About This Issue

One of the pleasant ironies of computer music lies in the attention its practitioners must devote to a problem that is the inverse of a problem facing human performers. Musicians seeking to master traditional instruments devote years of practice to attain greater precision in rhythm, intonation, tone quality, and articulation. For computer music, the problem is the opposite: precision is a given; it is trivial to generate music whose rhythms, pitches, and timbres are absolutely uniform. Instead, we engage in the quest for irregularity, in an effort to grasp human performers' elusive and expressive deviations from the purely mechanical. The challenge crops up in both the production and the analysis of music. In the realm of sound synthesis, it is necessary to model not only involuntary and random deviations, but also intentional departures from uniformity. Similarly, in the realm of automatic transcription, we strive to understand how to parse an unquantized, nonrobotic performance back into the theoretically simple rhythms and pitches of the musical score that the human performer was interpreting.

This theme of expressive deviations shows up in most of the technical articles in this issue, starting with Jim Purbrick's work on the automatic articulation of notes in real-time sound synthesis. This work aims to correct the artificial-sounding phrasing that often results when a controller doesn't match the synthesis patch. For example, a performer might be playing a MIDI keyboard to control a violin patch, but the sorts of manipulations possible with a keyboard don't map well to the articulations that a violinist would use. Mr. Purbrick's system, called the Expression Articulating SYnthesizer (EASY), inserts a software layer between the human performer and the synthesizer. This layer tries to analyze the performance and extrapolate expressive parameters that are tailored to the current patch.

Expressive deviations from uniformity pose difficulties for software that matches the notes of a performance to a provided score. The article by Hank Heijink and colleagues analyzes different solutions to the problem of performance-score matching, focusing on the case of keyboard performances captured as MIDI data. Performance-score matching is trivial when the performance is purely mechanical in pitch and rhythm. Human performers, however, use expressive timing and also make errors. In addition, scores are often incomplete specifications of the music; ornaments, for example, can frequently be interpreted in more than one way. The authors examine some existing matchers and propose a more general model, after which they describe a new "structure matcher" that better handles temporal discrepancies between voices.

The topics mentioned above concern the expression in a musician's performance. With computer technology, the performer of the music might not be a musician per se, but some other artist, such as a dancer. A team of researchers working in Italy and Japan have developed an ambitious system called EyesWeb that attempts to understand the emotional content of dancers' gestures, using that information to control synthesized music as well as other media. One of the techniques described in the researchers' article is to analyze a single fragment of a dance performed by different dancers, or by the same dancer with different expressive intentions. A related technique is to study different dance fragments that have the same expressive intention. The system builds up a database with the goal of classifying dances in real time. The EyesWeb platform includes hardware such as video cameras, on-body sensors, custom electronics, and a frame-grabber, as well as a set of software modules for processing the data, reacting to it, and extracting low- or high-level information.

Some researchers propose to extract gestural information from the audio recording of a performance. Nick Bailey and David Cooper of the University of Leeds present an article about a tool they have developed as part of a larger project whose ultimate goal is gestural capture from audio. The tool, dubbed Sculptor, is an open-source suite of programs that permit real-time manipulation of timbre. Based on the phase vocoder, Sculptor uses state-space techniques to model formant characteristics, allowing users to create smooth transitions between timbres.

Most issues of *Computer Music Journal* include an interview with a prominent composer. In this issue, Tristan Murail discusses the development of his compositions from the 1970s to the present. A stylistic progression from simple linearity to increasing complexity and activity is traced not only to aesthetic choices, but also to technological change. He offers perspectives on emulating older synthesizers in software, integrating electronics with live instruments, incorporating sounds of nature, and using compositional software.

The Reviews section of this issue covers three events, including the Bourges and KlangArt festivals; five books; and seven compact discs. The Products of Interest section announces a variety of hardware and software offerings.

Front cover: This illustration was generated by 3D MiDi, a shareware program (see http://www.3dmidi.com) that converts live or stored MIDI data into graphics using OpenGL.
Back cover: A set of images from the EyesWeb platform.