



Semantic Video Analysis

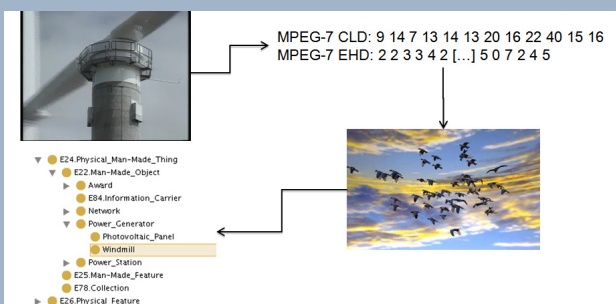
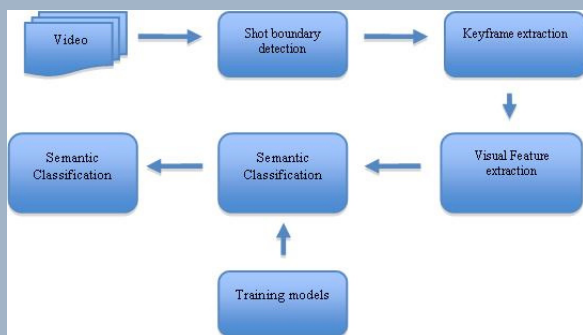
OVERVIEW

The objective of this component is to index videos based on semantic mid to high-level features. To achieve this, the component integrates different modules for video processing. As shown in the diagram, the component integrates the following components in order to extract the embedded semantics from the video: shot boundary detection for categorising shots with similar attributes; key frame extraction, which extracts visually significant frames from each shot boundary; low-level visual feature extraction; and semantic classification.

In order to address the challenges imposed by the semantic gap, the semantic classification module implements biologically inspired classifiers in order to enhance the performance of the visual classification over traditional machine learning algorithms. Of many different algorithms inspired by biological species, the classifier is based on the "Particle Swarm Optimisation" algorithm. The algorithm was initially developed based on bird flocks and fish schooling. The results obtained from this module have shown to improve the performance of the semantic video analysis component when evaluated against traditional machine learning algorithm such as SVM's.

INNOVATION

Through this component, semantic search is advanced to offer enhanced content retrieval algorithms for existing search engines in the market. The Semantic Video Analysis component goes beyond the traditional manual description of video items and incorporates automatic processing for identifying the relevance of the specific content with respect to a given domain of interest. The individual modules integrated within the component have been extensively evaluated against corresponding state-of-the art technologies. The results have indicated an increased performance of the proposed approaches when compared to other algorithms.



BUSINESS IMPACT

The Semantic Video Analysis component can significantly enhance the workflow in media organisations, as the content entering the relevant systems is huge and the annotation process has to be optimised. A manual annotation process is seen as a rather deficient way to achieve this, while the algorithms used in the Semantic Video Analysis component show promising results, to describe the news items, based on the most commonly desired needs of the target domain users. The component could potentially be integrated into any video based repository for extraction of semantic information. The module consists of a dynamic classification algorithm, which supports semantic concept evolution. It is currently implemented for 29 concepts with varying degrees of visual vocabularies as training models.

INTEROPERABILITY

The component has been developed using native Java programming and therefore provides platform independency. The component has been tested on Linux, Windows and Mac operating systems. The integration of the component is currently supported through RESTful web service integration, although the module could also be provided with standard API's as a JAR file for future integration.