Introduction

With the growing use of digital cameras and video recorders, video creation and distribution are becoming easier. While more and more videos are easily accessible, the burden of browsing the video contents also grows exponentially. It is challenge to effectively browse a collection of videos at once and pick those users want. Even current video summarization methods either combine salient shots into a short video, or pack a collection of keyframe in a static image.

In this extended abstract, we present a dynamic collage system that aims to enable simultaneous browsing of a collection of videos. The important portions of videos are extracted and packed one by one in the same canvas, and are played simultaneously. An efficient layout algorithm is proposed to enable the system to respond to content changes and users’ interactions efficiently, and the method encourages the canvas to be compact and informative. Therefore, the system provides an interface to efficiently browse and rediscover those interesting contents from a collection of video files.

Dynamic and Interactable Collage

The final collage should satisfy the following criteria:
(1) The important regions should appear in the final canvas.
(2) The nonessential parts of a video can be eliminated in the canvas.
(3) The collage should respond the change of video contents and users’ interaction.

Step 1. Important portion extraction
This step extracts the important regions of videos. We first divide each video into a number of shots using cut detection. Then we compute the temporal-spatial saliency for each shot, which is the combination of the saliencies of all frames.

Step 2. Collage layout optimization
The objective is to find an optimal configuration without occluding each important volume. We approximate the optimal solution by a two-stage heuristic. The first important region is placed at the center of the canvas. Then, we iteratively place each remaining important region radially around the canvas center while ensuring no overlap between it and all other already on the canvas. An optimal direction is selected to minimize the empty space while respecting the aspect ratio of the canvas. Second, this layout is iteratively refined.

Step 3. Canvas rendering
This step generates the final collage on the canvas with the multiple-site Voronoi method. Specifically, we sample a number of Voronoi sites along the boundaries of the important regions and proceed the Voronoi algorithm.

Results and Conclusion

Using our dynamic and interactable system to browse a collection of videos, users can efficiently get what they are finding with direct manipulation of the canvas. In the future, we would improve the usability of the system and endow users with more choices of managing their ever-growing media collections.