EvoDraw: Evolving Interactive Animations

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Interactive evolutionary algorithms (IEAs) tackle the challenge of evaluating individual's qualities (aesthetical or another), by using letting humans perform this task. Examples of web-based IEAs are those by Secretan et al. (2011) and Clune and Lipson (2011) used to evolve artistic artifacts using a generative encoding and compositional pattern producing networks, both presented on the web. There is an inherent drawback in the human fatigue caused by the repeated evaluation, and some authors have already tried to address this (Frade et al., 2010), for instance by simplifying the user interface by using a single button to evaluate individuals (Davies et al., 2016).

The present installation builds on a previous work (García-Valdez et al., 2013) but this version is directly inspired by the 1997 Galpagos interactive media installation by Sims (1997) that allowed visitors to evolve 3D animated forms. In Galápagos twelve computers displayed simulations of growth and behavior of a population of abstract animated forms. Viewers participated in this exhibit by selecting which organisms they found most aesthetically pleasing by standing on step sensors in front of those displays. The selected organisms survive, mate, mutate and reproduce. EvoDraw is also an IEA where through the interaction with viewers, animations are also selected. Animations are inspired in the Process Compendium by Reas Sims (2010), where visual forms emerge by the relations of multiple geometric forms and their behavior.

In EvoDraw, viewers interact with animations by merely looking at them. Drawings emerge from animations scripted in the Processing language, and each has an initial setup by a list of parameters represented its chromosomes. To start the evolutionary cycle, first, a population of animations is randomly generated and stored in a container server called EvoSpace. Once the population is active, client computers take animations (their chromosome) from the server to be presented in a monitor one at a time. After a certain amount of time, animations are put back to the server along with information generated from the interaction. The cycle continues by again removing another animation to be presented to viewers. This cycle continues until there are enough interactions to create a new generation of animations. In the previous version of this system (García-Valdez et al., 2013) viewers directly assigned a rating to each animation via a web page; in this work, viewers only need to see the animations on different monitors, but this time they can look at them or not, just like the paintings inside a gallery. To assign a fitness value to each animation and thus enabling the EA the selection of the more attractive animations, a natural user interface device (Kinect sensor for Xbox One) it is used for facial tracking. The sensor can track up to 6 persons at once and it provides a basic set of information for every face: where the face is, where it is looking, among others which are used to compute the attention received by each simulation. Each animation is presented several times in a single generation, and those with the best fitness are always passed to the next. To generate the new population GA operators are applied to the population.

Figure 1: Two viewers interacting with EvoDraw in Alife XV

In this paper, we are presenting some animations generated by EvoDraw after the execution of the algorithm on the first two days of the Alife XV conference in Cancun, Mexico in July of 2016 (see Figure 1). First, in Figure 2 we show an example of an animation generated by another ver-

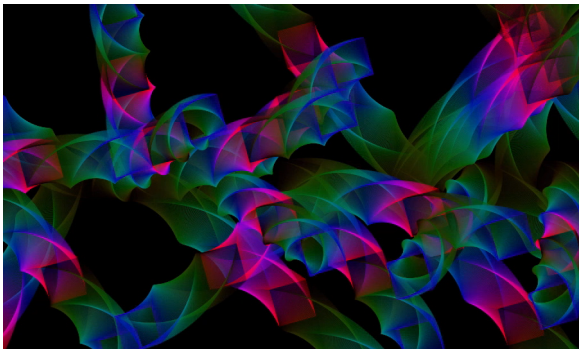

Figure 2: Animation generated by an IEA with explicit ratings

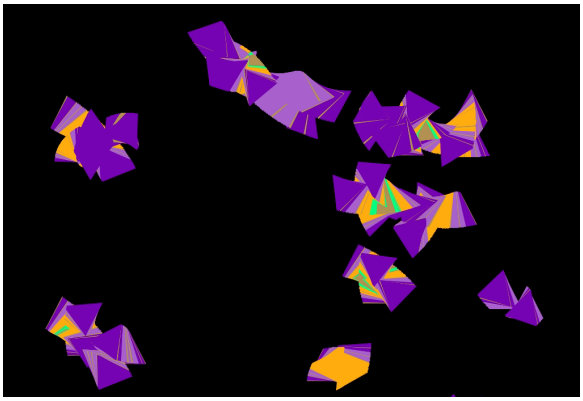

Figure 3: Randomly generated animation from Generation 1

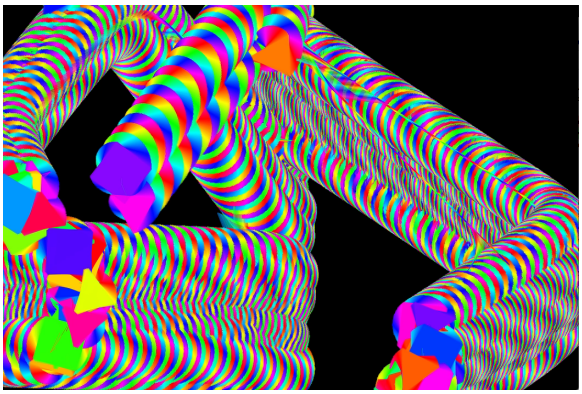

Figure 4: Animation from generation 3

sion of EvoDraw where viewers directly assigned a rating to each animation. Then in Figure 3 a randomly generated animation from the first generation is shown. After some generations, (see Figures **??** and 5) animations evolved to have larger figures and more bold colors.

One of the goals of this work is to develop an open source framework for Web and local IEA systems, using current web standards and libraries for mobile devices and to explore innovative ways in which users can be part of the IEA algorithm. All the code of this work is available as open source from `https://github.com/mariosky/evospace-js`.

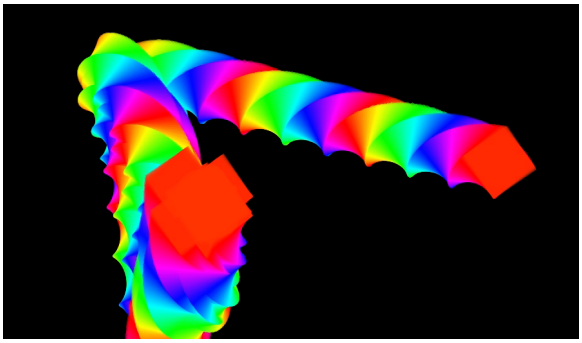

Figure 5: Animation from generation 6

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