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Video Content Analysis

Video content analysis (VCA) is the capability of automatically analyzing video to detect and determine temporal events not based on a single image and can be considered as the automated equivalent of the biological visual cortex. This technical capability is used in a wide range of domains including entertainment, health-care, retail, automotive, transport, home automation, safety and security. The algorithms can be implemented as software on general purpose machines, or as hardware in specialized video processing units.

A lot of different functionalities can be implemented in VCA. Video Motion Detection is one of the simplest forms where motion is detected with regard to a fixed background scene. More advanced functionalities include video tracking (used to determine the location of persons or objects in the video signal, possibly with regard to an external reference grid) and egomotion estimation (used to determine the location of a camera by analyzing its output signal). Based on the internal representation that VCA is generated in the machine, it is possible to build other functionalities, such as identification, behavior analysis or other forms of situation awareness.VCA relies on good input video, so it is often combined with such video enhancement technologies as video denoising, image stabilization, unsharp masking and super-resolution. Speaking about it functionalities such features can be added as dynamic masking (blocking a part of the video signal based on the signal itself, for example because of privacy concerns),object detection (used to determine the presence of a type of object or entity, for example a person or car. Other examples include fire and smoke detection), recognition (face recognition and Automatic Number Plate Recognition are used to recognize, and therefore possibly identify persons or cars). Such functionalities as motion detection and people counting are believed to be available as commercial off-the-shelf products with a decent track-record, even such freeware as Flowstone can handle movement and color analysis.

In many domains VCA is implemented on CCTV systems and is either distributed on the cameras (at-the-edge) or centralized on dedicated processing systems. Video Analytics and Smart CCTV are commercial terms for VCA in the security domain. In the UK the BSIA has developed an introduction guide for VCA in the security domain. Audio analytics can be also used in addition to video analytics and to complement it. Kinect is an add-on peripheral for the Xbox 360 gaming console that uses VCA as a part of the user input.

VCA is a new technology but it is highly promising one. New applications are frequently found, however the track record of different types of VCA differs widely.