Managing Parameter Spaces for Multimedia Composition

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1 Introduction

Although the capability to create whole animations by computer has greatly enhanced the artist's repetoire, it does not by itself address the issue that Whitney [1980] encountered while producing his film, *Arabesque*, where the "concept was not deeply 'mined' for its fullest possibilities." Systematic exploration of alternatives is usually costly because it requires "less imagination than patience" [Bertin 1983], and has no guarantee of results. Software systems aimed at reducing the requirement for patience in the exploration of alternatives have achieved success. *Design Galleries* [Marks et al. 1997] is a prominent example, but it is limited by the need for the composer to describe, *a priori*, how the system should differentiate between alternatives. In contrast, the approach presented in this poster, using *cogito* [Hepting 2003], allows the composer to explore the parameter space and interactively articulate what is of interest, using semantic distinctions. The system manages the realization of representative samples from amongst all available alternatives and allows the composer to focus on application of their aesthetic judgment instead of technical details.

2 Concepts

An essential characteristic of multimedia is the programmability of its components, which is accessed in this approach through parameters. An artist might begin with a single image, and by considering what is essential about the forms depicted in that image, an appropriate parameterization can be developed as his or her interface to the image. This permits any available image, or media fragment, to be identified according to a unique tuple of values in this parameterization, corresponding to a single point in the parameter space. A central parameter variation is a path through parameter space that is mapped onto the chosen image parameters in order to determine the appearance of each frame in an animation. The same central parameter variation can be mapped onto, for example, chosen sound parameters. In this way, different media elements can be created to form a rich multimedia work that is inherently synchronized.

The *cogito* software [Hepting 2003] augments the composer by allowing them to easily explore different paths through parameter space, because the *cogito* system manages access to the entire parameter space without overwhelming the composer nor requiring any explicit specification of parameter values. It partitions the parameter space and allows the composer to view samples from each partition in order to gain a quick overview of the range of available choices (a screen generally shows 10 different samples at once). He or she may explore the entire parameter space by making choices from amongst the samples and having the system generate new subspaces consistent with those selections until an interesting point in the parameter space is found.

The generality of the interface allows different objects to be parameterized and the corresponding parameter spaces to be explored. For example, different central parameter variations may be explored through this interface, with the realized samples being animations. As an alternative, the interface can be used to locate desirable *keystates*, a generalization of the more familiar keyframes

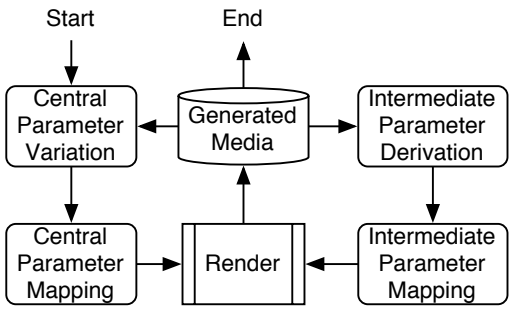

Figure 1: Parameter extraction and media generation.

concept, and to explore different available interpolations between these keystates. In the latter case, the realized samples will be animations of the interpolations.

Features from each set of generated media can be extracted and used as parameters to be fed back into the system to refine new generations of the combined work. Just as in the initial iteration, the artist can explore the implications of different mappings of these secondary parameters into the other media. For example, the area of the figure in each frame can be used to modulate the volume of the corresponding sound and the spectrum of sound may be used to modulate the colour of the corresponding frame. This process is illustrated in Figure 1.

3 Discussion

The goal of this approach is to provide artists with tools that will help them to express their ideas in the multimedia realm and allow more ideas to be explored. As Whitney [1980] said "art is a matter of, 'judgment – not calculation.'" These tools support but do not interfere with artist in the composition process. With this same philosophy, ongoing research is examining whether there are still better ways to provide this support.

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