

Using Multimedia to Support Reflection on Past Events for Young Children

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Abstract: The work presented in this paper focuses on software tools that act as video explorers and annotation platforms and more specifically as diary composers for younger children. Through such tools, children can have as their raw material video recordings from everyday life and they are given the opportunity to review this material, reflect upon it and annotate it, thus creating the stories of everyday life from their own perspective. The specific tool proposed, focuses on multi-perspective capture of events by one or more children and their cooperation during the annotation procedure.

Introduction

Current educational software rarely offers either the child or the adult facilitator options for 'deeper interaction'. By 'deeper interaction' we refer to a procedure where the child takes active control over the material presented to it, reflects upon this material, annotates it alone or in teams and creates his own version of reality. This work focuses on developing both at interface levels of interaction and within the software, features that could explore a number of dimensions of learning (Umaschi 1997). The software paradigm being proposed will aim at supporting stages of reflection, levels of abstraction and opportunities for cooperation in grounded context that are accessible to young children. The ultimate aim is to enhance children's development both at cognitive, physical and social communication level (Baecker & Posner 1998), (Umaschi 1996).

More specifically, interaction with the video material recorded previously is performed through a video explorer. This video explorer is essentially a platform for the first stages of reflection. These will include the software and interface's functionalities of location, navigation and individual or collaborative viewing/annotation. The video explorer must therefore provide tools for both navigating inside videos and annotating them, thus consisting a diary composer. Navigating features are suggested to be inherent to the diary composer through a control panel, while annotation features are organized in distinguished toolbox palettes accompanying the composer. Functionality of the

palettes could include traditional editing functions such as cut, paste, drag, drop, coupled with other levels of annotation such as sequence by time, event, emotion, people, object, movement.

The research and implementation leading to the tool proposed here, have taken place within the framework of project “Today’s Stories”, part of the Long Term Research Task 4.4, (i3 –ESE, Project Nr. 29312, URL: <http://stories.starlab.org/>). The Today’s Stories project is evolving a wearable technology facilitated approach to learning for young children (4 to 8 years old) that is aimed at supporting the development of social, communicative and emotional skills of children in the context of the everyday activities. In this paper, a thorough reference is being made to those requirements that must be met by an innovative diary composing tool, such as the one already outlined (see Druin 1998), (see Norman 1990). Consecutively, a list of the functional specifications of the proposed implementation is given. Based on the above, the diary composer prototype environment is described, escorted by implementation and usage details.

Related Work

Within the framework of the work presented in this paper, a thorough evaluation of the respectful number of current commercial and research activities in the field of multimedia editing and storyboarding for younger children has been performed (see Buckleitner et al. 1999). Among the commercial products taken under consideration, the most outstanding ones were:

- Kid Pix Studio Deluxe from Brøderbund Software, California
- Magic Theatre from Instinct Corporation, Silicon Valley
- Stanley's Sticker Stories from Edmark Corporation, an IBM company
- The Multimedia Workshop from Davidson
- Kid Works(TM) Deluxe from Davidson
- ClarisWorks for Kids from Apple Computer, Inc

These products were evaluated with respect to the proposed tool and a summary of their features is given in (Tab. 1).

Feature	Kid Pix Studio Deluxe	Magic Theatre	Stanley's Sticker Stories	The Multimedia Workshop	Kid Works Deluxe	ClarisWorks for Kids
Authoring platform	x	x	x	x	x	x
Playback platform	x	x	x	x	x	
Age range	3-12	pre-readers	3-7	8 and up	4-9	5-11
Create video	x	x	x	x	x	x
Insert video	x			x		x
Create sound	x	x	x	x	x	
Insert sound		x	x	x	x	x
Text-to-speech	x			x	x	x
Verbal help		x	x		x	x
Icon-based UI	x	x	x		x	x
Automatic saving and naming of files		x				
Spelling			x		x	x
Wizard					x	

Table 1: A collection of features from commercial diary composing tools for younger children

An interesting research activity in the field of storyboarding consists ‘The Fabula project: Interactive children's storybooks to promote bilingual literacy’ (‘Fabula’ Project 1998). Fabula was a two-year project in which partners in Ireland, Spain, the Netherlands and the United Kingdom worked together to develop an easy to use multimedia software kit for schools. An authoring tool was developed, to enable teachers to create illustrated bilingual multimedia story books to help primary school children learn a second language (and gain a deeper understanding of their first) through the written word, supported by pictures, sound, animation and interactive graphics. As children read the ‘pages’ of those storybooks, using the specially developed Fabula viewer software, they were able to exploit the unique opportunities provided by a multimedia environment.

Requirements

In this section a more detailed set of requirements for stimulating reflection through the confrontation of viewpoints and perspectives is proposed. The design approach of the video explorer tool, given in the following sections, is entirely based on this set of requirements. The diary composer environment should be essentially shared (as opposed to single user). Although it must be possible for children to reflect on their own material alone, we expect the most productive sessions to be based on collaborative confrontation of children's interpretations. The diary composer should be as much as possible language neutral. We do not assume literacy so we do not propose the use of text. We also envisage that the spoken word is a powerful means of annotation, allowing the children for example to narrate, in their own language and words, an interpretation of an episode.

The tool should be open to include arbitrary libraries of annotations, including those that have been created by children (symbols from scanned drawings for instance). It should allow making explicit interpretations. The core of interpretation is by annotation with symbols that children can select from a given repository. The collaborative aspect is essential here. The design choice followed is to use a single repository of annotations, also when different video frames are rolling. This does not mean that there is only one consistent interpretation of the events but will foster mutual understanding of them. The tool should finally act as a self-organizing memory support, avoiding file naming and saving operations. The different recorded episodes will be organized on a time line reflecting the times of their occurrence e.g. throughout the day.

Functional specifications

Storing and Indexing

The structure of the database of video recordings is proposed to be based on a time line indexing, with a time span of e.g. one day. Functions to be performed on this database are:

- Adding a new recording
- Erasing a recording: Children should be allowed to delete recordings and preserve for editing and annotation only those considered to be more interesting

Annotating

Functions to be provided here include:

- Interaction with the video player: Either by using pause, forward, backward buttons or by a mechanism that translates movement of the mouse over the video screen
- Preview of the meaning of an annotation icon by clicking on it
- Insertion of new annotations, either verbal or graphical ones
- Implementation of a wizard acting as a guide throughout the annotation procedure

Archiving

This set of functions aims at maintaining a database of the annotated versions in addition or as a replacement of the original video recordings. The two alternatives are either to delete the previous annotated version of a recording if re-editing is desirable or to perform re-editing over an existent annotated version by removing old and adding new annotations. In both cases saving an annotated video is done automatically. In cases where the original video needs to be destroyed for privacy reasons, the better approach is to automatically delete a video after an expiry date.

Worthwhile Features

Based on our research in the field of commercial diary composing environments, we have ended up with a set of features that such a tool as the one proposed should try to inherit. Some of the most important features are:

- Possibility to send a "story" (annotated video) to a friend, parent, etc.
- Easy-to-use icon based User Interface.

- Option to insert sounds (e.g. verbal annotation).
- Option to insert pictures and sounds either by the children or imported from an external source.
- Providing both an authoring and a playback platform combined in a transparent way to the child.
- Providing help on the meaning of annotation buttons by visual animation which could be accompanied or not of sounds suggestive of its action.

A general description of the diary composer prototype environment

The prototype environment proposed for development consists of two modules: the ‘Timeline’ display and the ‘Annotation’ display. In (Fig. 1), those two displays are presented simultaneously. However, this is not obligatory. It is proposed that the ‘Timeline’ display is permanent on screen, while the ‘Annotation’ display appears only when it is required: during the procedure of video annotation.



Figure 1: The ‘Timeline’ and ‘Annotation’ displays

The ‘Timeline’ display expands to the whole screen displaying one curved line for each child using the diary composer. Each one of the curved lines in (Fig. 1) represents a day for one child. One thumbnail for each video recording is placed on a child’s timeline. In (Fig. 1), three such thumbnails are created in the first timeline and two thumbnails are placed on the second timeline. Thumbnails are placed on the timelines in such a way that the time of recording is reflected, thus the distance of two thumbnails on a certain timeline is proportional to the real time interval between the two recordings. The ‘Annotation’ display consists of two groups of annotation icons, one group of icons symbolizing sounds and another group of icons symbolizing emotions and any other kind of annotation. Each group consists a tool bar placed at the screen edges (the placement of the ‘Sounds’ icon bar on the top left part of the screen and the ‘Annotations’ icon bar on the bottom right of the screen in (Fig. 1) is indicative).

The ‘Annotation’ display provides children with the tools for annotating the videos. The icons representing sounds can be either buttons, which when pressed allow for the playback of the correspondent sound, or drag and drop items, which the children will be able to drop on a video frame in order to annotate the instance displayed with the correspondent sound. The icons for the rest of the annotations (showing expressions, feelings etc.) can only be drag and drop icons, dragged by the children on certain video frames, during the annotation procedure.

Both the icon bars of the ‘Annotation’ display will be global in the diary composer environment. In other words, the annotation tool bars will always be visible during the annotation procedure of different videos, instead of appearing each time an annotation procedure is initiated and being imminently related to the current video under annotation. This will allow children to treat the diary composer as a homogeneous tool that provides the same layout and options regardless of the current thumbnails and video processing procedures.

The annotation procedure

When one or more children decide to annotate a video of an incident they have already recorded, they have to simply 'click' on this video's thumbnail, for the annotation procedure to begin. Immediately, the thumbnail is transformed to an enlarged video display, extending to a large part of the screen (see Fig. 2). The dimensions of the video display will be customizable but it is definite that they will not extend to the whole of the screen. Space on the screen must be preserved for the 'Annotation' display and the timeline(s) will remain at the background for the children to return to them and select another thumbnail, if needed.

Navigation in a video recording for the purposes of annotation will be made either by the buttons appearing on the bottom of the video (right arrow for 'Forward', left arrow for 'Backward' and the hand icon for 'Stop' or 'Slow Motion' playback) or by imminently clicking on the video itself. The latest feature will allow children to move forwards in the video by placing their mouse at the right hand-side of the video display, move backwards in the video by placing their mouse at the left hand-side of the video display and pausing/resuming playback of the video by clicking on the video display.



Figure 2: Annotations are added to the video

Once the child has successfully acquired the navigation techniques, it can then playback the video and pause/stop playback at any moment in order to annotate it. In the case where both sound and expression/emotion annotations are of a drag and drop nature, the diary composer screen will look like that of (Fig. 2). Two annotations, one sound and one expression/emotion annotation are added to the particular video frame and can appear as small icons, dropped on the top right corner of it. Of course, the placement of annotations will not be restricted.

During the annotation procedure, any annotations and changes on the current video will be automatically saved. However, when a child wishes to make a modification, it will be able to locate the annotated video frame it wishes to edit and remove or add annotations with the drag and drop fashion. Removing an annotation from a video frame will be achieved by dragging and dropping it out of the space where the video is displayed. Removing all annotations added to a video recording and restart annotating the pure video will be achieved by clicking on the thumbnail of the video recording, which remains on the timeline in the background. Clicking on the 'Timeline' display, which during the annotation procedure comprises the diary composer's background, will terminate an annotation procedure, saving automatically all annotations in the current video.

Specific features of the Diary Composer

An interesting feature that is proposed for the 'Timeline' display is that of dynamic behavior. Although the diary composer will allow a child to reflect only on his own material, by watching only his own timeline and thumbnails on the 'Timeline' display, it will also allow collaborative confrontation of children's interpretations. This feature will be supported by the dynamic the timelines. It is proposed that in cases where two children have recorded the same incident (from different points of view) and wish to annotate their recordings cooperatively, the two different thumbnails of this same incident will be associated. This association will be visualized by the two children's timelines 'approaching', as shown for the first thumbnails of the two timelines in (Fig. 3). This metaphor will initiate the procedure on collaborative annotation of the videos.

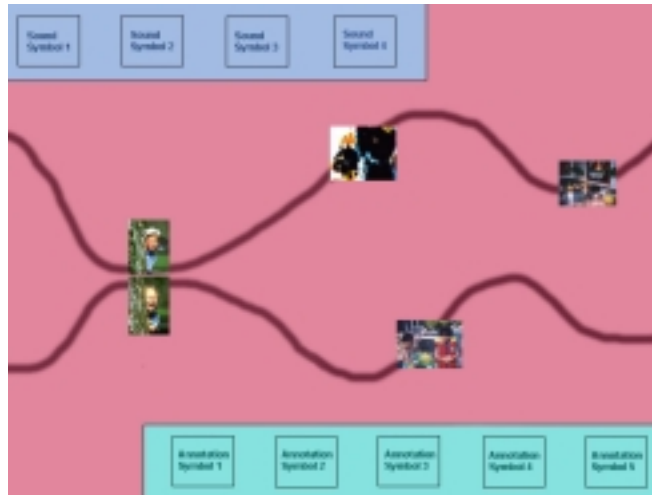


Figure 3: The dynamic behavior of timelines

Conclusions and Future Work

It is evident by the nature and design of the tool proposed here that a lot of its implementation choices consist open issues with regard to their pedagogical value. The tool seems to succeed in acquiring collaboration of its young users, by presenting simultaneously video recordings on the same event and provoking small groups of children to comment upon them and annotate them. It, therefore, distinguishes itself among relevant existent tools.

The issue is here, how to stimulate the children's involvement in the editing and annotating procedure as much as possible. On this goal, should future work on the diary composer focus. The issues to be dealt with are the improvement of the controls for loading, editing and annotating the videos as well as the library of annotations, so that they will approach as much as possible the children's perception.

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