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Scene Structure Graph (SSG) Annotation And Visualization in Video Computing

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ABSTRACT *Computing context-aware, interactive video representation is usually a big complicated and hard process. A multimedia computing environment is used to explore and express users design ideas efficiently. In this paper we present a sketch-based two-layer representation, known as scene structure graph (SSG), to represent the video computing process. One layer in SSG uses sketches as a visualization of scene information is easily and clearly understood and the other layer uses a graph to represent and edit the narrative structure in the computing process. With scene structure graph, the computing process works in two ways. In the first , various sketch forms such as symbols and hand-drawing illustrations are used as basic primitives to computing the video clips and the hyperlinks encoding spatio-temporal relations are established in SSG. In the next way, sketches in SSG are modified and new scene structure graph is composed for any particular computing video purpose. The scene structure graph is user-friendly and can achieve a good balance between expressiveness of users' intent and ease of use for computing of interactive video.*

INTRODUCTION

Interactive video computing plays an important role in multimedia representation. The collection of ordinary video clips does not support abstraction and interaction other than viewing. In this proposed system, we used to use sketch based representation for both annotation and visualization of video contents, which serves as an efficient video computing tool. The purpose of multimedia authoring is that people communicate message with each other using various media forms. Existing work on video computing uses design primitives including texts, captions, key frames, and videos. Captions, as well as text annotations, can provide valuable and correct information or text for understanding for the user. Key frame is another importantly used format to summarize the video content. When Compared to texts and key frames are effective in representing visual content of a video sequence and do not have the text recognition problem in a multi-linguistic environment. Distinguished from natural images, sketches are very important and useful forms of pictorial information which have rich semantic meanings and summarize well the visual collection of videos. In our proposed, we propose to use sample drawing in a video computing environment for both video annotation and visualization.

Video computing is a design process. The key in video computing is to specify the individual components and their relationships in a video document, based on a collection of video to be used. It involves collecting, structuring, and presenting information in digital videos. It is a decision taken by users to quickly explore, compare, and communicate design ideas with high-level semantic information in an early design process. In human-computer interaction, the sketch-based interface explores a point in the trade off between expressiveness. In the video annotations application, complex and difficult messages can be communicate with a single sketch. To get the visualization, users can sketch the structure of visual layout, by retrieving and establishing the links between video clips and sketch annotations. The video computing can be achieved by integrating related video sources based on the visual layout structures. The automatic and manual annotations are explored in video annotation research. Automatic annotation methods usually segment videos into shots and extract low-level features from shots to describe video content. Manual annotations are particularly useful for allowing users to create time-based and personalized annotations of videos.

In this proposed, we use sketches (drawing) to annotate and visualize the content of video clips. First, various sketch forms such as symbols and hand-drawing illustrations are used to annotate the video clips, serving as knowledge creation and extraction in video computing. Then these sketches are automatically arranged into a scene structure representation and user can further edit the representation in a sketch-based interface, for reuse in video computing. The contributions of this work include using various sketch forms for video annotations and utilizing two-layer scene structure graph (SSG) that serves as a concise and easy-to-use form for video computing. The basic techniques that are used for video annotations are: 1) sketch-based annotations, 2) sketch-based video visualization, and 3) sketch-based SSG representations. To represent the inter-relationship between individual components in authoring videos, SSG-based authoring environment supports using connection for navigation between concept-related video clips. The key idea behind sketch-based interfaces is to mimic traditional paper-and-pencil-like drawing that represents a natural way of thinking and communicating ideas. In proposed paper, we introduce the sketching techniques into the video computing process. An interactive authoring environment is proposed to annotate and visualize video content using sketches. These sketches are then organized into SSG based to develop a narrative structure. A sketch-based interface is used in the proposed authoring process such that users can sketch out their mind like scribbling on physical paper.

SSG-BASED VIDEO COMPUTING

In this work, we propose to use sketch-based annotation and visualization for video computing. Based on sketch representation, develop an SSG technique to represent and edit the narrative structure in an authoring process. First we regard the video summarization as a model-based semantic visualization that maps the screen display to the users' perception.

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The proposed video annotation and visualization method uses sketches as visualization primitives and works as follows. First various forms of sketches are annotated in video by either user sketching or auto-extraction from key frames. For video visualization, is a canvas that can be quickly perceived by the users and we define by a scene structure graph. These sketches are then organized into an elementary for each clip , using the layout algorithm. Several elementary can be further edited and combined together to form a larger graph. For efficient communication, the proposed authoring environment uses a paper-and-pencil-like sketching interface, with which users can design by sketching, searching, and modifying their idea interactively with immediate and continuous visual feedback, and thus achieve optimized perception of video summarization.

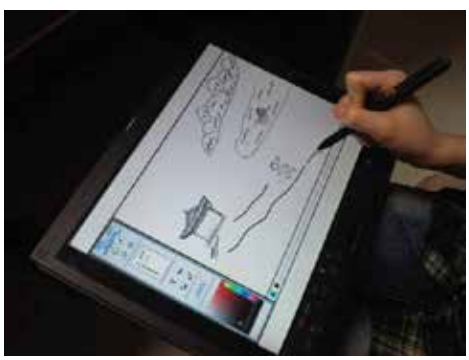

Fig 1: Example of video computing using sketches.

The scene structure graph is a visualization model that is represented by two layers: a visualization layer and a graph layer. The visualization layer uses sketches to present a semantic summarization of the narrative structure in a video computing process. In the graph layer, the nodes are sketched as a graphical method. The connection between nodes indicates the procedural information which also specify the conceptual relationship between nodes. The two-layer form of SSG can help users quickly overview the narrative structures and easily interact with video clips. To achieve a good quality of perception in a video computing process, it was composed of two stages. The user browses videos and annotates on shots using sketch forms in including symbols and hand-drawing illustrations. Then an elemental is generated for each clip by using the sketch set on authoring stage. The user designs composite SSGs with high quality to visualize and edit the narrative structure for a particular authoring purpose. During the authoring process, the user can draw sketches or search in the elemental SSG based. Parts or whole structures in elemental SSGs can then be reused for the new SSG design. We found that SSG reusability is particularly useful in video computing.

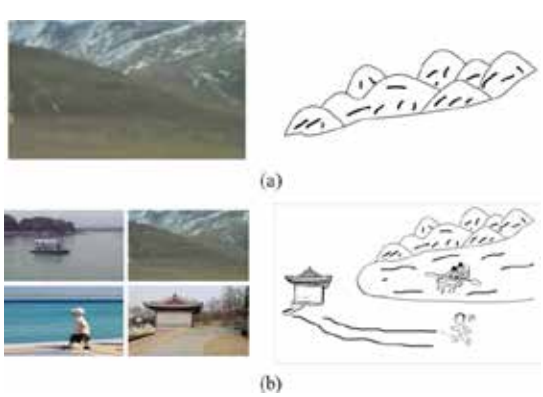

Fig2: Eample of Sketch-based annotation and visualization for video computing. (a) Sketch-based annotation.(b) Sketch-based visualization.(c)The SSG representation

TESTING EXPERIENCE

The presented sketch-based authoring environment aims to provide an efficient and intuitive tool, through an integration of the sketch-based annotations and SSG representation of narrative structures in a video computing process. There are the three user studies have been conducted for test the usability and functionality of the presented sketch-based authoring environment. The first study evaluated different video annotation methods, including typed keywords, key frames, and sketches. The second study evaluated different video content visualization methods, using keywords, key frames, and sketches, respectively. The third study evaluated the video computing process by comparing the commercial system, a sketch-based environment.

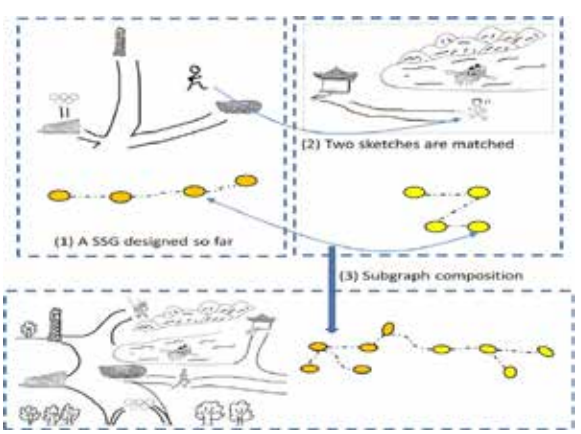

Fig 3: Sketch-matching-based SSG composition

CONCLUSION

Sketching is prevalent at the design process, and common users intend to adopt freehand sketching as the main method of communicating their ideas. In this paper, we present an interactive video computing environment which uses sketches to facilitate the annotation and visualization of video contents. From the viewpoint of knowledge engineering, annotation by sketches can be regarded as knowledge extraction and representation, and video content visualization and reorganization using SSG can be regarded as knowledge creation and reuse. In the presented authoring environment, SSG with two-layer representation and simple sketching tools are provided. The SSG and

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sketching tools serve the users that can easily annotate the videos in a way which helps to improve user experience in an early-stage design process.

Limitations of the presented method: - Currently the proposed interactive authoring environment only supports simple sketch based styles. It is difficult to understanding about complicated and difficult sketches. Although the two-layer integrated representation of SSG helps alleviate some of these problems, in the authoring process, users still prefer to provide sketches of different complexities based on complexities of authoring tasks. Future research will extend this work to cover sketch understanding with domain knowledge and support adaptive sketching based on a user attention model akin to the one in.

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