Human Tended Gardens of Evolutionary Design

In this paper we approach the problem of creativity by augmenting the human creative process through machine computational evolution with genetic algorithms. We identify the problem that the creative process is difficult within a domain such as design - particularly with regard to evaluation of successful designs and the formulation of new designs that build upon these successes. We describe a system that supports creative iteration through machine computation, making use of human insights to influence high-level evolutionary goals and draw comparisons from similar work in other domains. This reframes creative design as a human adjustment to a distributed evolutionary design process.

An evolutionary system allows us to focus on the identification of successful creative process artifacts - i.e. identifying good designs. This is accomplished through our **recycled research program**, a decentralized software based experimental system that stores human (empirical) experience with interactions and responses to stimuli. Recycled research couples a structured research goal to a distributed medium, such as software, to test software design hypotheses. Recycled research allows rapid experimental propagation through software deployment on the web in a few ways:

Viral Propagation - Our inquiry has been structured to be a decentralized model, with possibilities for viral spread and easy embedding.
Structuring Community Tending - Recycled research project goals (design goals, in this case) are set and modified by a community that observes the automated evolutionary iteration and makes high level decisions based on associated data, analytic tools, and community discussion.
Organic Experimental Conditions - As the software is deployed virally, we require the host to set initial seed conditions. In a sense, this promotes organic or even market driven conditions. If a condition is not interesting or valuable to the community it will be used less, or even not at all.
Participatory Cost Model - The approach institutes a new kind of cost, a participatory one, requiring that any first-tier user of the software continue the experimental mechanism and allow iteration through genetic algorithms.
Genetic Iteration - While human analysis is necessary for the determination of high-level success or 'fitness', the iterative work can be combined with a genetic algorithm that explores alterations to the initial experimental conditions. Capabilities for genetic iterative adjustments provide growth direction within these conditions.

We present **organic canvas** as one of the projects that explores the use of this technique. The recycled research goal of the project is to perform a usability study on a theme for a popular blogging engine. In addition to a number of presentation options that are structured by human designers and organically selected across a large number of viral hosts, there are genetic algorithms that can alter the themes appearance (with regard to basic structural choices, font selection, color, etc.). Through evaluation tools such as **mouse tracking**, we are able to computationally evaluate a number of target design goals such as: successful conversion of search terms, translation of visitors into feed subscribers, general 'stickiness' of the page - specifically amount of time spent and number of pages visited, the amount of article content read (or interpreted to be read) and so on.

The viral hosts allow a limited capability for low level design evolution. A computational change that is determined to be successful propagates across hosts with similar conditions (for example, blue and red color choices being successful on political blogs). The community structure is capable of observing these growth patterns, and supplementing large design adjustments through human interpretation via analytic tools (software visualization of mouse tracking patterns, in this case).

This project is descended from our human computation design project, **recycled canvas**, which has spread across hundred of sites and collected millions of data points. Similar techniques have been used, in a limited fashion, in domains such as architecture and product design. We offer a general purpose system that supports creative decision making in software design and extends the exploration beyond what is possible in the human design process.