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A Visual Language for Animating Sketches

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Abstract

We present our research into visual languages for animating sketches. Animation is a rich mode of communication that is currently accessible to few. Simple animation systems exist, but severely restrict the types of motion that can be represented. Our field studies are demonstrating that would-be animators need to coordinate many objects moving in a variety of ways. The visual language described here allows a variety of motions to be defined with hand gestures, and gives visual feedback for coordination of events. This may open up computerized communication to users who think in dynamic visual images.

1. Introduction

Animation is a popular medium for entertainment, education, and communication, but it is out of reach for many. This is unfortunate, because animation is a rich mode of communication. In education, for example, animation can make content more attractive and engaging, and also accessible to a more students. A recent education newsletter explains that animation "appeals to a broader range of learners than single-media tools, allowing educators to accommodate various learning styles simultaneously." [1] These benefits apply outside education as well. Those who think in dynamic, visual images may find it easier to communicate with animated pictures.

The simplest way to create animation is to draw a series of images in a flip-book. This is tedious, but technology can remove the tedium. More and more users have access to the computer hardware needed to produce animation, but the necessary software tools and skills are still in the hands of a small number of designers. Current computer animation tools essentially turn animation into a programming task. Each animation "language" contains constructs that direct the motion of graphics. This can be simpler than designing every frame by hand, but only if users have time to learn a complex animation language.

Our research seeks to improve access to animation through an intuitive visual language for animating sketches. By reducing the number of animation constructs and focusing on visual, gestural input, we hope to make animating a rough drawing about as complex as drawing it. In this abstract, we will give a brief overview of related work, describe field work in progress, and present a user interface for animation.

2. Related Work

Several attempts have been made to use sketching and gestures to define character motion in 3D animation. [2] These approaches are useful in large productions with articulated characters, but do not help rough, 2D animation. Some commercial tools, such as PowerPoint and MorphInk [6], provide simple ways to build 2D animations, but greatly restrict the types of motion that can be represented. Some, such as Sketchy [5], are simply computerized flipbooks.

A handful of systems have been designed to support general 2D animation with sketching. [3,7] These systems generate in-between frames from drawings with warping [3], or translation along motion paths. [7] These are steps in the right direction, and we wish to build on these ideas by conducting field studies to identify the needs of conventional users.

3. Field Studies

Few researchers doubt that animation can help communication, but exactly *when* it helps is widely debated. Attempts to answer this question have been inconclusive. Consequently, we do not draw examples of useful animation from research, but from field studies. In our studies, potential users are asked to describe examples of animation they would like to produce. We then produce rough versions of these animations to guide our designs.

Our early results have shown that pleasing character animation is important to only a small subset of users. Most users wish simply to loosely coordinate the motion or deformation of several drawn objects. Even loose coordination of events is a complex process, and our system seeks to make this process intuitive.

4. Animation User Interface

In response to these field studies, we have designed a simple animation user interface for coordinating moving objects. Users draw on a blank canvas that contains only a slider bar for controlling position in time and a "GO" button that runs the animation (see Figures 2 and 3). This allows seamless transitions between drawing and animating. When a drawn object is selected, a selection widget like that in Figure 1 appears. The widget has multiple control zones so that users may specify a variety of motions (such as translating or scaling) or other operations (such as moving the center of rotation). By integrating many tools into one, this widget is similar to Tracking Menus [4], though it does not track the pen as these menus do.

To define motion, the user presses "GO," and all drawings, modifications, or pauses are recorded as if a video camera were pointed at the canvas. After recording stops, visual feedback (a motion path) becomes visible (see Figure 2). This motion path can be deleted to erase the motion, or modified to change the path. As shown in Figure 3, more moving objects can be added by rewinding, drawing a new object, and pressing "GO" to start the recording. Objects will move as they have been defined to move, and the user can coordinate the motion of new objects with her hands.

If users move objects without pressing "GO," motion is recorded, but pauses are not. Other objects will begin to move the moment a drag operation begins. This provides somewhat more precise timing control. If users wish simply to move an object, they may delete the motion path that appears after a drag operation completes. This is another example of how visual feedback can simplify the animation interface.

5. Conclusion

We have presented a design for a visual language for animating sketches. This visual language has the potential to make producing moving drawings about as easy as producing static drawings, giving all computer users access to a powerful expressive medium. Those who think in dynamic, visual images may find that computers facilitate communication like never before.

6. References

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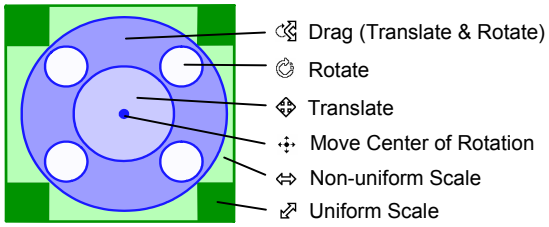

Figure 1: Selection Widget with Control Zones.

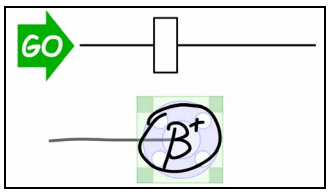

Figure 2: After dragging, the positron's motion is recorded and visual feedback appears.

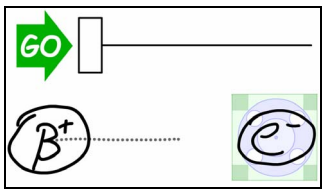

Figure 3: To define motion of another object, simply rewind and repeat the process.