Control Strategies in Real-Time Interactive Digital Sound Synthesis

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ABSTRACT

Real-time interactive digital sound synthesis has become an increasingly important component in a variety of applications including music and video games across a variety of platforms from networked computers to mobile phones. The paradigmatic approach to interactive sound synthesis can be conceptualized as a hierarchical structure with a sound synthesis model generating output at the lowest level, and a human or automated controller at the highest level. The controller generates some number of digital control signals as input to the system, which must be mapped to the parametric control handles of the sound model. Even with rich models capable of dynamic, responsive sounds, inadequate control strategies and mappings can result in dull, 'mechanical' sonic output.

This project tries to address this issue by proposing a novel control system to control the synthesis of sound. The three important modules of the system, the communications system, the data-acquisition system and the mapping system are designed and developed throughout this project. The mapping technique extends the familiar concept of morphing to the domain of synthesis parameters. A morph between defined points in the parameter space representing desirable sounds is itself parameterized with high-level controls. The choice of end points of the morph and the extent of the morph are used as input handles to map arbitrary control signals to the synthesis parameters. Additional off-line methods control the interpolation functions and selection of parameter points. The final system yields a control system that is able to provide the user, expressive, intuitive and comprehensible control over the synthesis of the sound.