpoints.	95	94			
201.Alley	Small, narrow passage way between two buildings.	155	154			
202.Amusement_Park	Shots of an amusement park.	171	170			
203.Apartments	indvidual apartments and condminiums,including buildings with balconies	243	242			
204.Bank	Interior shots of a bank.	174	173; 487			
205.Bar_Pub	Interior shots of a bar or pub.	159	158			
206.Barge	shots ofbarges	252	251			
207.Battlefield		496	495			
208.Boardwalk		502	501			
209.Bridges	a structure carrying a pathway or roadway over a depression or obstacle. label as positive any shots that containa structure containing a pathway or roadway over a depression or obstacle and as negative those shots that do not contain such a sturcture.	261	260			
210.Building	Shots of an exterior of a building	227	226	16		
211.Bus_Terminal		513	512			
212.Celebration_Or_Party	One or more people celebrating or partying	40	39			
213.Ceremony		527	526; 527			
214.Church		533	532			
215.Court	Shots of the interior of a court-roomlocation	214	213	75		
216.Demonstration_Or_Protest	One or more people protesting. May or may not have banners or signs.	7	6			
217.Garden		599	598			
218.Gas_Station	Exterior shots of a gasstation.	47	46			
219.Grass		904		44		
220.Grassland	Open plains and fields.	164	163			
221.High_Security_Facility	Any facility that ishighly guarded, requiring security checkpoints or clearance forentry.	123	122			
222.Highway	A major road with many lanes.	74	73			
223.Hotel	Exterior shots of a hotel.	52	51			
224.House	A freestanding single family home.	165	164	67		
225.Indoor		911		6		
226.Laboratory	Laboratory environment where researchers may conduct experiments.	85	84			
227.Library	Interior shots of alibrary.	161	160; 653			
228.Meadows		671	670			

229.Meeting_Setting		674	673			
230.Monument		685	684			
231.Museum		693	692			
232.Office	Office environment with desks, chairsand/or white-collar workers.	86	85	33		
233.Office_Building	buildings whose primary purposeif to house offices	358	357			
234.Outdoor	Shots of Outdoor locations	225	224	4		
235.Parade	Multiple units of marchers, devices, bands, banners or Music.	1	0			
236.Parking_Lot	Outdoor area for parkingcars.	90	89			
237.Pedestrian_Zone	shots of pedestrian zones andwalkways for people only	309	308			
238.Picnic_Area		727	726			
239.Restaurant		763	762			
240.Riot	Many people engaging in violence or mayhem in city streets	21	20			
241.Road	Shots depicting a road	207	206	14		
242.Room	room of a house (anything indoors, wherethere is a room in a house, but not an office orfactory	399	398			
243.School	Exterior shots of a school. (For children, Not a college or a university).	57	56			
244.Security_Checkpoint	Any security checkpoint.Includes military checkpoints and airport security.	148	147			
245.Shopping_Mall	Exterior shots of a shopping mall.	58	57			
246.Sidewalks	images of sidewalks or walkways.Included are Paved plazas, Crosswalks. Excluded are Roads, Parking Lots, Docks,Anything indoors, Helipads/Airports, Medians in roads, Stairs toHouses	443	442			
247.Sky	Shots depicting sky	208	207	11		
248.Stadium	Exterior shots of a stadium (baseball/footbal stadiums and basketball/hockey arenas. Domed or openair).	59	58			
249.Streets	regular paved streets (not highways,dirt roads, or special types of road)	419	418			
250.Subway_Station	Interior views of a subway station.	103	102			
251.Supermarket	Exterior shots of a supermarket.	60	59			
252.Tower	any structure that is a tower, skyscrapersdo not count as towers	435	434	53		
253.Town_Squares		837	836			
254.Traffic	shots that show roads withtraffic	395	394			
255.Train_Station		841	840			
256.Trees	Shots where trees arevisible	436	435	50		
257.Tunnel	Views of the inside of a tunnel. May be a tunnel for cars, trains, sewage, or anything else.	82	81			
258.Urban_Park	A public park in a city, such as Central Park.	102	101			
259.Urban_Scenes	scenes taking place in a city setting	209	208	9		
260.Vegetation	Shots depicting natural or artificial greenery, vegetation woods, etc	236	235	23		

21.11. Animals - cats, dogs, and so on

Static concepts (Is-a)

Concept	Definition	ID ViSOR	ID LSCOMM	ID MediaMill	ID UniFi	Note
261.Animal	(No humans): Shots depicting an animal	211	210; 201	39		
262.Bird		867		79		
263.Cats	shots of cats, does not include tigers,leopards, jaguars	271	270			
264.Dogs	shots of dogs, does not include wolves or foxes	293	292	82		

Dynamic concepts (Has-a)

Concept	Description	DataType	ViperDataType	Extended	Dyn
265.Position_BBOX		bbox	bbox	True	True
266.PositionBar	2D Position of the gravity center	point	point	True	True
267.Contour	Contour of the object	polygon	polygon	True	True
268.Description		svalue	svalue	False	False
269.Position_Ellipse		ellipse	obox	False	True

21.12. Weather - sun, cloud, rain…

Static concepts (Is-a)

Concept	Definition	ID ViSOR	ID LSCOMM	ID MediaMill	ID UniFi	Note
270.Clouds	Scenes where clouds are visible	277	276	45		
271.Daytime_Outdoor	shots that take place outdoors during the day. Included are images from space (light side of Earth). If it is a continuation of a story where the image is ambiguous (if a story starts in the day, it probably ends in daytime)	291	290			
272.Rainy	Rainy Scenes includes slick roads, andrain on windows	388	387			
273.Snow	Snow falling or already accumulated on the ground	25	24			
274.Sunny	Sunny Scenes may also be inside. In general, if it would be uncomfortable to look towards the sun, it is a sunnyscene.	424	423			
275.Windy	Scenes showing windyweather	448	447			

21.13. Shot - shot detection

Dynamic concepts (Has-a)

Concept	Description	DataType	ViperDataType	Extended	Dyn

276.FrameStart		dvalue	dvalue	False	False
277.FrameEnd		dvalue	dvalue	False	False

21.14. Transition - transition type, like cut, fade, dissolve

Dynamic concepts (Has-a)

Concept	*Description*	*DataType*	*ViperDataType*	*Extended*	*Dyn*
278.Pre		dvalue	dvalue	False	False
279.Post		dvalue	dvalue	False	False
280.TransitionType	*Values:* Cut Dissolve Fade	lvalue	lvalue	False	False

21.15. Clip - clip segmentation

Dynamic concepts (Has-a)

Concept	*Description*	*DataType*	*ViperDataType*	*Extended*	*Dyn*
281.FrameStart		dvalue	dvalue	False	False
282.FrameEnd		dvalue	dvalue	False	False
283.Description		svalue	svalue	False	False

21.16. Video - global video information

Dynamic concepts (Has-a)

Concept	*Description*	*DataType*	*ViperDataType*	*Extended*	*Dyn*
284.Description		svalue	svalue	False	False
285.CalibrationData		svalue	svalue	False	False

22. Video Corpus Set (updated to 31/07/2008)

Category	Description	Number of videos
Human actions	*Short Videos of different human actions. Each video contains an human action*	40
Human Actions II	*Long videos for human action recognition given from University of Surrey.*	1
Indoor Domotic	*Indoor Domotic Unimore D.I.I. setup. Video from a indoor surveillance project.*	16
Indoor Poeple Tracking	*Video for indoor people tracking with occlusions*	6
IseLab Collection	*Videos from the IseLab - Computer Vision Center - Universitat Autònoma de Barcelona - Road crossing of pedestrians and vehicles*	3
Other	*Generic videos for thesis activities and not belonging to other specific classes*	6
Outdoor - other	*Outdoor Video with a handy camera*	1
Outdoor Unimore Multicamera	*Outdoor Unimore D.I.I. setup – Multicamera. Synchronized sequence from more than one camera. (see Unimore D.I.I. setup in Fig. 38*	30
Outdoor Unimore Single camera	*These video are captured from the D.I.I. Unimore setup by a single camera (one of the 4 installed). The area is a pedestrian zone.*	27
Shadows	*Shadows - These videos are from the ATON project. See http://cvrr.ucsd.edu/aton/shadow/ for details*	5
Smoke	*Several videos for Smoke detection (outdoor)*	14
Stopped Vehicles	*Videos for Stopped Vehicles Detection*	4
VSSN06 Competition	*Videos used for the VSSN background competition Vssn 06*	4

TABLE 1: VIDEO CATEGORIES

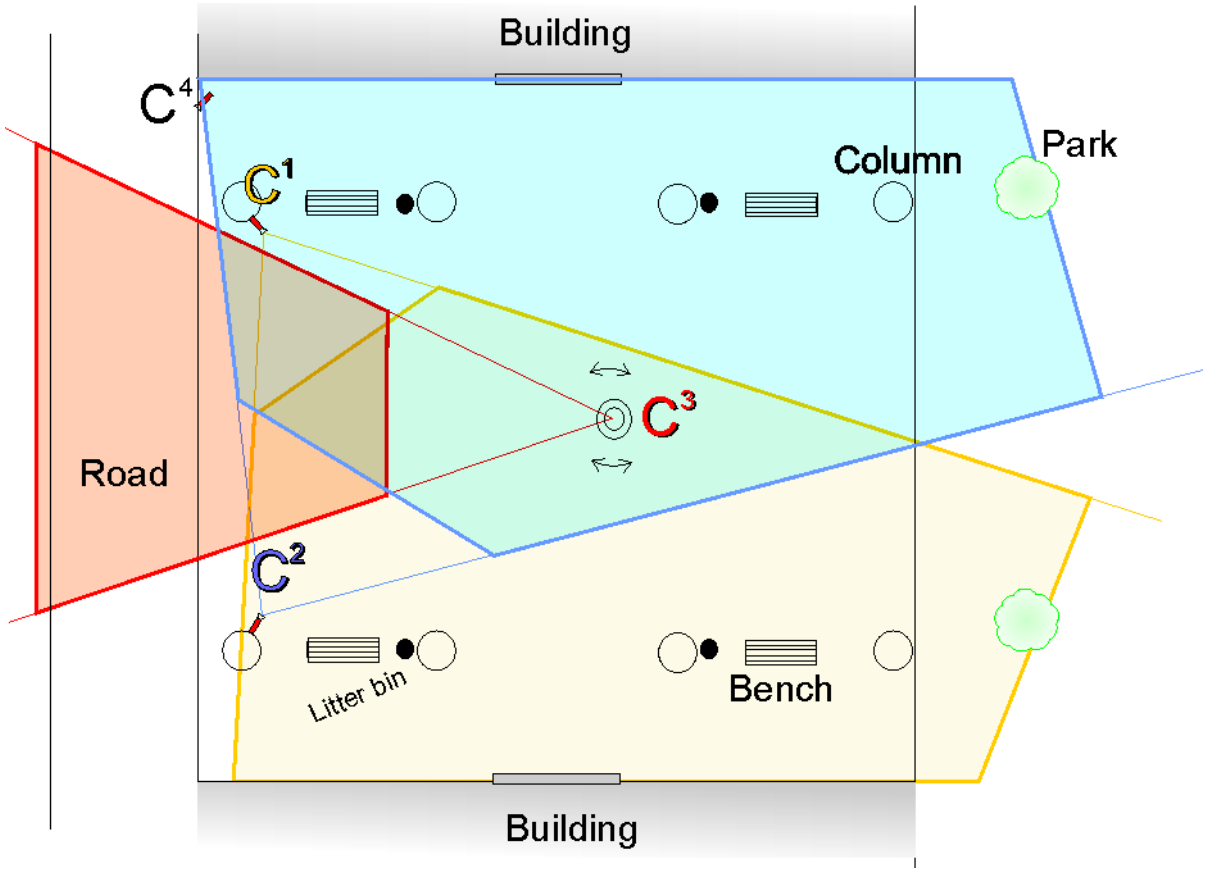


FIG. 38: MAP OF THE D.I.I. UNIMORE OUTDOOR SETUP

22.1. VidiVideo Corpus Set (updated to 31/07/2008)

From the ViSOR video corpus, a subset of videos has been selected has VidiVideo surveillance corpus set. In the following table these videos are listed with some details.

In particular, for each video a feature list is reported and the corresponding icon legend is shown in Fig. 39.

Icon Legend	
	Video with base annotation
	Video with GT annotations
	Video with reference papers
	Video with other related videos in ViSOR
	Video from the VidiVideo Corpus set

FIG. 39: FEATURE ICON LEGEND

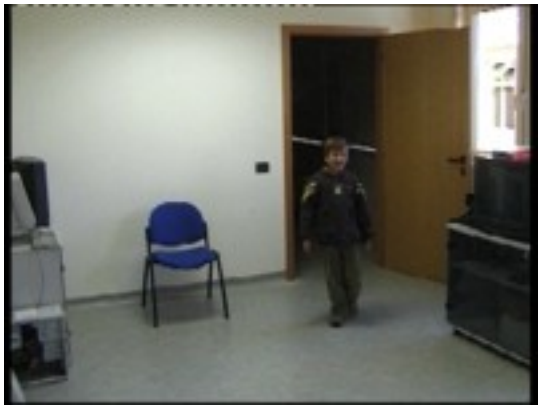
Category: Outdoor Unimore - Outdoor Unimore D.I.I. setup - Single Camera

Camera3exp3_1	
	**File Name:** Camera3exp3_1.mpeg **Title:** Camera3exp3_1 **Description:** Camera3exp3_1
Features:	
Video Details:	Width: 0 Height: 0 Frame Rate: 1 Frame Count: 0 Duration: 00:00:00 Compression:
Author:	
Creation date:	28/09/2007
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	
Other Related Videos in ViSOR:	

sadsasad_1	
	**File Name:** sadsasad_1.mpeg **Title:** sadsasad_1 **Description:** sadsasad_1
Features:	
Video Details:	Width: 0 Height: 0 Frame Rate: 1 Frame Count: 0 Duration: 00:00:00 Compression:
Author:	
Creation date:	28/09/2007
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	
Other Related Videos in ViSOR:	

ATCS.mpeg	
	**File Name:** ATCS.mpeg **Title:** ATCS.mpeg **Description:** ATCS
Features:	
Video Details:	Width: 0 Height: 0 Frame Rate: 1 Frame Count: 0 Duration: 00:00:00 Compression:
Author:	
Creation date:	28/09/2007
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	
Other Related Videos in ViSOR:	

22.2. Category: Indoor Domotic - Indoor Domotic Unimore D.I.I. setup

Domotica_federico	
	**File Name:** Domotica_federico.mpg **Title:** Domotica_federico **Description:**
Features:	B GT
Video Details:	Width: Height: Frame Rate: 1 Frame Count: Duration: 00:00:00 Compression:
Author:	
Creation date:	
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	
Other Related Videos in ViSOR:	

Domotica_030930_1

	**File Name:** Visor_0000072.mpg **Title:** Domotica_030930_1 **Description:** Domotica_030930_1
Features:	BGT
Video Details:	Width: 384 Height: 288 Frame Rate: 25 Frame Count: 1410 Duration: 00:00:56 Compression:
Author:	
Creation date:	
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Outdoor; Unimore; pedonal zone
Other Related Videos in ViSOR:	

LabInfoFixed_NoCompr

	**File Name:** Visor_0000073.mpg **Title:** LabInfoFixed_NoCompr **Description:** LabInfoFixed_NoCompr
Features:	GT
Video Details:	Width: 0 Height: 0 Frame Rate: 1 Frame Count: 0 Duration: 00:00:00 Compression:
Author:	
Creation date:	
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Indoor
Other Related Videos in ViSOR:	

video5parte1	
	**File Name:** Visor_0000076.mpg **Title:** video5parte1 **Description:** video5parte1
Features:	GT
Video Details:	Width: 0 Height: 0 Frame Rate: 1 Frame Count: 0 Duration: 00:00:00 Compression:
Author:	
Creation date:	
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	
Other Related Videos in ViSOR:	

video5parte2

File Name: Visor_0000077.mpg
Title: video5parte2
Description: video5parte2

Features:	GT
Video Details:	Width: 0 Height: 0 Frame Rate: 1 Frame Count: 0 Duration: 00:00:00 Compression:
Author:	Roberto
Creation date:	01/01/2006
Copyright statement:	Imagelab - Use of this video is allowed by citing this work: ...
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Laboratory
Other Related Videos in ViSOR:	

video5parte3	
	**File Name:** Visor_0000078.mpg **Title:** video5parte3 **Description:** video5parte3
Features:	GT
Video Details:	Width: 0 Height: 0 Frame Rate: 1 Frame Count: 0 Duration: 00:00:00 Compression:
Author:	
Creation date:	
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	
Other Related Videos in ViSOR:	

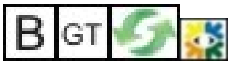
22.3. Category: Other

Man with a dog	
	**File Name:** panini_cane.mpg **Title:** Man with a dog **Description:** Man with a dog
Features:	
Video Details:	Width: 320 Height: 240 Frame Rate: 25 Frame Count: 532 Duration: 00:00:21 Compression: MPEG-1V Codec/String
Author:	Roberto Vezzani
Creation date:	01/01/2005
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	
Other Related Videos in ViSOR:	

parco_re_cam1	
	**File Name:** Visor_0000074.mpg **Title:** parco_re_cam1 **Description:** parco_re_cam1
Features:	B GT
Video Details:	Width: 0 Height: 0 Frame Rate: 1 Frame Count: 0 Duration: 00:00:00 Compression:
Author:	
Creation date:	
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Urban Park
Other Related Videos in ViSOR:	

parco_re_cam2	
	**File Name:** Visor_0000075.mpg **Title:** parco_re_cam2 **Description:** parco_re_cam2
Features:	B GT
Video Details:	Width: 0 Height: 0 Frame Rate: 25 Frame Count: 0 Duration: 00:00:00 Compression:
Author:	Imagelab
Creation date:	
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Urban Park
Other Related Videos in ViSOR:	

22.4. Category: Outdoor Unimore D.I.I. setup - Multicamera

seq02_cam1_120405_A1	
	**File Name:** Visor_0000068.mpg **Title:** seq02_cam1_120405_A1 **Description:** cam1_120405A1
Features:	
Video Details:	Width: Height: Frame Rate: 1 Frame Count: Duration: 00:00:00 Compression:
Author:	
Creation date:	
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Outdoor; Unimore; pedonal zone
Other Related Videos in ViSOR:	Synchronized camera: seq02_cam4_120405_A1

seq03_cam1_120405_B	
	**File Name:** Visor_0000069.mpg **Title:** seq03_cam1_120405_B **Description:** cam1_120405B
Features:	GT
Video Details:	Width: Height: Frame Rate: 1 Frame Count: Duration: 00:00:00 Compression:
Author:	
Creation date:	
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Outdoor; Unimore; pedonal zone
Other Related Videos in ViSOR:	Synchronized camera: seq03_cam2_120405_B

seq03_cam2_120405_B	
	**File Name:** Visor_0000070.mpg **Title:** seq03_cam2_120405_B **Description:** cam2_120405B
Features:	GT
Video Details:	Width: Height: Frame Rate: 1 Frame Count: Duration: 00:00:00 Compression:
Author:	
Creation date:	
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Outdoor; Unimore; pedonal zone
Other Related Videos in ViSOR:	Synchronized camera: seq03_cam1_120405_B

seq02_cam4_120405_A1	
	**File Name:** Visor_0000071.mpg **Title:** seq02_cam4_120405_A1 **Description:** cam3_120405A1
Features:	GT
Video Details:	Width: Height: Frame Rate: 1 Frame Count: Duration: 00:00:00 Compression:
Author:	
Creation date:	
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Outdoor; Unimore; pedonal zone
Other Related Videos in ViSOR:	Synchronized camera: seq02_cam1_120405_A1

seq05_cam4_200907

	**File Name:** visor_1213803695046_Camera1_200907.avi **Title:** seq05_cam4_200907 **Description:** 200907_Camera1
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 8662 Duration: 00:14:26 Compression: M-JPEG-M-JPEG including Huffman Tables
Author:	Vezzani Roberto
Creation date:	20/09/2007
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	
Other Related Videos in ViSOR:	Synchronized camera: seq05_cam3_200907

seq05_cam3_200907

	**File Name:** visor_1213803701390_Camera2_200907.avi **Title:** seq05_cam3_200907 **Description:** 200907_Camera2
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 8662 Duration: 00:14:26 Compression: M-JPEG-M-JPEG including Huffman Tables
Author:	Vezzani Roberto
Creation date:	20/09/2007
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	
Other Related Videos in ViSOR:	Synchronized camera: seq05_cam4_200907

seq01_cam1_300305_A

	**File Name:** visor_1216221782303_Camera1_300305A.avi **Title:** seq01_cam1_300305_A **Description:** Camera1_300305A
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 2292 Duration: 00:03:49 Compression: RGB-
Author:	Vezzani Roberto
Creation date:	30/03/2005
Copyright statement:	
Camera Information	Description: DII Setup Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Unimore; Campus
Other Related Videos in ViSOR:	Synchronized camera: seq01_cam2_300305_A

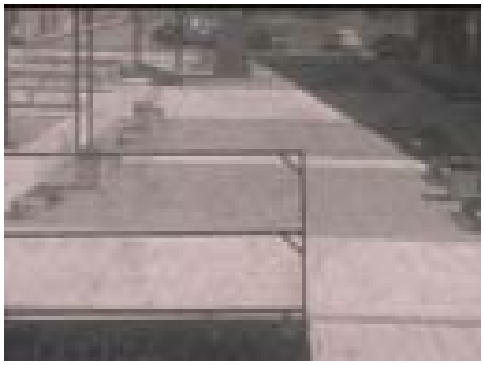
seq01_cam2_300305_A	
	**File Name:** visor_1216222029959_Camera2_300305A.avi **Title:** seq01_cam2_300305_A **Description:** Camera2_300305A
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 2292 Duration: 00:03:49 Compression: RGB-
Author:	Vezzani Roberto
Creation date:	30/03/2005
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Unimore; Campus
Other Related Videos in ViSOR:	Synchronized camera: seq01_cam1_300305_A

seq07_cam1_140708

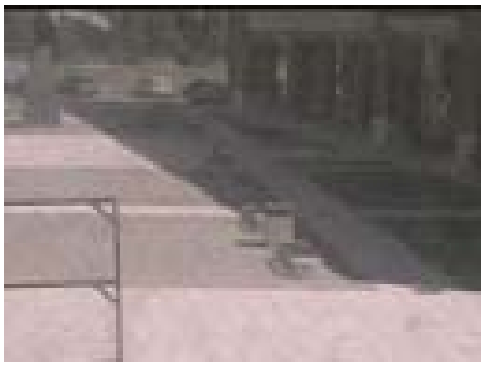
	**File Name:** visor_1216377084366_cam2_140708.avi **Title:** seq07_cam1_140708 **Description:** cam2_140708.avi
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 1519 Duration: 00:02:31 Compression: RGB-
Author:	Vezzani Roberto
Creation date:	14/07/2008
Copyright statement:	
Camera Information	Description: Outdoor D.I.I. Unimore setup Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Outdoor D.I.I. Unimore setup
Other Related Videos in ViSOR:	Synchronized camera: seq07_cam4_140708

seq08_cam1_140708_B	
	**File Name:** visor_1216377141662_cam2_140708b.avi **Title:** seq08_cam1_140708_B **Description:** cam2_140708b.avi
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 600 Duration: 00:01:00 Compression: RGB-
Author:	Vezzani Roberto
Creation date:	14/07/2008
Copyright statement:	
Camera Information	Description: Outdoor D.I.I. Unimore setup Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Outdoor D.I.I. Unimore setup
Other Related Videos in ViSOR:	Synchronized camera: seq08_cam4_140708_B

seq09_cam3_180708	
	**File Name:** visor_1216377160412_cam3_180708.avi **Title:** seq09_cam3_180708 **Description:** cam3_180708.avi
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 17079 Duration: 00:28:27 Compression: XviD-XviD project
Author:	Vezzani Roberto
Creation date:	18/07/2008
Copyright statement:	
Camera Information	Description: Outdoor D.I.I. Unimore setup Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Outdoor D.I.I. Unimore setup
Other Related Videos in ViSOR:	Synchronized camera: seq09_cam4_180708

seq07_cam4_140708	
	**File Name:** visor_1216377177991_cam4_140708.avi **Title:** seq07_cam4_140708 **Description:** cam4_140708.avi
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 1519 Duration: 00:02:31 Compression: RGB-
Author:	Vezzani Roberto
Creation date:	14/07/2008
Copyright statement:	
Camera Information	Description: Outdoor D.I.I. Unimore setup Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Outdoor D.I.I. Unimore setup
Other Related Videos in ViSOR:	Synchronized camera: seq07_cam1_140708

seq08_cam4_140708_B

	**File Name:** visor_1216377210928_cam4_140708b.avi **Title:** seq08_cam4_140708_B **Description:** cam4_140708b.avi
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 600 Duration: 00:01:00 Compression: RGB-
Author:	Vezzani Roberto
Creation date:	14/07/2008
Copyright statement:	
Camera Information	Description: Outdoor D.I.I. Unimore setup Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Outdoor D.I.I. Unimore setup
Other Related Videos in ViSOR:	Synchronized camera: seq08_cam1_140708_B

seq09_cam4_180708	
	**File Name:** visor_1216377221256_cam4_180708.avi **Title:** seq09_cam4_180708 **Description:** cam4_180708.avi
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 17079 Duration: 00:28:27 Compression: XviD-XviD project
Author:	Vezzani Roberto
Creation date:	18/07/2008
Copyright statement:	
Camera Information	Description: Outdoor D.I.I. Unimore setup Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Outdoor D.I.I. Unimore setup
Other Related Videos in ViSOR:	Synchronized camera: seq09_cam3_180708

seq06_cam2_090708	
	**File Name:** visor_1216383595037_cam1_090708_xvid.avi **Title:** seq06_cam2_090708 **Description:** cam1_090708
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 19214 Duration: 00:32:01 Compression: XviD-XviD project
Author:	Vezzani Roberto
Creation date:	09/07/2008
Copyright statement:	
Camera Information	Description: D.I.I. Unimore Setup Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	outdoor, unimore setup
Other Related Videos in ViSOR:	Synchronized camera: seq06_cam1_090708

seq06_cam1_090708	
	**File Name:** visor_1216383621928_cam2_090708_xvid.avi **Title:** seq06_cam1_090708 **Description:** cam2_090708
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 19214 Duration: 00:32:01 Compression: XviD-XviD project
Author:	Vezzani Roberto
Creation date:	09/07/2008
Copyright statement:	
Camera Information	Description: D.I.I. Unimore Setup Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	outdoor, unimore setup
Other Related Videos in ViSOR:	Synchronized camera: seq06_cam2_090708

seq10_cam4_220708

	**File Name:** visor_1216741061990_c4_220708.avi **Title:** seq10_cam4_220708 **Description:** c4_220708.avi
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 47178 Duration: 01:18:37 Compression: XviD-XviD project
Author:	Vezzani Roberto
Creation date:	22/07/2008
Copyright statement:	
Camera Information	Description: unimore setup Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	outdoor; multicamera; tracking
Other Related Videos in ViSOR:	Synchronized camera: seq10_cam3_220708 Synchronized camera: seq10_cam1_220708

seq10_cam3_220708	
	**File Name:** visor_1216741118396_c3_220708.avi **Title:** seq10_cam3_220708 **Description:** c3_220708.avi
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 47178 Duration: 01:18:37 Compression: XviD-XviD project
Author:	Vezzani Roberto
Creation date:	22/07/2008
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	outdoor; multicamera; tracking
Other Related Videos in ViSOR:	Synchronized camera: seq10_cam4_220708 Synchronized camera: seq10_cam1_220708

seq04_cam4_180405

File Name:
visor_1213795581156_Camera3_180405.avi
Title: seq04_cam4_180405
Description: Camera3_180405.avi

Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 3795 Duration: 00:06:19 Compression: M-JPEG-M-JPEG including Huffman Tables
Author:	Vezzani Roberto
Creation date:	18/04/2005
Copyright statement:	
Camera Information	Description: DII Setup Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Unimore; Campus
Other Related Videos in ViSOR:	Synchronized camera: seq04_cam1_180405 Synchronized camera: seq04_cam2_180405

seq04_cam1_180405	
	**File Name:** visor_1213795590984_Camera1_180405.avi **Title:** seq04_cam1_180405 **Description:** Camera1_180405.avi
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 3795 Duration: 00:06:19 Compression: M-JPEG-M-JPEG including Huffman Tables
Author:	Vezzani Roberto
Creation date:	18/04/2005
Copyright statement:	
Camera Information	Description: DII Setup Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Unimore; Campus
Other Related Videos in ViSOR:	Synchronized camera: seq04_cam4_180405 Synchronized camera: seq04_cam2_180405

seq04_cam2_180405

File Name:
visor_1213795606734_Camera2_180405.avi
Title: seq04_cam2_180405
Description: Camera2_180405.avi

Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 3795 Duration: 00:06:19 Compression: M-JPEG-M-JPEG including Huffman Tables
Author:	Vezzani Roberto
Creation date:	18/04/2005
Copyright statement:	
Camera Information	Description: DII Setup Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Unimore; Campus
Other Related Videos in ViSOR:	Synchronized camera: seq04_cam4_180405 Synchronized camera: seq04_cam1_180405

seq10_cam1_220708	
	**File Name:** visor_1216741213349_c2_220708.avi **Title:** seq10_cam1_220708 **Description:** c2_220708.avi
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 47178 Duration: 01:18:37 Compression: XviD-XviD project
Author:	Vezzani Roberto
Creation date:	22/07/2008
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	outdoor; multicamera; tracking
Other Related Videos in ViSOR:	Synchronized camera: seq10_cam4_220708 Synchronized camera: seq10_cam3_220708

seq11_cam1_240907

	**File Name:** visor_1217002418880_Camera1_240907A.avi **Title:** seq11_cam1_240907 **Description:** Multicamera sequence for abandoned object 24-09-07
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 2631 Duration: 00:04:23 Compression: M-JPEG-M-JPEG including Huffman Tables
Author:	Vezzani Roberto
Creation date:	24/09/2007
Copyright statement:	
Camera Information	Description: unimore setup Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Multicamera; Unimore; abandoned object
Other Related Videos in ViSOR:	

seq11_cam4_240907	
	**File Name:** visor_1217002439661_Camera2_240907A.avi **Title:** seq11_cam4_240907 **Description:** Multicamera sequence for abandoned object 24-09-07
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 2631 Duration: 00:04:23 Compression: M-JPEG-M-JPEG including Huffman Tables
Author:	Vezzani Roberto
Creation date:	24/09/2007
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Multicamera; Unimore; abandoned object
Other Related Videos in ViSOR:	

seq11_cam2_240907

	**File Name:** visor_1217002452411_Camera3_240907A.avi **Title:** seq11_cam2_240907 **Description:** Multicamera sequence for abandoned object 24-09-07
Features:	
Video Details:	Width: 384 Height: 288 Frame Rate: 10 Frame Count: 2631 Duration: 00:04:23 Compression: M-JPEG-M-JPEG including Huffman Tables
Author:	Vezzani Roberto
Creation date:	24/09/2007
Copyright statement:	
Camera Information	Description: Type: False Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	Multicamera; Unimore; abandoned object
Other Related Videos in ViSOR:	

22.5. Category: Human Actions II - Long videos for human action recognition

MULTI-KTH-Original.AVI	
	**File Name:** visor_1216889980802_MULTI_KTH_Original.AVI **Title:** MULTI-KTH-Original.AVI **Description:** MULTI-KTH-Original.AVI
Features:	
Video Details:	Width: 640 Height: 480 Frame Rate: 30 Frame Count: 4182 Duration: 00:02:19 Compression: XviD-XviD project
Author:	Krystian Mikolajczyk (Univ. of Surrey)
Creation date:	24/07/2008
Copyright statement:	
Camera Information	Description: handy camera, moving, with zoom Type: True Constrained Motion:False Infra Red capabilities:False Omnidirectional camera:False
Keywords:	action recognition; Surrey;
Other Related Videos in ViSOR:	

23. Example of a ViPER annotation file (from the video "Smoke Video 11")

```
<?xml version="1.0" encoding="UTF-8"?>
<viper xmlns="http://lamp.cfar.umd.edu/viper#"
xmlns:data="http://lamp.cfar.umd.edu/viperdata#">
  <!-- Data file created by Visor -->
  <!-- Date : 31/07/2008 18.32.33 - Version: 1.1  -->
  <!-- Using static concepts -->
  <!-- without Descriptor list -->
  <!-- without ba list-->
  <!-- Frame Span: All -->
  <config>
    <descriptor name="Information" type="FILE">
      <attribute dynamic="false" name="SOURCETYPE"
type="http://lamp.cfar.umd.edu/viperdata#lvalue">
        <data:lvalue-possibles>
          <data:lvalue-enum value="SEQUENCE"/>
          <data:lvalue-enum value="FRAMES"/>
        </data:lvalue-possibles>
      </attribute>
      <attribute dynamic="false" name="VISORID" type="dvalue"/>
      <attribute dynamic="false" name="NUMFRAMES" type="dvalue"/>
      <attribute dynamic="false" name="FRAMERATE" type="fvalue"/>
      <attribute dynamic="false" name="H-FRAME-SIZE" type="dvalue"/>
      <attribute dynamic="false" name="V-FRAME-SIZE" type="dvalue"/>
      <attribute dynamic="false" name="CAMERATYPE" type="svalue"/>
      <attribute dynamic="false" name="CameraDescription" type="svalue"/>
      <attribute dynamic="false" name="Infrared" type="fvalue"/>
      <attribute dynamic="false" name="Omnidirectional" type="fvalue"/>
      <attribute dynamic="false" name="CameraMotion" type="fvalue"/>
      <attribute dynamic="false" name="ConstrainedMotion" type="fvalue"/>
    </descriptor>
    <descriptor name="Person" type="OBJECT">
      <attribute name="Position_BBOX" type="bbox" dynamic="true"/>
      <attribute name="PositionBar" type="point" dynamic="true"/>
      <attribute name="Contour" type="polygon" dynamic="true"/>
      <attribute name="IDPerson" type="dvalue" dynamic="false"/>
      <attribute name="RealHeight" type="fvalue" dynamic="false"/>
      <attribute name="PersonName" type="svalue" dynamic="false"/>
      <attribute name="FeetPosition" type="point" dynamic="true"/>
      <attribute name="HeadPosition" type="point" dynamic="true"/>
      <attribute name="ObjectMaskFileName_CVC" type="svalue" dynamic="true"/>
      <attribute name="Position_Ellipse" type="obox" dynamic="true"/>
      <attribute name="CR_People_Crying" type="fvalue" dynamic="false"/>
      <attribute name="CR_Female_Person" type="fvalue" dynamic="false"/>
      <attribute name="CR_Male_Person" type="fvalue" dynamic="false"/>
      <attribute name="CR_Civilian_Person" type="fvalue" dynamic="false"/>
      <attribute name="CR_Armed_Person" type="fvalue" dynamic="false"/>
      <attribute name="CR_Firefighter" type="fvalue" dynamic="false"/>
      <attribute name="CR_Guard" type="fvalue" dynamic="false"/>
      <attribute name="CR_Fighter_Combat" type="fvalue" dynamic="false"/>
      <attribute name="CR_Individual" type="fvalue" dynamic="false"/>
      <attribute name="CR_Adult" type="fvalue" dynamic="false"/>
      <attribute name="CR_Agent" type="fvalue" dynamic="false"/>
      <attribute name="CR_Boy" type="fvalue" dynamic="false"/>
      <attribute name="CR_Girl" type="fvalue" dynamic="false"/>
      <attribute name="CR_Dead_Bodies" type="fvalue" dynamic="false"/>
      <attribute name="CR_Ground_Combat" type="fvalue" dynamic="false"/>
      <attribute name="CR_Person" type="fvalue" dynamic="false"/>
      <attribute name="CR_Police_Private_Security_Personnel" type="fvalue"
dynamic="false"/>
```

```
    <attribute name="CR_Prisoner" type="fvalue" dynamic="false"/>
    <attribute name="CR_Baby" type="fvalue" dynamic="false"/>
    <attribute name="CR_Dark-skinned_People" type="fvalue" dynamic="false"/>
    <attribute name="CR_Child" type="fvalue" dynamic="false"/>
    <attribute name="CR_Medical_Personnel" type="fvalue" dynamic="false"/>
    <attribute name="CR_Old_People" type="fvalue" dynamic="false"/>
    <attribute name="CR_Single_Person" type="fvalue" dynamic="false"/>
    <attribute name="CR_Soldiers" type="fvalue" dynamic="false"/>
    <attribute name="CR_Aggressor" type="fvalue" dynamic="false"/>
    <attribute name="CR_Launcher" type="fvalue" dynamic="false"/>
    <attribute name="CR_Men_In_Women's_Clothing" type="fvalue" dynamic="false"/>
    <attribute name="CR_Motorcyclist" type="fvalue" dynamic="false"/>
    <attribute name="CR_People_With_Disabilities" type="fvalue" dynamic="false"/>
    <attribute name="CR_Prostitute" type="fvalue" dynamic="false"/>
    <attribute name="CR_Rioter" type="fvalue" dynamic="false"/>
    <attribute name="CR_Terrorist" type="fvalue" dynamic="false"/>
    <attribute name="CR_Traffic_Cop" type="fvalue" dynamic="false"/>
    <attribute name="CR_Vandal" type="fvalue" dynamic="false"/>
    <attribute name="CR_Police/security" type="fvalue" dynamic="false"/>
    <attribute name="CR_Asian_People" type="fvalue" dynamic="false"/>
    <attribute name="CR_Backpackers" type="fvalue" dynamic="false"/>
    <attribute name="CR_Beggar" type="fvalue" dynamic="false"/>
    <attribute name="CR_Caucasians" type="fvalue" dynamic="false"/>
    <attribute name="CR_Glasses" type="fvalue" dynamic="false"/>
    <attribute name="CR_Hispanic_Person" type="fvalue" dynamic="false"/>
    <attribute name="CR_Indian_Person" type="fvalue" dynamic="false"/>
    <attribute name="CR_Infants" type="fvalue" dynamic="false"/>
    <attribute name="CR_Street_Vendor" type="fvalue" dynamic="false"/>
    <attribute name="CR_Sunglasses" type="fvalue" dynamic="false"/>
  </descriptor>
  <descriptor name="BodyPart" type="OBJECT">
    <attribute name="Position_BBOX" type="bbox" dynamic="true"/>
    <attribute name="PositionBar" type="point" dynamic="true"/>
    <attribute name="Contour" type="polygon" dynamic="true"/>
    <attribute name="IDPerson" type="dvalue" dynamic="false"/>
    <attribute name="Owner_ID" type="dvalue" dynamic="false"/>
    <attribute name="Position_Ellipse" type="obox" dynamic="true"/>
    <attribute name="FaceTilt" type="lvalue" dynamic="true">
      <data:lvalue-possibles>
        <data:lvalue-enum value='0_front' />
        <data:lvalue-enum value='30' />
        <data:lvalue-enum value='60' />
        <data:lvalue-enum value='90_side' />
        <data:lvalue-enum value='180_rear' />
      </data:lvalue-possibles>
    </attribute>

    <attribute name="Side" type="dvalue" dynamic="false"/>
    <attribute name="CR_Head_And_Shoulder" type="fvalue" dynamic="false"/>
    <attribute name="CR_Hand" type="fvalue" dynamic="false"/>
    <attribute name="CR_Face" type="fvalue" dynamic="false"/>
    <attribute name="CR_Noses" type="fvalue" dynamic="false"/>
    <attribute name="CR_Trunk" type="fvalue" dynamic="false"/>
    <attribute name="CR_Leg" type="fvalue" dynamic="false"/>
    <attribute name="CR_Body_Parts" type="fvalue" dynamic="false"/>
  </descriptor>
  <descriptor name="GroupOfPeople" type="OBJECT">
    <attribute name="Position_BBOX" type="bbox" dynamic="true"/>
    <attribute name="PositionBar" type="point" dynamic="true"/>
    <attribute name="Contour" type="polygon" dynamic="true"/>
    <attribute name="IDGroup" type="dvalue" dynamic="false"/>
    <attribute name="NumberOfPeople" type="dvalue" dynamic="true"/>
    <attribute name="CR_Crowd" type="fvalue" dynamic="false"/>
    <attribute name="CR_Group" type="fvalue" dynamic="false"/>
    <attribute name="CR_3_Or_More_People" type="fvalue" dynamic="false"/>
    <attribute name="CR_Criminals" type="fvalue" dynamic="false"/>
    <attribute name="CR_Demonstrators" type="fvalue" dynamic="false"/>
    <attribute name="CR_Firing_Squad" type="fvalue" dynamic="false"/>
    <attribute name="CR_Large_Group" type="fvalue" dynamic="false"/>
```

```
      <attribute name="CR_More_Than_1_Person" type="fvalue" dynamic="false"/>
      <attribute name="CR_Small_Group" type="fvalue" dynamic="false"/>
      <attribute name="CR_People" type="fvalue" dynamic="false"/>
      <attribute name="CR_Protesters" type="fvalue" dynamic="false"/>
    </descriptor>
    <descriptor name="Event" type="OBJECT">
      <attribute name="Description" type="svalue" dynamic="false"/>
      <attribute name="EventDescription" type="svalue" dynamic="false"/>
      <attribute name="CR_Car_Crash" type="fvalue" dynamic="false"/>
      <attribute name="CR_Bomber_Bombing" type="fvalue" dynamic="false"/>
      <attribute name="CR_Explosion_Fire" type="fvalue" dynamic="false"/>
      <attribute name="CR_Car_Racing" type="fvalue" dynamic="false"/>
      <attribute name="CR_Accident" type="fvalue" dynamic="false"/>
      <attribute name="CR_Explosion" type="fvalue" dynamic="false"/>
      <attribute name="CR_Earthquake" type="fvalue" dynamic="false"/>
      <attribute name="CR_Violence" type="fvalue" dynamic="false"/>
    </descriptor>
    <descriptor name="ActionByAPerson" type="OBJECT">
      <attribute name="IDPerson" type="dvalue" dynamic="false"/>
      <attribute name="Description" type="svalue" dynamic="false"/>
      <attribute name="IDObject" type="dvalue" dynamic="false"/>
      <attribute name="ActionDescription" type="svalue" dynamic="false"/>
      <attribute name="CR_Running" type="fvalue" dynamic="false"/>
      <attribute name="CR_Walking" type="fvalue" dynamic="false"/>
      <attribute name="CR_Talking" type="fvalue" dynamic="false"/>
      <attribute name="CR_Cheering" type="fvalue" dynamic="false"/>
      <attribute name="CR_Greeting" type="fvalue" dynamic="false"/>
      <attribute name="CR_Throwing" type="fvalue" dynamic="false"/>
      <attribute name="CR_Shooting" type="fvalue" dynamic="false"/>
      <attribute name="CR_Sitting" type="fvalue" dynamic="false"/>
      <attribute name="CR_Standing" type="fvalue" dynamic="false"/>
      <attribute name="CR_Abused_Child" type="fvalue" dynamic="false"/>
      <attribute name="CR_Abused_Woman" type="fvalue" dynamic="false"/>
      <attribute name="CR_Guarding" type="fvalue" dynamic="false"/>
      <attribute name="CR_Cycling" type="fvalue" dynamic="false"/>
      <attribute name="CR_PersonEntersObject" type="fvalue" dynamic="false"/>
      <attribute name="CR_PersonEntersArea" type="fvalue" dynamic="false"/>
      <attribute name="CR_PersonExitsObject" type="fvalue" dynamic="false"/>
      <attribute name="CR_PersonExitsArea" type="fvalue" dynamic="false"/>
      <attribute name="CR_PersonInteractsObject" type="fvalue" dynamic="false"/>
      <attribute name="CR_PersonTakesObject" type="fvalue" dynamic="false"/>
      <attribute name="CR_PersonLeavesObject" type="fvalue" dynamic="false"/>
      <attribute name="CR_PersonFiringWeapon" type="fvalue" dynamic="false"/>
      <attribute name="CR_PersonFallsDown" type="fvalue" dynamic="false"/>
      <attribute name="CR_Tying shoe laces" type="fvalue" dynamic="false"/>
      <attribute name="CR_Taking off part of his/her clothes" type="fvalue"
dynamic="false"/>
      <attribute name="CR_Drinking" type="fvalue" dynamic="false"/>
      <attribute name="CR_Wearing glasses" type="fvalue" dynamic="false"/>
      <attribute name="CR_Jumping" type="fvalue" dynamic="false"/>
      <attribute name="CR_Raising up an arm" type="fvalue" dynamic="false"/>
      <attribute name="CR_Oscillating" type="fvalue" dynamic="false"/>
    </descriptor>
    <descriptor name="FixedObject" type="OBJECT">
      <attribute name="Position_BBOX" type="bbox" dynamic="true"/>
      <attribute name="PositionBar" type="point" dynamic="true"/>
      <attribute name="Contour" type="polygon" dynamic="true"/>
      <attribute name="IDObject" type="dvalue" dynamic="false"/>
      <attribute name="CR_Office" type="fvalue" dynamic="false"/>
      <attribute name="CR_Windows" type="fvalue" dynamic="false"/>
      <attribute name="CR_House" type="fvalue" dynamic="false"/>
      <attribute name="CR_Building" type="fvalue" dynamic="false"/>
      <attribute name="CR_Barge" type="fvalue" dynamic="false"/>
      <attribute name="CR_Tower" type="fvalue" dynamic="false"/>
      <attribute name="CR_Barrier" type="fvalue" dynamic="false"/>
      <attribute name="CR_Chair" type="fvalue" dynamic="false"/>
      <attribute name="CR_Church" type="fvalue" dynamic="false"/>
      <attribute name="CR_Monument" type="fvalue" dynamic="false"/>
      <attribute name="CR_Furniture" type="fvalue" dynamic="false"/>
      <attribute name="CR_bench" type="fvalue" dynamic="false"/>
```

```
    <attribute name="CR_Waste_bin" type="fvalue" dynamic="false"/>
    <attribute name="CR_Table" type="fvalue" dynamic="false"/>
    <attribute name="CR_Door" type="fvalue" dynamic="false"/>
  </descriptor>
  <descriptor name="ActionByPeople" type="OBJECT">
    <attribute name="Description" type="svalue" dynamic="false"/>
    <attribute name="ActionDescription" type="svalue" dynamic="false"/>
    <attribute name="IDGroup" type="dvalue" dynamic="false"/>
    <attribute name="CR_Handshaking" type="fvalue" dynamic="false"/>
    <attribute name="CR_People_Marching" type="fvalue" dynamic="false"/>
    <attribute name="CR_Meeting" type="fvalue" dynamic="false"/>
    <attribute name="CR_People walking" type="fvalue" dynamic="false"/>
    <attribute name="CR_CrowdFormation" type="fvalue" dynamic="false"/>
    <attribute name="CR_CrowdDispersal" type="fvalue" dynamic="false"/>
    <attribute name="CR_PeopleAggregation" type="fvalue" dynamic="false"/>
    <attribute name="CR_Mutual Occlusion" type="fvalue" dynamic="false"/>
  </descriptor>
  <descriptor name="Location" type="CONTENT">
    <attribute name="CR_Parade" type="fvalue" dynamic="false"/>
    <attribute name="CR_Demonstration_Or_Protest" type="fvalue" dynamic="false"/>
    <attribute name="CR_Riot" type="fvalue" dynamic="false"/>
    <attribute name="CR_Celebration_Or_Party" type="fvalue" dynamic="false"/>
    <attribute name="CR_Highway" type="fvalue" dynamic="false"/>
    <attribute name="CR_Tunnel" type="fvalue" dynamic="false"/>
    <attribute name="CR_Office" type="fvalue" dynamic="false"/>
    <attribute name="CR_Parking_Lot" type="fvalue" dynamic="false"/>
    <attribute name="CR_Urban_Park" type="fvalue" dynamic="false"/>
    <attribute name="CR_High_Security_Facility" type="fvalue" dynamic="false"/>
    <attribute name="CR_Security_Checkpoint" type="fvalue" dynamic="false"/>
    <attribute name="CR_Grassland" type="fvalue" dynamic="false"/>
    <attribute name="CR_House" type="fvalue" dynamic="false"/>
    <attribute name="CR_Bank" type="fvalue" dynamic="false"/>
    <attribute name="CR_Road" type="fvalue" dynamic="false"/>
    <attribute name="CR_Sky" type="fvalue" dynamic="false"/>
    <attribute name="CR_Urban_Scenes" type="fvalue" dynamic="false"/>
    <attribute name="CR_Court" type="fvalue" dynamic="false"/>
    <attribute name="CR_Outdoor" type="fvalue" dynamic="false"/>
    <attribute name="CR_Building" type="fvalue" dynamic="false"/>
    <attribute name="CR_Vegetation" type="fvalue" dynamic="false"/>
    <attribute name="CR_Barge" type="fvalue" dynamic="false"/>
    <attribute name="CR_Pedestrian_Zone" type="fvalue" dynamic="false"/>
    <attribute name="CR_Traffic" type="fvalue" dynamic="false"/>
    <attribute name="CR_Streets" type="fvalue" dynamic="false"/>
    <attribute name="CR_Tower" type="fvalue" dynamic="false"/>
    <attribute name="CR_Trees" type="fvalue" dynamic="false"/>
    <attribute name="CR_Sidewalks" type="fvalue" dynamic="false"/>
    <attribute name="CR_Battlefield" type="fvalue" dynamic="false"/>
    <attribute name="CR_Boardwalk" type="fvalue" dynamic="false"/>
    <attribute name="CR_Ceremony" type="fvalue" dynamic="false"/>
    <attribute name="CR_Meeting_Setting" type="fvalue" dynamic="false"/>
    <attribute name="CR_Train_Station" type="fvalue" dynamic="false"/>
    <attribute name="CR_Grass" type="fvalue" dynamic="false"/>
    <attribute name="CR_Indoor" type="fvalue" dynamic="false"/>
    <attribute name="CR_Airport" type="fvalue" dynamic="false"/>
    <attribute name="CR_Airport_Terminal" type="fvalue" dynamic="false"/>
    <attribute name="CR_Alley" type="fvalue" dynamic="false"/>
    <attribute name="CR_Amusement_Park" type="fvalue" dynamic="false"/>
    <attribute name="CR_Apartments" type="fvalue" dynamic="false"/>
    <attribute name="CR_Bar_Pub" type="fvalue" dynamic="false"/>
    <attribute name="CR_Bridges" type="fvalue" dynamic="false"/>
    <attribute name="CR_Bus_Terminal" type="fvalue" dynamic="false"/>
    <attribute name="CR_Church" type="fvalue" dynamic="false"/>
    <attribute name="CR_Garden" type="fvalue" dynamic="false"/>
    <attribute name="CR_Gas_Station" type="fvalue" dynamic="false"/>
    <attribute name="CR_Laboratory" type="fvalue" dynamic="false"/>
    <attribute name="CR_Library" type="fvalue" dynamic="false"/>
    <attribute name="CR_Meadows" type="fvalue" dynamic="false"/>
    <attribute name="CR_Monument" type="fvalue" dynamic="false"/>
    <attribute name="CR_Museum" type="fvalue" dynamic="false"/>
```

```
    <attribute name="CR_Office_Building" type="fvalue" dynamic="false"/>
    <attribute name="CR_Picnic_Area" type="fvalue" dynamic="false"/>
    <attribute name="CR_Restaurant" type="fvalue" dynamic="false"/>
    <attribute name="CR_Room" type="fvalue" dynamic="false"/>
    <attribute name="CR_Hotel" type="fvalue" dynamic="false"/>
    <attribute name="CR_School" type="fvalue" dynamic="false"/>
    <attribute name="CR_Shopping_Mall" type="fvalue" dynamic="false"/>
    <attribute name="CR_Stadium" type="fvalue" dynamic="false"/>
    <attribute name="CR_Subway_Station" type="fvalue" dynamic="false"/>
    <attribute name="CR_Supermarket" type="fvalue" dynamic="false"/>
    <attribute name="CR_Town_Squares" type="fvalue" dynamic="false"/>
    <attribute name="CR_Classroom" type="fvalue" dynamic="false"/>
    <attribute name="CR_University" type="fvalue" dynamic="false"/>
    <attribute name="CR_College" type="fvalue" dynamic="false"/>
    <attribute name="CR_Hall" type="fvalue" dynamic="false"/>
  </descriptor>
  <descriptor name="Clip" type="CONTENT">
    <attribute name="FrameStart" type="dvalue" dynamic="false"/>
    <attribute name="FrameEnd" type="dvalue" dynamic="false"/>
    <attribute name="Description" type="svalue" dynamic="false"/>
  </descriptor>
  <descriptor name="Video" type="CONTENT">
    <attribute name="Description" type="svalue" dynamic="false"/>
    <attribute name="CalibrationData" type="svalue" dynamic="false"/>
  </descriptor>
  <descriptor name="MobileObject" type="OBJECT">
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    <data:bbox  framespan="1336:1336" height="133" width="60" x="158" y="78" />
    <data:bbox  framespan="1337:1337" height="133" width="64" x="154" y="78" />
    <data:bbox  framespan="1338:1338" height="133" width="70" x="148" y="78" />
    <data:bbox  framespan="1339:1341" height="133" width="75" x="143" y="78" />
    <data:bbox  framespan="1342:1343" height="133" width="71" x="143" y="78" />
    <data:bbox  framespan="1344:1345" height="133" width="60" x="145" y="78" />
    <data:bbox  framespan="1346:1347" height="133" width="54" x="136" y="78" />
    <data:bbox  framespan="1348:1349" height="139" width="54" x="128" y="78" />
    <data:bbox  framespan="1350:1350" height="139" width="59" x="120" y="78" />
    <data:bbox  framespan="1351:1351" height="140" width="71" x="108" y="78" />
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    <data:bbox  framespan="1360:1360" height="143" width="64" x="78" y="78" />
    <data:bbox  framespan="1361:1361" height="146" width="66" x="71" y="75" />
    <data:bbox  framespan="1362:1362" height="146" width="71" x="63" y="75" />
    <data:bbox  framespan="1363:1364" height="146" width="75" x="55" y="75" />
    <data:bbox  framespan="1365:1367" height="146" width="80" x="50" y="75" />
    <data:bbox  framespan="1368:1371" height="146" width="85" x="45" y="75" />
    <data:bbox  framespan="1372:1372" height="146" width="61" x="45" y="75" />
    <data:bbox  framespan="1373:1374" height="146" width="61" x="38" y="75" />
    <data:bbox  framespan="1375:1376" height="146" width="54" x="36" y="75" />
    <data:bbox  framespan="1377:1378" height="146" width="60" x="28" y="75" />
    <data:bbox  framespan="1379:1380" height="146" width="70" x="12" y="75" />
    <data:bbox  framespan="1381:1385" height="146" width="69" x="8" y="75" />
    <data:bbox  framespan="1386:1388" height="146" width="61" x="4" y="75" />
    <data:bbox  framespan="1389:1390" height="151" width="50" x="4" y="70" />
    <data:bbox  framespan="1391:1391" height="151" width="45" x="1" y="70" />
    <data:bbox  framespan="1392:1393" height="151" width="42" x="1" y="70" />
    <data:bbox  framespan="1394:1397" height="151" width="37" x="1" y="70" />
    <data:bbox  framespan="1398:1401" height="151" width="32" x="1" y="70" />
    <data:bbox  framespan="1402:1403" height="151" width="16" x="1" y="70" />
    <data:bbox  framespan="1404:1404" height="151" width="12" x="1" y="70" />
  </attribute>
  <attribute name="IDPerson">
    <data:dvalue value = "2"/>
  </attribute>
  <attribute name="CR_Male_Person" >
    <data:fvalue  framespan="983:1406" value = "1"/>
  </attribute>
```

```
        <attribute name="CR_Civilian_Person" >
          <data:fvalue  framespan="983:1406" value = "1"/>
        </attribute>
        <attribute name="CR_Adult" >
          <data:fvalue  framespan="983:1406" value = "1"/>
        </attribute>
        <attribute name="CR_Person" >
          <data:fvalue  framespan="983:1406" value = "1"/>
        </attribute>
        <attribute name="CR_Single_Person" >
          <data:fvalue  framespan="983:1406" value = "1"/>
        </attribute>
        <attribute name="CR_Male" >
          <data:fvalue  framespan="983:1406" value = "1"/>
        </attribute>
      </OBJECT>
      <OBJECT framespan="980:1404" id="0" name="GroupOfPeople">
        <attribute name="CR_Group" >
          <data:fvalue  framespan="980:1404" value = "1"/>
        </attribute>
        <attribute name="CR_People" >
          <data:fvalue  framespan="980:1404" value = "2"/>
        </attribute>
      </OBJECT>
      <OBJECT framespan="402:1640" id="0" name="MobileObject">
        <attribute name="CR_Smoke" >
          <data:fvalue  framespan="402:1639" value = "1"/>
        </attribute>
      </OBJECT>
      <OBJECT framespan="1:40" id="1" name="MobileObject">
        <attribute name="CR_Car" >
          <data:fvalue  framespan="1:40" value = "1"/>
        </attribute>
      </OBJECT>
      <OBJECT framespan="1774:1873" id="2" name="MobileObject">
        <attribute name="CR_Car" >
          <data:fvalue  framespan="1774:1873" value = "1"/>
        </attribute>
      </OBJECT>
      <CONTENT framespan="1:1901" id="0" name="Location">
        <attribute name="CR_Urban_Scenes" >
          <data:fvalue  framespan="1:1" value = "1"/>
        </attribute>
        <attribute name="CR_Outdoor" >
          <data:fvalue  framespan="1:1" value = "1"/>
        </attribute>
      </CONTENT>
    </sourcefile>
  </data>
</viper>
```

24. Example of a Mpeg7 annotation file (from the video "Smoke Video 11")

```
<?xml version="1.0" encoding="iso-8859-1"?>
<Mpeg7 xmlns="urn:mpeg:mpeg7:schema:2001" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xmlns:mpeg7="urn:mpeg:mpeg7:schema:2001"
xsi:schemaLocation="urn:mpeg:mpeg7:schema:2001 Mpeg7-2001.xsd">
  <Description xsi:type="ContentEntityType">
    <MultimediaContent xsi:type="VideoType">
      <Video id="visor_1196179837385_movie11_viper.mpg">
        <MediaLocator>
          <MediaUri>visor_1196179837385_movie11_viper.mpg</MediaUri>
        </MediaLocator>
        <MediaTime>
          <MediaTimePoint>T00:00:00:0F25</MediaTimePoint>
          <MediaDuration>PT00H00M04S0N25F</MediaDuration>
        </MediaTime>
        <TemporalDecomposition gap="true" overlap="true">
          <VideoSegment>
            <TextAnnotation relevance="1" confidence="1">
              <KeywordAnnotation>
                <Keyword>Male_Person</Keyword>
              </KeywordAnnotation>
            </TextAnnotation>
            <MediaTime>
              <MediaTimePoint>T00:00:00:1F25</MediaTimePoint>
              <MediaDuration>PT00H01M09S22N25F</MediaDuration>
            </MediaTime>
          </VideoSegment>
          <VideoSegment>
            <TextAnnotation relevance="1" confidence="1">
              <KeywordAnnotation>
                <Keyword>Civilian_Person</Keyword>
              </KeywordAnnotation>
            </TextAnnotation>
            <MediaTime>
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              <MediaDuration>PT00H01M09S22N25F</MediaDuration>
            </MediaTime>
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          <VideoSegment>
            <TextAnnotation relevance="1" confidence="1">
              <KeywordAnnotation>
                <Keyword>Adult</Keyword>
              </KeywordAnnotation>
            </TextAnnotation>
            <MediaTime>
              <MediaTimePoint>T00:00:00:1F25</MediaTimePoint>
              <MediaDuration>PT00H01M09S22N25F</MediaDuration>
            </MediaTime>
          </VideoSegment>
          <VideoSegment>
            <TextAnnotation relevance="1" confidence="1">
              <KeywordAnnotation>
                <Keyword>Person</Keyword>
              </KeywordAnnotation>
            </TextAnnotation>
            <MediaTime>
              <MediaTimePoint>T00:00:00:1F25</MediaTimePoint>
              <MediaDuration>PT00H01M09S22N25F</MediaDuration>
            </MediaTime>
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```

```
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    <KeywordAnnotation>
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  </TextAnnotation>
  <MediaTime>
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    <MediaDuration>PT00H01M09S22N25F</MediaDuration>
  </MediaTime>
</VideoSegment>
<VideoSegment>
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    <KeywordAnnotation>
      <Keyword>Male</Keyword>
    </KeywordAnnotation>
  </TextAnnotation>
  <MediaTime>
    <MediaTimePoint>T00:00:00:1F25</MediaTimePoint>
    <MediaDuration>PT00H01M09S22N25F</MediaDuration>
  </MediaTime>
</VideoSegment>
<VideoSegment>
  <TextAnnotation relevance="1" confidence="1">
    <KeywordAnnotation>
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    </KeywordAnnotation>
  </TextAnnotation>
  <MediaTime>
    <MediaTimePoint>T00:00:39:8F25</MediaTimePoint>
    <MediaDuration>PT00H00M16S24N25F</MediaDuration>
  </MediaTime>
</VideoSegment>
<VideoSegment>
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    <KeywordAnnotation>
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    </KeywordAnnotation>
  </TextAnnotation>
  <MediaTime>
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    <MediaDuration>PT00H00M16S24N25F</MediaDuration>
  </MediaTime>
</VideoSegment>
<VideoSegment>
  <TextAnnotation relevance="1" confidence="1">
    <KeywordAnnotation>
      <Keyword>Adult</Keyword>
    </KeywordAnnotation>
  </TextAnnotation>
  <MediaTime>
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    <MediaDuration>PT00H00M16S24N25F</MediaDuration>
  </MediaTime>
</VideoSegment>
<VideoSegment>
  <TextAnnotation relevance="1" confidence="1">
    <KeywordAnnotation>
      <Keyword>Person</Keyword>
    </KeywordAnnotation>
  </TextAnnotation>
  <MediaTime>
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    <MediaDuration>PT00H00M16S24N25F</MediaDuration>
  </MediaTime>
</VideoSegment>
<VideoSegment>
  <TextAnnotation relevance="1" confidence="1">
    <KeywordAnnotation>
```

```
        <Keyword>Single_Person</Keyword>
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    </TextAnnotation>
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      <MediaDuration>PT00H00M16S24N25F</MediaDuration>
    </MediaTime>
  </VideoSegment>
  <VideoSegment>
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      </KeywordAnnotation>
    </TextAnnotation>
    <MediaTime>
      <MediaTimePoint>T00:00:39:8F25</MediaTimePoint>
      <MediaDuration>PT00H00M16S24N25F</MediaDuration>
    </MediaTime>
  </VideoSegment>
  <VideoSegment>
    <TextAnnotation relevance="1" confidence="1">
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        <Keyword>Group</Keyword>
      </KeywordAnnotation>
    </TextAnnotation>
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  <VideoSegment>
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        <Keyword>People</Keyword>
      </KeywordAnnotation>
    </TextAnnotation>
    <MediaTime>
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      <MediaDuration>PT00H00M17S0N25F</MediaDuration>
    </MediaTime>
  </VideoSegment>
  <VideoSegment>
    <TextAnnotation relevance="1" confidence="1">
      <KeywordAnnotation>
        <Keyword>Smoke</Keyword>
      </KeywordAnnotation>
    </TextAnnotation>
    <MediaTime>
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      <MediaDuration>PT00H00M49S14N25F</MediaDuration>
    </MediaTime>
  </VideoSegment>
  <VideoSegment>
    <TextAnnotation relevance="1" confidence="1">
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        <Keyword>Car</Keyword>
      </KeywordAnnotation>
    </TextAnnotation>
    <MediaTime>
      <MediaTimePoint>T00:00:00:1F25</MediaTimePoint>
      <MediaDuration>PT00H00M01S15N25F</MediaDuration>
    </MediaTime>
  </VideoSegment>
  <VideoSegment>
    <TextAnnotation relevance="1" confidence="1">
      <KeywordAnnotation>
        <Keyword>Car</Keyword>
      </KeywordAnnotation>
    </TextAnnotation>
    <MediaTime>
```

```
            <MediaTimePoint>T00:01:10:24F25</MediaTimePoint>
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          </MediaTime>
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        <VideoSegment>
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            <KeywordAnnotation>
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            </KeywordAnnotation>
          </TextAnnotation>
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            <MediaDuration>PT00H01M16S1N25F</MediaDuration>
          </MediaTime>
        </VideoSegment>
        <VideoSegment>
          <TextAnnotation relevance="1" confidence="1">
            <KeywordAnnotation>
              <Keyword>Outdoor</Keyword>
            </KeywordAnnotation>
          </TextAnnotation>
          <MediaTime>
            <MediaTimePoint>T00:00:00:1F25</MediaTimePoint>
            <MediaDuration>PT00H01M16S1N25F</MediaDuration>
          </MediaTime>
        </VideoSegment>
      </TemporalDecomposition>
    </Video>
  </MultimediaContent>
 </Description>
</Mpeg7>
```

25. ViSOR references

The ViSOR system has been described and presented in the following conferences and journals.

- R. Vezzani, R. Cucchiara, **"Annotation Collection and Online Performance Evaluation for Video Surveillance: the ViSOR Project"** in press on 5th IEEE International Conference On Advanced Video and Signal Based Surveillance (AVSS2008), Santa Fe, New Mexico, 1-3 Sep, 2008
- R. Vezzani, S. Calderara, P. Piccinini, R. Cucchiara, **"Smoke detection in videosurveillance: the use of VISOR (Video Surveillance On-line Repository)"**, Proceeding of ACM International Conference on Image and Video Retrieval, Niagara Falls, Canada, July, 7-9, 2008
- R. Vezzani, R. Cucchiara, **"ViSOR: Video Surveillance On-line Repository for Annotation Retrieval"** Proceedings of IEEE International Conference on Multimedia & Expo (IEEE ICME 2008), Hannover, 2008
- R. Vezzani, R. Cucchiara, **"Visor: Video Surveillance Online Repository"** Proceedings of BMVA symposium on "Security and surveillance: performance evaluation", London, 2007

The ViSOR system has also been presented during the following events:

- **14th International Conference on Image Analysis and Processing (ICIAP 2007).**
  10-14 September 2007, Modena (Italy) ICIAP is one of the most important events covering image processing and pattern recognition which is organized every two years by the Italian group of researchers on pattern recognition (GIRPR) affiliated with the IAPR (International Association on Pattern Recognition). The topics of ICIAP 2007 have been organized into main streams, one of which was about Surveillance and Security. During the conference UoM did a demo presentation and advertized the system with posters and depliants.
- **ANSA news bulletin - 13 September 2007.**
  ANSA (Italian General News Service) is the Italy's leading newswire providing national and international news. The Ansa news agency, created by Italian newspapers in 1945, supplies up-to-the-minute coverage of events in Italy and around the world. The ViSOR system has been segnalated as a new technology available for video surveillance researchers.

- **VideoGov Summit**

  27 September 2007, Rome (Italy). VideoGov was a national summit principally for public administration. The topic of the summit was the future of the Videosurveillance, with particular attention to real implementation issues. UoM has participated as invited speaker presenting the ViSOR portal.

26. References

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[3] R. Vezzani, R. Cucchiara, "Video surveillance concepts and the VISOR system (VIdeo Surveillance Online Repository)", Tech Rep VV1.0, 20 Apr 2007.

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[6] C.G.M. Snoek, M. Worring, J.C. Van Gemert, J.M. Geusebroek, and A.W.M. Smeulders, "The challenge problem for automated detection of 101 semantic concepts in multimedia," in Proceedings of the 14th ACM Int'l Conference on Multimedia, New York, NY, USA, 2006, pp. 421–430, ACM.

[7] M.R. Naphade, L. Kennedy, J. R. Kender, S.-F. Chang, Smith J. R., P. Over, and A. Hauptmann, "A light scale concept ontology for multimedia understanding for trecvid 2005," Tech. Rep., IBM Research, 2005.

[8] L. Kennedy, "Revision of lscom event/activity annotations, dto challenge workshop on large scale concept ontology for multimedia," Tech. Rep., Columbia University ADVENT, 2006.

[9] D. Doermann and D. Mihalcik, "Tools and techniques for video performance evaluation," Proc. of Int'l Conference on Pattern Recognition, vol. 04, pp. 4167, 2000.

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[13] Ram Nevatia, Jerry Hobbs, and Bob Bolles. An ontology for video event representation. In CVPRW '04: Proceedings of the 2004 Conference on Computer Vision and Pattern Recognition Workshop (CVPRW'04) Volume 7, page 119,Washington, DC, USA, 2004. IEEE Computer Society.

[14] A.-T. Nghiem, F. Bremond, M. Thonnat, and V. Valentin. Etiseo, performance evaluation for video surveillance systems. In Proceedings of AVSS 2007, 2007.

[15]C.G.M. Snoek, M. Worring, J.C. Van Gemert, J.M. Geusebroek, and A.W.M. Smeulders. The challenge problem for automated detection of 101 semantic concepts in multimedia. In Proceedings of the 14th ACM Int'l Conference on Multimedia, pages 421–430, New York, NY, USA, 2006. ACM.

[16] L. Kennedy. Revision of lscom event/activity annotations, DTO challenge workshop on large scale concept ontology for multimedia. Technical report, Columbia University ADVENT, 2006.