MPEG-7 : Content Based Recognition.

Saravanan SJ Mayuri Singh

Shah & Anchor Kutchhi Engineering College

sjs7007@gmail.com

seventh.glory6@gmail.com

August 13, 2014

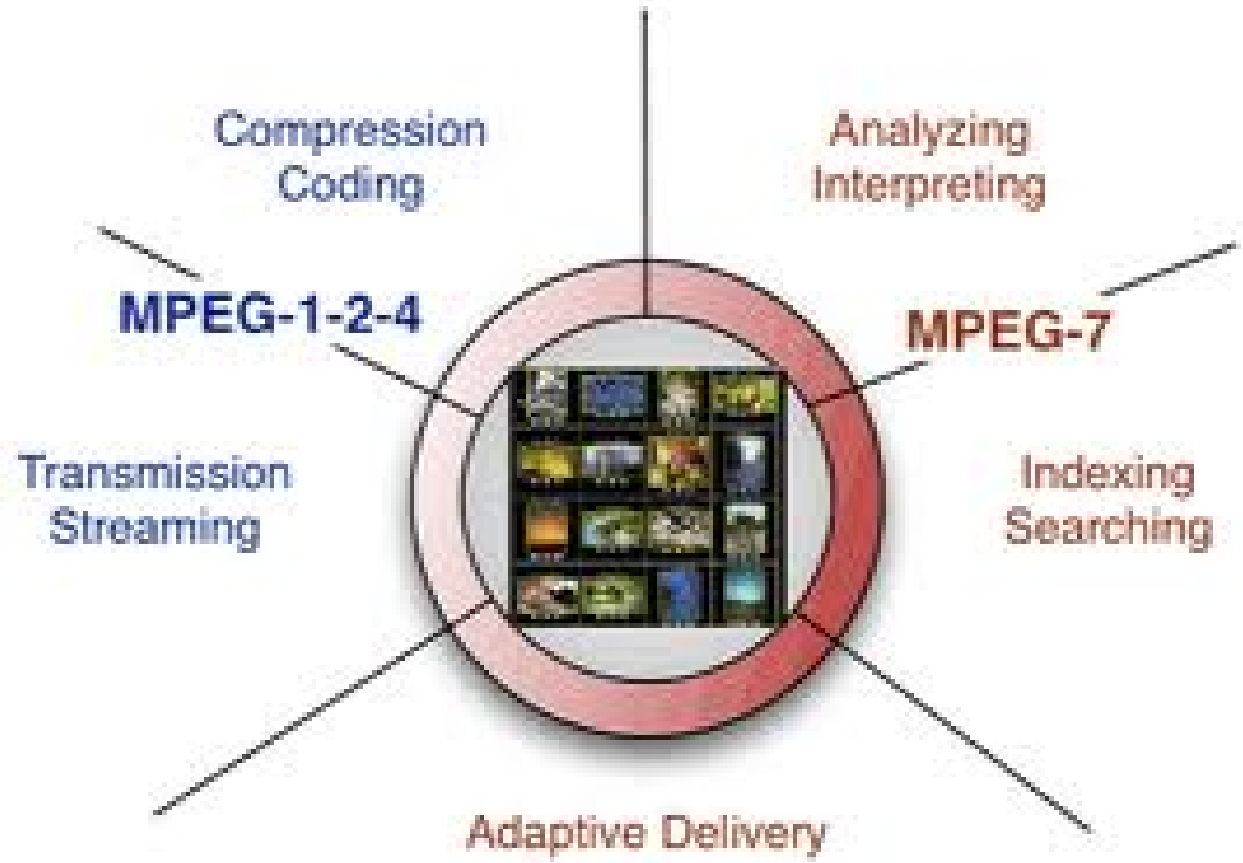
What is MPEG-7?

- Multimedia content description interface.
- Provides a standardized description of streamed or stored images or videos.
- Among this diversity of possible applications,the MPEG-7 Visual feature descriptors allow users or agents to perform the following tasks taken as examples.
  - Graphics: Draw a few lines on a screen and get, in return, a set of images containing similar graphics or logos.
  - Images: Define objects, including color patches or textures, and get, in return, examples among which you select the ones of interest.
  - Video: On a given set of video objects, describe object movements, camera motion, or relations between objects and get, in return, a list of videos with similar or dissimilar temporal and spatial relations.
  - Video Activity: On a given video content, describe actions and get a list of videos where similar actions happen.

Need for MPEG-7.

- Fast and accurate access.
- Personalized content production and consumption.
- Content Management.
- Automation.

MPEG-7 Standard.



- Content based Description of various Audio/Visual based information.
- Not a Standard for feature extraction/matching.
- Not a Compression Standard similar to MPEG 1/2/4 or their extensions.

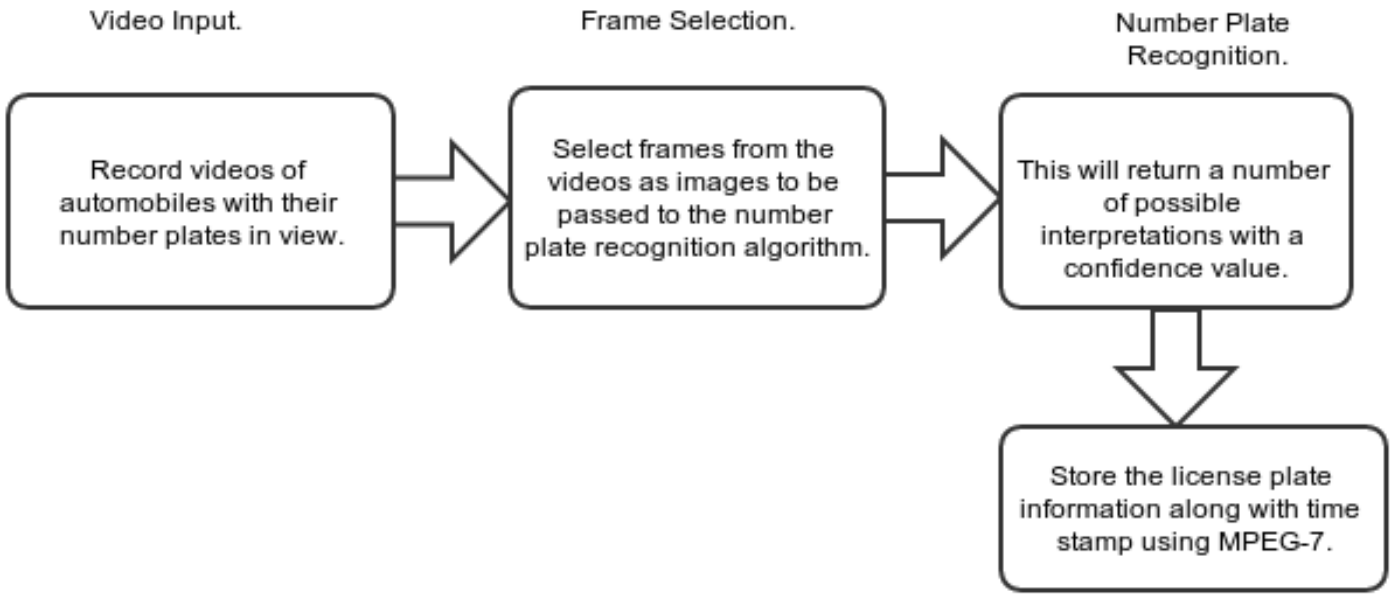
MPEG-7: DDL and its Component.

- Description Definition Language:
  - Creation of the Descriptions and Description Schemes: XML Schema & MPEG-7 Extension
  - Installation of XML
- XML Schema:
  - Data types
  - Simple and Complex types
  - Elements, attributes
  - Inheritance, Abstract types
- MPEG-7 extensions:
  - Array and Matrix data type

MPEG-7: Visual

- Color
  - quantization, dominant, scalable, color-structure, layout.
- Texture
- Shape
  - region-based, contour-based, 3D.
- Motion
  - camera motion, motion trajectory, parametric motion, motion activity.
- Localization
  - spatio-temporal
- Facial recognition

Proposed Implemetation : Automatic License Plate Recognition.



Proposed Implemetation : Algorithms required for ALPR.

There are seven primary algorithms that the software requires for identifying a license plate:

- Plate localization : responsible for finding and isolating the plate on the picture.
- Plate orientation and sizing : compensates for the skew of the plate and adjusts the dimensions to the required size.
- Normalization : adjusts the brightness and contrast of the image.
- Character segmentation : finds the individual characters on the plates.
- Optical character recognition.
- Syntactical/Geometrical analysis : check characters and positions against country-specific rules.
- Averaging of the recognised value over multiple fields/images to produce a more reliable or confident result.

Proposed Implementation : Modifying OpenALPR.

- Open source tools for automatic number plate recognition are available.
- However the limitation is that they are not suited for Indian license plates.
- We propose to modify one such existing library, OpenALPR.
- OpenALPR is an open source Automatic License Plate Recognition library written in C++. The library analyzes images and identifies license plates. The output is the text representation of any license plate characters found in the image.

Sample Results from OpenALPR on Indian License Plates.

- (•) North American License Plate
- ( ) European Number Plate

Analyze

Plate	Confidence (%)	Processing Time (ms)
14CS997	88.27%	145.25 ms

Sample Results from OpenALPR on Indian License Plates.

North American License Plate

European Number Plate

Analyze

Plate	Confidence (%)	Processing Time (ms)
1H12CD2	88.45%	148.8 ms

Sample Results from OpenALPR on Indian License Plates.

- (•) North American License Plate
- ( ) European Number Plate

Analyze

Plate	Confidence (%)	Processing Time (ms)
4355Q	76.14%	196.05 ms
DL1YA3	91.81%	107.66 ms

Conclusion : Why MPEG-7?

- Easy to add semantic information.
- Support for advanced query on audio, visual and sketch.
- It'll leave the scope open for future expansion.
- While the current proposed system will just record license plate numbers along with time stamps, future versions can have additional features like the following :
  - Estimate mean speed of vehicles per minute,density/capacity per direction and lane.
  - Estimate average travel time and queue length.
  - Recover vehicle parameters such as location,length, and speed.
  - Identify unsafe driving behaviour in individual vehicles.