

# Performance evaluation of multimedia analysis for surveillance applications

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The general goal of the European CANTATA project (Content Aware Networked systems Iowards Advanced and Tailored Assistance) is to energize the European industry with respect to the development of multimedia content-aware systems. Three main application domains are studied via three different scenarios in video surveillance, home multimedia and medical applications.

Performance evaluation of such systems is a major challenge since many different methods exist and the criteria for evaluation are highly subjective. By combining results and state-of-the-art knowledge from different research communities, the CANTATA project avoids re-development of existing methods or tools and only develops extensions where necessary to propose a single standard validation framework.

This paper gives an overview of the state-of-the-art in performance evaluation and proposed datasets (e.g. ETISEO, PETS, iLIDS, trictrac, ovvv, level crossing, Traficon...). It is always difficult to evaluate content analysis methods on professional materials such as images or movies due to copyright issues. We found out that there is a considerable number of available datasets in the public domain well-suited for multi content analysis benchmarks. The same copyright issue holds for benchmarking audio-content analysis methods. We will present and describe available datasets for the domain of security and surveillance.

A web page is under construction to group the datasets per domain of application. For each dataset: important information is given:

- Name
  - Webpage link (if any).
  - Description of Dataset (Content, size, etc).
  - Description of Ground Truth/Metadata (if any).
  - Contextual info: environment conditions (calibration, scene...).
  - Results from metrics and ground truth.
  - Comments.
  - Information on Copyright, license, cost, etc.
  - Contact person from Cantata: contact person to get more info.

The website will become public in few months for now with a link from the CANTATA website (<http://www.hitech-projects.com/euprojects/cantata>). The proposed evaluation approach compares the results of the Multimedia Content-Analysis (MCA) algorithms with a ground-truth (GT) counterpart, which contains the desired results. Both the MCA results and the ground truth comprise description files that are formatted in XML using the following approach:

- Use the schema developed by VIPER project (<http://vipер-toolkit.sourceforge.net/docs/file>), because a significant part of the

community has already adopted it and different useful tools are publicly available.

- Extend the schema developed by ViPER or get inspiration from it to cover for example multiple camera tracking with 3D coordinates.

Furthermore, acquiring the ground truth for a given video sequence is a boring and time consuming process. Also creating the appropriate video sequence for a given problem is not always easy. Several solutions are provided for these problems, e.g. computer-aided ground-truth creation as provided by the ViPER toolset. Another solution for these problems is to use computer-generated video sequences, with automatically generated ground truth. The state-of-the-art shows multiple research activities related to computer-generated video and ground truth. Two examples of information concerning a virtual video creation tool and a Traffic jam, as provided on the website are given below:

- OVVV (ObjectVideo Virtual Video)
  - Website: <http://development.objectvideo.com/>
  - Description of Dataset: The ObjectVideo Virtual Video provides the ability to generate virtual video sequences. These video sequences can then be used to test VCA algorithms.
  - Description of Ground Truth/Metadata: The automatically generated ground truth is generated in a propriety binary format. The format is open, and a conversion program can be created to convert metadata to any format. A simple bounding box scheme is available, for more powerful validation a "blob" video can be created.
  - Contextual info: Virtual environment, the user can make his own environment from the internet. Several camera settings can be changed to simulate real-world cameras more closely.
  - Results from metrics and ground truth: results from metrics and ground truth are not applicable for OVVV.
  - Comments: This is not a dataset as is but using these tools, very powerful and tailored; test video's can be created.
  - Information on Copyright: The ObjectVideo Virtual Video Tool is provided free for non-commercial use, for your own research and development purposes. If you publish or distribute images, videos or derivative results based on this software, you must acknowledge ObjectVideo by including "ObjectVideo Virtual Video Tool". To use the ObjectVideo Virtual Video tool a licence for the commercial game Half-Life 2 is needed ([www.steampowered.com](http://www.steampowered.com)).
  - Contact person from Cantata: Rick Koeleman, VDG-Security bv. [rick@vdg-security.com](mailto:rick@vdg-security.com)
- Traffic dataset
  - Website: no.
  - Description of dataset: Traffic jam.
  - Description of Ground Truth/Metadata: no.
  - Contextual info: Calibration: Camera height 12m, Camera: ½ inch sensor, 4 mm lens.
  - Comments: Information: Period of road markings is 12m (9+3).
  - Information on Copyright: license (no), cost (free): When dataset is used refer and give credit to Traficon N.V. as follows: "[www.traficon.com](http://www.traficon.com)".
  - Contact person from Cantata: Wouter Favoreel, [wf@traficon.com](mailto:wf@traficon.com)