USTH MM2.1
Soft. Eng. for Interactive Media

Reading Assignment #3 – Dynamic/Smart Timeline

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What is it about ?

Content-Aware Dynamic Timeline for Video Browsing

Problem when browsing videos with more frames than pixels in the silder, scrolling actions cause sudden jumps, video flash too fast.

Dynamic Timeline control decouples video speed and play back speed, and leverages video content analysis to allow salient shots to be presented at an intelligible speed.
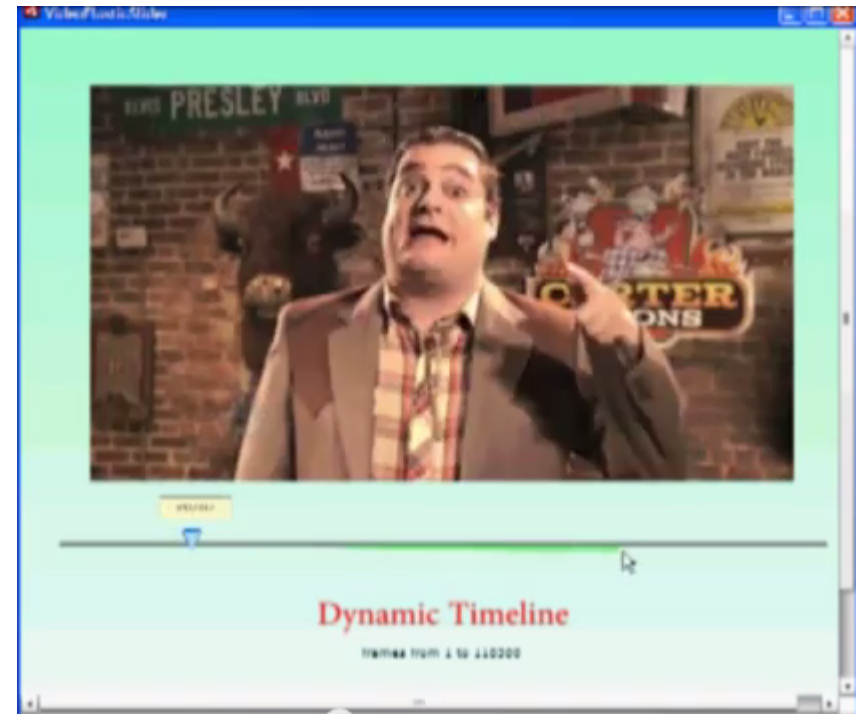
LikeLines: Collecting Timecode-level Feedback for Web Videos through User Interface.

Video players do not make the inner structure of the video apparent, making it hard to jump to the intersesting parts.

LikeLines system provides its users with a navigable heat map of intersting regions.

Dynamic Timeline: Examples

The results of the new technique

Dynamic Timeline: Open Problem

Traditional video players support timeline control to directly specify the video's current frame and its location.

Problem happens with long video and cause both frames unreachable and sudden jumps in a video's continuity or video frames to flash by too fast to be understandable.

2 main things:

- Fast-speed skiming through long video

- Low-speed navigation in a small section of the video.

Content-Aware Dynamic Timeline helps enabling high precision navigation as well as fast browsing and seeking functionality

How does the **Content-Aware Dynamic Timeline** work ?

- It works in 4 main steps:
- Elastic Timeline

  - Handle follows the mouse pointer through a non-linear speed function.

- Dynamic Video Skims
  - Extending the elastic timeline by decoupling the video speed from playback speed, and adding content-awareness.

- Selecting Key-Clips via Content Analysis
  - - Deviding the video into coherent shots to choose keyframe
  - - Clustering multiple keyframes to form key-clips.

- Building the key-clip hierarchy

Elastic Timeline

- User drags the handle and moves along the timeline, the handle follows the mouse pointer through a nonlinear speed function.

- Vs is determined by two distances.
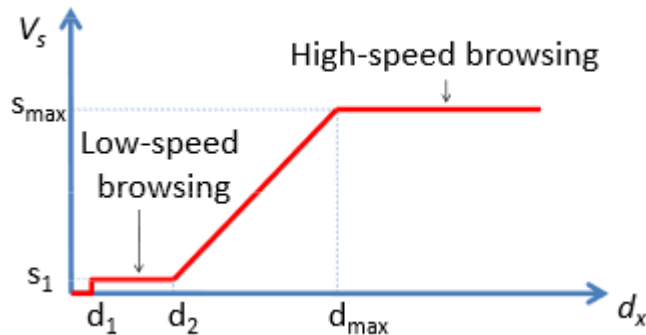
Dynamic Video Skims

- Extending the elastic timeline by decoupling the video speed from playback speed, and adding content-awareness.

- Decoupling of video speed and playback speed helps leveraging speed easily.
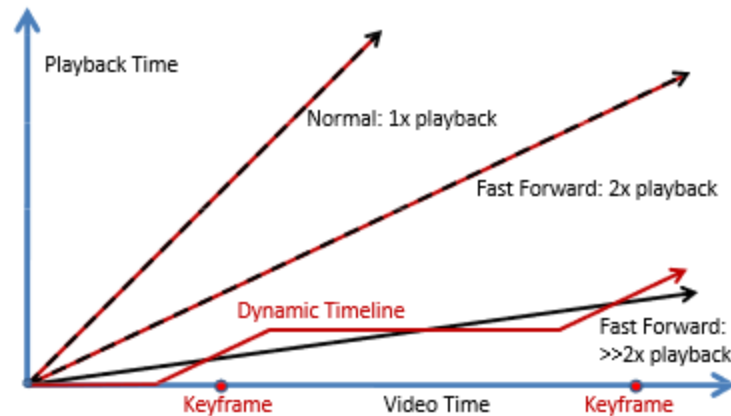
Selecting Key-Clips via Content Analysis

- Divide the video into coherent shots, each shot is associated with a represantative keyframe.

- Create key-clip of 1 second surrounding each keyframe.

- Choose the key-clip of nearest keyframe to play.

Building the key-clip hierarchy

- Clustering multiple keyframes to create a higher level decomposition to form a hierachy of key-clips.

- This hierachy is used to select the highest value key-clips for display during a very fast skim.
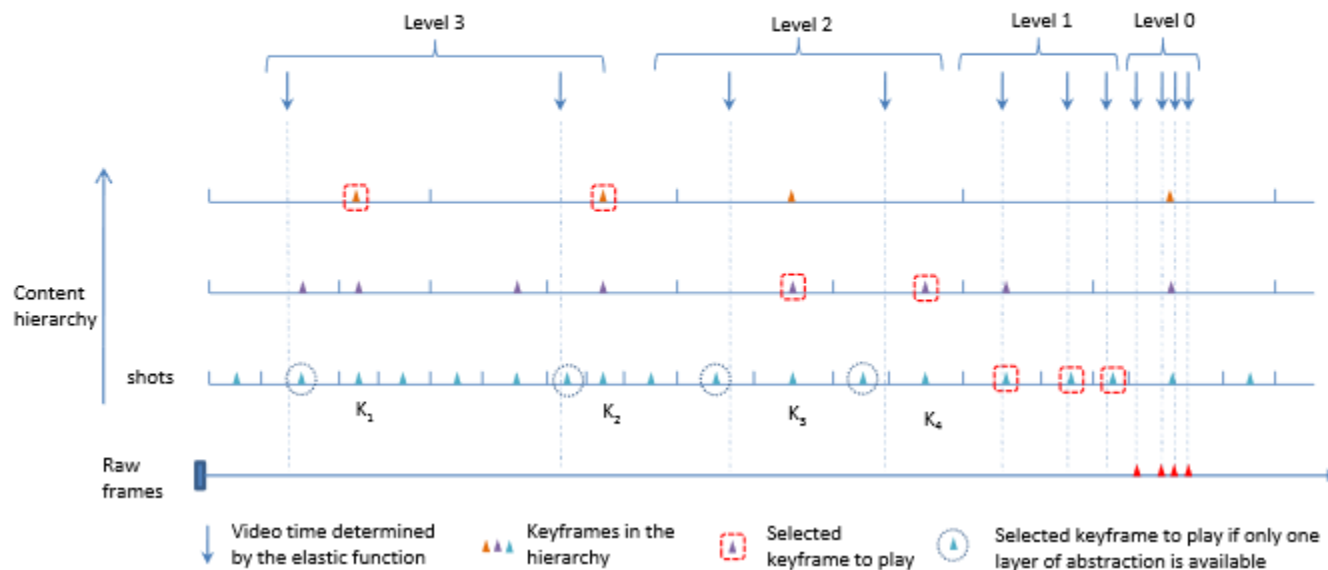
LikeLines: Example

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LikeLine: Open Problem

- Conventional online video players do not make the inner structure of the video apparent, making it hard to the interesting parts.

How does LikeLines work?

- LikeLines system provides it users with a navigable heat map of interesting regions for the video they are watching.

- Lies in its combination of content analysis and impicit user interactions.

- LikeLines contains 2 steps:

  - Collect interesting Timecode from users by heatmap and Like button.
  - Provide heatmap for users to interact.

Technical Details

- LikeLines system consists of two main componets:
  - Web video player component that resides in a browser. This component is implemented in Javascript and uses HTML5 or Flash for video playback.
  - Server component is responsible for storing and aggregating all the user interactions.

How does it relate to MM2.1 ?

- We talked about Dynamic Timeline and Likelines.

- In this work the authors bring a new interaction channel for user.

- Similarities: Both Dynamic Timeline and Likelines are technique using to improve the quality of experience for user about content awareness.

- Differences:
  - Dynamic Timeline uses Elastic Timeline, keyframe, and key-clips to implement content awareness.
  - Likelines uses heatmap and Like button to collect intersting Timecode to implement content awareness.

Take Home Messages

- Dynamic Timeline:
  - Presenting a meaningful visual abstraction of the video content in the fast skimming mode.
  - Providing accurate frame location in slow speed navigation mode
  - Being efficient at both fast and slow-speed browsing modes and allowing for smooth transition between them.
- LikeLine:
  - Studying both implicit and explicit timecode-level user feedback.
  - Understand for what kinds of video this feedback is useful.
  - Know if Timecode-level data can be linked to certain queries in order to recommend relevant jump up point.

The end!

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