

Modeling Intention in Creative Systems: Logics and Generative Art

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ABSTRACT

This paper examines the possibility of modeling intention in creative computer mediated systems. It discusses the way that I have employed logic and logic programming as a significant mechanism that has helped me develop certain kinds of generative art towards this end. Central to the approach to participant interaction is an extension of drawing practice which uses unhindered human movement within a motion tracked space. Central to this process is the absence of a physical connection between human and computer.

1. Introduction

The paper reports on work done in the domain of interactive art to investigate the ability of a computer system to facilitate exploration of the processes occurring from the initial intention to the observable realization of that intention. Observable referred to here relates to the acknowledgment that an intention has occurred and that phenomena exist that represent the realization or articulation of that intention. The work is described in the context of generative art systems, based on logic programming, that have been extended to include interaction with the participating audience.

The authors' approach to these problems is described. This approach is an extension of drawing practice which uses unhindered human movement within a motion tracked space. Central to this process is the absence of a physical connection between human and computer.

2. Generative Systems and Logic

To many, music is the highest art form. The purity and yet the power of these abstract structures in time seems to cross cultures and ages and are often at the centre of, or perhaps pointedly excluded from, religious worship. Not surprisingly, painters quite frequently aspire to being composers or musicians. Formally, the distinction between seeing and hearing aside, the key difference between painting and music might be seen to be the presence of time as an integral element or dimension. Verotov's characterization of his film

The Man with the Movie Camera as "an experiment in visual music" perhaps captures the visual artist's interest in time [1]. However, other influences have also been afoot in the 20th century. For example, in work that uses geometric or other systems, it has been common to produce series of works that often have a natural sequence. It is only a small step to think of them as stills from a movie. Another closely related development was the early use of computer programs to generate drawings. Generative works of this kind lend themselves to the automatic generation of a series because the computer program is a kind of general structure or form that can apply to a class of works, each a variation of another. It seems natural to extend such explorations to time-based visual art. See for example, *Sydney* by Edmonds (fig. 1) [2].

There are a number of classic mechanisms that artists use in making generative work. Variations on genetic algorithms are, perhaps, the most common. These are modelled loosely on scientific theories about life and the development of new life forms. Selection of the fittest, or elimination of the weakest, is an essential part of these processes and the application of pseudo-random numbers to selection or, in interactive works, selection by the audience or participant are normal. The work described here is quite different in its inner

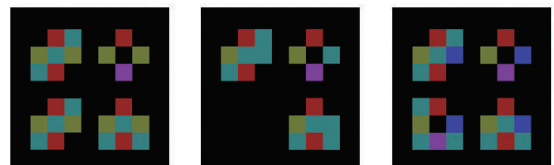


Figure 1: Stills from *Sydney* (1995) by Ernest Edmonds

structure to such "genetic" works. This work is constructed by specifying rules that determine how the generation of images should progress. These descriptions do not contain any random element and are not intended to model any particular scientific theory, either loosely or tightly. The mechanisms discussed have been developed purely to support developments in the making of time-based art and no meaning for them is claimed beyond that. The paper does not attempt to describe any kind of scientific, aesthetic or other motivation for this work. This account simply confines the discussion to the methods for constructing generative time-

based art works, interaction with them and the search for understanding intention.

In generative time-based art, the explicitly defined part of the work is the structural element including, specifically, the *rules* that are to be used to determine in which order and at which pace the image sequence should develop. Although random or pseudo-random elements can be employed, in this work it is entirely deterministic. The complexity of these works leads to enough uncertainty without adding randomness as well. In comparison to music, this work has a relationship to the early works of the composer Pierre Boulez and others who took the serial music concepts to a more extreme level than Schoenberg by including more musical elements in the structures that the serial forms defined. In this work, just as the images have an underlying order about them, based on geometrical and colour relationships, so the progress in time also has an order based on the generating logics. The exception to this determinism comes with the addition of *interaction* as an element of the work.

3. Interaction and Intention

A series of experiments are being conducted that explore the relationships between movement and external representations of this behavior. This work is based on the development of interactive generative systems.

Heron (2002) by Edmonds, for example, is a work that consists simply of a set of coloured vertical stripes that change in time. Physically, it is a projected image on a sheet of translucent plastic hung in space.

In this case, the image is a set of coloured stripes and the nearer the person is to the piece the narrower the stripes become. This creates a sensation of the work retreating as the viewer approaches it. In addition, the rate of change is, up to a point, directly proportional to the amount of movement (e.g. waving) that is detected. However, too simple a relationship is not particularly appropriate. One point is that there is always some movement (using $y=Mx+C$ rather than $y=Mx$ to relate image rate of change, y , to person movement, x). In addition, when the degree of person movement reaches a particular level, the images revert to the slowest level (**if $x>Limit$ then $y=C$**). In effect, the piece does not “like” wild articulation. This notion is borrowed from Edward Ihnatovich, whose piece SAM, moved in relation to sound but stopped if things became too loud [3].

As the day progresses, *Heron* builds a simple record of events as a vector in which the degree, extent and variation of movements in front of it are represented. Meta-rules make use of this data to modify the behaviour patterns, for example, by lowering the threshold, *Limit*, which is used to define the degree of movement to which it will not respond. One could say that *Heron* can become ‘tired’ of people jumping and waving in front of it all day long.

The experiments are based on analysis of behaviour patterns observed by the system in the audience participants who interact with the work. The logic of the generative system is being modified by the behaviour of people who are thought of as communicating with it. The process is one of the art work system inferring intentions or meanings in the movement of the human participants and hence engaging with them in a kind of primitive dialogue. From the human point of view, we can see the process as one of trying to control, or partly control, the behaviour of the system by expressing intention through movement.

4. Conclusion

The use of logic programming to provide a way of composing time-based generative art has the great advantage over procedural programming methods. For this kind of work, it is very concise and productive in enabling thinking about the work to include a significant investigation at a structural level. Furthermore, it is relatively natural to extend the method to include interactive work and, with the help of meta-rules, interactive work that performs differently over time according to experience. As the artwork learns, it changes the way that it *develops* rather than simply the way that it employs stimulus-response rules to govern its performance. The interactive art systems advocated by Cornock and Edmonds [4], and others, can now be realised and developed in ways not imagined thirty years ago.

Current work is described that involves investigating a method to capture/articulate the “space in between” an intention and the realizable object. This includes the construction of mechanisms to extend the control of a human in the context of a computer system and the development of a language of articulation that assists the realization of an intention.

ACKNOWLEDGEMENTS

The authors wish to thank the artists, the support staff and students of C&CRS, The Creativity and Cognition research Studios, Department of Computer Science, Loughborough University, UK.

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