

# A Fully Automatic Evolutionary Art

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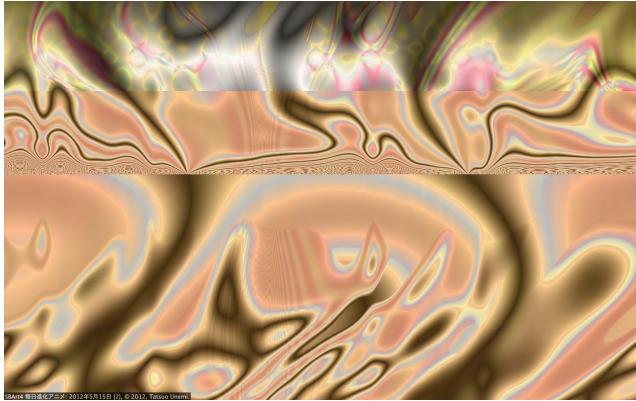


Figure 1: Sample image.

This is a project of an automatic art that the computer autonomously produces animations of a type of abstract images. Figure 1 is a typical frame image of an animation. A custom software, SBArt4 version 3, developed by the author is taking a main role of the work, that based on a genetic algorithm utilizing computational aesthetic measures as fitness function (Unemi 2012a). The fitness value is a weighted geometric mean of measures including complexity, global contrast factor, distribution of color values, distribution of edge angles, difference of color values between consecutive frame images, and so on.

Figure 2 illustrates the system configuration using two personal computers connected by the Ethernet. The left side is for evolutionary process, and the right side is for rendering and sound synthesis. Starting from a population randomly initialized with mathematical expressions that determines the color value for each pixel in a rectangular area, a never-ending series of abstract animations are continuously displayed on the screen in turn with synchronized sound effect (Unemi 2012b). Each of the 20 seconds animation is corresponding to an individual of relatively high fitness chosen from the population in the evolutionary process.

The evolutionary part is using Minimal Generation Gap model (Satoh, Ono, and Kobayashi 1997) for the generational alternation to guarantee the time for each computation step is minimal. After 120 steps of generational alterna-

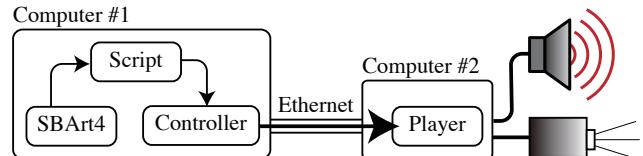


Figure 2: System setup.

tions, the genotypes of the best ten individuals are sent to the player side in turn. To avoid convergence to lead a narrower variation of individuals in the population, the individuals of lower fitness in one forth of the population are replaced with random genotypes for each 600 steps.

The visitors will notice not only the recent progress of the power of computer technology but also will possibly be given an occasion to think what the artistic creativity is. These technologies are useful not only to build up a system that makes unpredictable interesting phenomena but also to provide an occasion for people to reconsider how we should relate to the artifacts around us. We know the nature is complex and often unpredictable, but we, people in the modern democratic society, intend to assume that artificial systems should be under our control and there must be some person who takes responsibility on the effects. The author hopes the visitors will notice that it is difficult to keep some of the complex artifacts under our control, and will learn how we can enjoy with them.

## References

- Satoh, H.; Ono, I.; and Kobayashi, S. 1997. A new generation alternation model of genetic algorithms and its assessment. *Journal of Japanese Society for Artificial Intelligence* 12(5):734–744.
- Unemi, T. 2012a. Sbart4 for an automatic evolutionary art. In *Proceedings of the IEEE World Congress on Computational Intelligence*, 2014–2021.
- Unemi, T. 2012b. Synthesis of sound effects for generative animation. In Soddu, C., ed., *Proceedings of the 15th Generative Art Conference*, 364–376.

Demo video:

[http://www.youtube.com/watch?v=XBej\\_nlu-Hg](http://www.youtube.com/watch?v=XBej_nlu-Hg)