

EnhancedMovie: Movie Editing on an Augmented Desk as a Large-sized Display

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ABSTRACT

We introduce a movie editing system, “EnhancedMovie”, which is an application for an augmented desk system called the “EnhancedDesk.” We had previously developed this desk system, which uses a large-sized display and a finger-hand tracking system that supplies some types of gesture-inputs. We developed the movie editing system as an application for it, and proposed a new type of user interface designed for the system.

Author Keywords

Movie editing, large-sized display, perceptual user interface.

INTRODUCTION

Movie editing or browsing many pictures requires a large workspace, and a large display would be convenient for users. In general, editing a movie requires such operations as: cutting movies by setting starting and ending points; changing the sequence of the movies or pictures. However, having such operations in a GUI application with a large-sized display may cause that users frequently move their cursor a lot, and several times actions would be required for completing such operations.

We have developed an augmented desk interface system called the “EnhancedDesk.” Using a camera and advanced computer vision techniques, it provides users intuitive interaction by allowing them to use their own hands or fingers for direct manipulation and making gestures [2]. We have developed some applications, and the merits seem to be that such an operation needs setting a length or a size after selecting a command.

Movie editing might be one application that can make use of this aspect, because the operations in movie editing described above need users to specify a command, a length or a location. When the system utilizes a large-sized display and direct manipulation inputs with hands or fingers, the

user interface might be different from ones in conventional GUI applications; we are exploring a movie editing system on our augmented desk system, the “EnhancedMovie,” and have developed a system that makes a movie from a sequence of pictures [1]. In this paper, we describe the design and implementation of a system that makes a movie by combining other movies.

ENHANCEDMOVIE

In our finger-tracking system, we utilize an IEEE1394 camera and image-processing software, “OpenCV” offered by Intel. Our finger-tracking system runs at 30frames/sec on a PC equipped with Pentium4 2.6Ghz [1]. The system recognizes both hands stably, and our application utilizes gestures as follows. 1) Grabbing and releasing: The system recognizes closing all fingers as the grabbing gesture and opening all fingers as the releasing gesture. 2) Pointing: The user puts only his/her index finger on an object; the system recognizes the gesture as the pointing gesture. 3) Gathering: When the user joins both hands while opening only the index fingers on two objects, the objects between the two fingers are grouped together, and the system recognizes the gesture as the gathering gesture. 4) Moving: When the user moves a hand with all fingers opened, the system recognizes the gesture as the moving gesture. The speed and the amount of movement are also recognized.

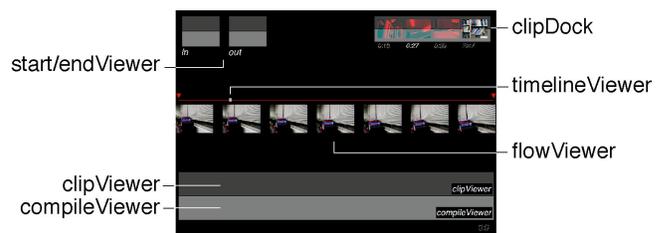


Figure 1. The user interface of EnhancedMovie.

Figure 1 shows our proposed interface. It runs on a Macintosh computer with JMF and Quicktime for Java, and is projected onto a desk. It loads movies in the specified directory and shows them in the “clipDock” on the upper right area. When the user makes the pointing gesture on a movie in the clipDock, it is selected and then shown in the flowViewer on the center area. In movie editing, a user selects frames to use from source movies, and sets start-points and end-points among them. In this operation, the

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user repeats forwarding and rewinding a movie to compare each frame. In our system, we show one movie, displaying frames in seven panels in parallel with a 100 milli-second delay each; we call these panels “flowViewer” (Figure 2). The movie is shown such that each frame flows from left to right, and the user is able to compare frames while simultaneously looking at frames before and behind.



Figure 2. Showing seven panels that show the same movie with 100ms delay in parallel.

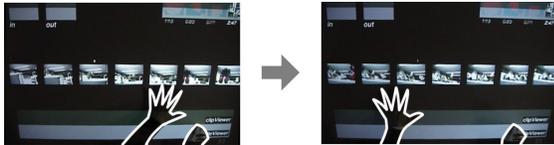


Figure 3. Decreasing the playing-speed with the moving gesture (The hands are highlighted in white for making images clear.).

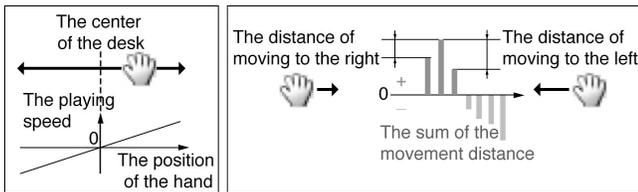


Figure 4. The two methods for changing the playing speed.

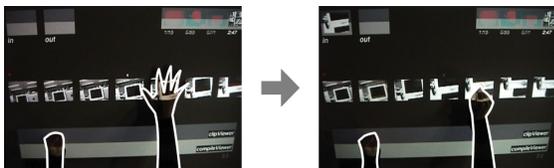


Figure 5. Selecting the start-point frame/the end-point frame with the grabbing gesture.

In the conventional movie-editing applications, users move the slide-bar for only one panel and memorize images for purposes of comparison. However, in the flowViewer, the user sees seven images simultaneously in order to compare them. It would make it easy to select one frame as a starting point or an ending-point. In order to search for starting points or ending points, the user forwards or rewinds a movie quickly or slowly. In our system, making the moving gesture below the flowViewer changes the playing speed of the movie shown in each panel (Figure 3). We implemented two kinds of methods for this task (Figure 4). One utilizes the location of the hand, and the other utilizes the sum of the hand movement distance. In the former, the playing speed is in proportion to the horizontal position on the desk. When considering the center of the desk to be the origin, the system forwards the movie if the location of the hand is to the right side of the origin, and rewinds it if it is to the left side of the origin. In the latter, the system adds the distance that the user moves the hand to the right and subtracts the distance that he/she moves the hand to the left.

The system forwards the movie when the sum is plus, and rewinds the movie when the sum is minus. The quantity of the sum is in proportion to the playing-speed. The maximum speed is limited by the size of the desk in the former, however, the latter has the merit that the user is able to increase the playing-speed without any limitation. The former is more intuitive so long as we use both methods.

By making the grabbing gesture on one panel on the flowViewer, the user selects the shown frame as a starting point or as an ending point (Figure 5). When no starting point is selected, the grabbed frame is set to a starting point and it is shown in the “start/endViewer”. When a starting point is set, the grabbed frame is set to an ending point which is shown in the start/endViewer. Thus, a movie clip between the starting point and the ending point is cut, and then the movie clip is shown in the clipViewer in the bottom area. Once a movie clip has been made, the start/endViewer is cleared. When the user makes the gathering gesture in the compileViewer, the system starts to compile the movie clips into one movie and then shows it in another window.

RELATED WORKS AND CONCLUSION

LEAN proposes a fluid interaction for media control, which shows frames of a movie with information visualization techniques [3]. SmartSkin [4] and RoomPlanner [5] propose gestures and applications on particular tabletop/finger-tracking infrastructures. We introduced a movie editing system on an augmented desk system that utilizes image-processing technology. In this paper, we proposed the flowViewer to show a movie in multi panels in parallel, and described two kinds of methods for changing the playing speed in the flowViewer. The flowViewer requires a larger space than ordinary interfaces of conventional applications and would be one alternative interface for a large-sized display with an abundant display space. We do not yet have user studies, and will have evaluations for the interface and the gestures as our future work.

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