DRACO: Sketching Animated Drawings with Kinetic Textures

Rubaiat Habib Kazi[1,2], Fanny Chevalier[3], Tovi Grossman[1], Shengdong Zhao[2], George Fitzmaurice[1]
Autodesk Research[1], National University of Singapore[2], INRIA[3]
rubaiat.habib@gmail.com, fanny.chevalier@inria.fr, zhaosd@comp.nus.edu.sg, {tovi.grossman, george.fitzmaurice}@autodesk.com

1. Introduction

Draco [Kazi et al. 2014] is a sketch-based interface that allows artists and casual users alike to add a rich set of animation effects to their drawings, seemingly bringing illustrations to life. While previous systems have introduced sketch-based animations for individual objects, our contribution is a unified framework of motion controls that allows users to seamlessly add coordinated motions to object collections. From an interface design perspective, the key challenge to this problem is to formulate a general framework for workflow and controls that is easy to use, but expressive enough to author a wide range of dynamic phenomena.

2. Kinetic Textures

Draco is built upon a framework named kinetic textures, a novel animation component that encodes collections of objects and their associated motion. Our framework builds on general concepts that are easy to understand, while offering rich creative capabilities. A kinetic texture consists of a patch—a small number of representative objects that serve as a source example to generate the collection, and a set of motion properties. The motion properties define the trajectory and movement of all the objects within the collection at two different scales: the global motion and the granular motion. We introduce two types of kinetic textures: emitting textures (Figure 1) and oscillating textures (Figure 2), which differ in how the collection is generated from the source patch, and how the global motion is defined. Emitting textures are motivated by particles systems and flocking, while oscillating textures allow the simulation of stochastic motion with repetitive, continuous harmonic motions. Our system provides motion controls in multiple scales, both at the global and granular scales of a collection. Global motion controls the overall shape and direction of the collection, while granular motion directs the variations of individual elements. The user interface and interaction techniques of Draco capitalize on the freeform nature of sketching and direct manipulation to author kinetic textures completely from scratch.

3. Conclusions

Draco enables the creation of a wide range of intricate animation effects, seemingly bringing illustrations to life. The core component of our system is kinetic textures, a new animation framework, which simultaneously achieves generality, control and ease of use. The interaction techniques within Draco capitalize on the freeform nature of sketching and direct manipulation to seamlessly author and control coordinated motions of collections of objects. Draco pushes the boundary of an emerging form of visual media that lies between static illustration and videos. Our user evaluation points to a variety of applications that would potentially empower end users to author and explore animation effects.

SIGGRAPH 2014, August 10 – 14, 2014, Vancouver, British Columbia, Canada.

ACM 978-1-4503-2977-4/14/08

Figure 1. *Creating an emitting texture. The user draws the source patch (a), then sketches a line emitter (b), which results in an emitting texture with a default motion (c). The user sketches a motion path (d), which instantaneously changes the global trajectory of the raindrops (e). Finally, she adjusts the granular motion by adding subtle translation to the raindrops (g), supplementing the global motion (f), with local variations (h)*

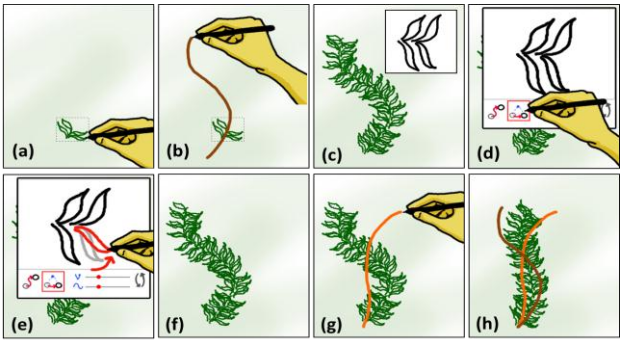

Figure 2. *Oscillating texture. The user draws the source patch (here example leaves) (a), then sketches the brush skeleton (b), which results in a brush texture, where the patch is replicating along the brush skeleton (c). The user sketches the oscillating skeleton (d), triggering the oscillation of the texture (e). Finally, she adds pivot granular motion (f-g), resulting in subtle local leave motions.*

References

KAZI, R. H., CHEVALIER, F., GROSSMAN, T., ZHAO, S., AND FITZMAURICE, G. 2014. Draco: Bringing Life to Illustrations with Kinetic Textures. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems,* ACM, Toronto, ON, Canada, CHI'14.