Livecell

Kingsley Ash
Echochroma New Music Research Group
Leeds Metropolitan University
K.Ash@leedsmet.ac.uk

Nikos Stavropoulos
Echochroma New Music Research Group
Leeds Metropolitan University
N.Stavropoulos@leedsmet.ac.uk

1. INTRODUCTION

Livecell combines elements of generative composition using cellular automata (CA) and stochastic processes with real-time score generation, under real-time control from user input. The CA graphical user interface enables interactive control through visual and auditory feedback whilst real-time score generation allows for the immediate realisation of the musical output by a string quartet. The tripartite structure of the system comprises the CA graphical user interface, the data musification engine and the score generator (Figure 1).
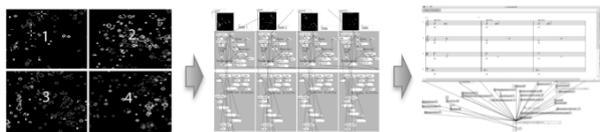

Figure 1. *System structure*

The user is able to interact with the system by drawing and erasing cells into the CA grid via the graphical user interface. Different implementations of the interface have to date included the use of a touch screen, an interactive projection system or simple mouse control depending on context and logistics. Different regions of the interface correspond to the different instruments in the string quartet. Cells are able to grow and move between these regions allowing the composition and the instrumentation to evolve under the direction of the user and through the natural evolution of the cellular automata. The interface also allows access to a collection of cellular automata rule sets, which correspond to distinct macroscopic behaviours, as well as a series of pitch class sets.

The initial objective behind this project was to develop a system for composition and performance that would allow a single user to generate and control a score in real-time. CA have been employed as a component in the system to enable greater musical complexity than would be achievable by a single user directly controlling all available parameters.

The system generates a musical discourse that displays complexity and temporal development analogous to the graphical realisation of the CA. These analogies manifest themselves either in a descriptive manner, where direct correspondence between the state of the CA on the screen and the musical events in the score / performance is explicit, e.g. increased cell activity results in faster rhythms, or via association, where behaviours and or structures that appear in the graphical representation are associated with distinct musical schemata, e.g. a particular set of CA rules produces ostinati with subtle rhythmic and melodic variations. The rationale behind this approach is "to guide selection and manipulation of variables or attention to specific outcomes, for users who have no model or prior knowledge" of the system and the musification algorithm.

3. REFERENCES

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Figure 2: Live performance setup

Figure 3: Performance at ICMC 2011