Multi-Conductor: An Onscreen Polymetrical Conducting and Notation Display System

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ABSTRACT

This software tool, developed in Max/MSP, presents performers with image files consisting of traditional notation as well as conducting in the form of video playback. The impetus for this work was the desire to allow the musical material for each performer of a given piece to differ with regard to content and tempo.

Keywords

Open form, notation, polymeter, polytempi, Max/MSP.

1. INTRODUCTION

While the system could easily be used for closed-form polymetrical pieces, it is intended for the performance of compositions with open forms, in which some or all decisions about the temporal relationships of pre-existing material are made in real-time during the performance. When implemented, each performer would have a client CPU running either Max/MSP or the free runtime version, with notation and video conducting presented on the display. Each client is designed to accept MIDI data from either a master CPU or a human, which determines tempo, start time, and notated content. Prior to the actual downbeat, each performer is given a visual warning (shown as a red "X"), followed by a two beat pickup at the appropriate tempo.

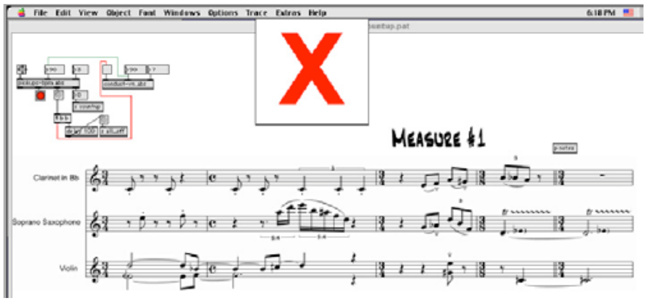
File Edit View Object Font Windows Options Trace Extras Help
X
Measure #1
Clarinet in Bb
Soprano Saxophone
Violin

Figure 1: The system alerts the performer that pickup beats are imminent

The patch uses two main abstractions with which the user has any interaction: pickups-bpm.abs and conduct-[inst].abs, where [inst] is replaced by vn, cl, or sax. These suffices indicate the instruments arbitrarily used by the musical example: violin, clarinet, and soprano saxophone - this allows for easy changes of instrumentation.

When used, the patch has pre-defined musical content stored as external text files, which store metrical data for the examples of notated content called "iterations." The conduct-[inst].abs abstraction takes arguments of tempo and an integer identifying the "iteration" to be used, while the pickups-bpm.abs abstraction takes arguments of tempo and metrical numerator.

2. PICKUPS

In order to ensure both that the multiple players could start together when necessary and also have appropriate pickup beat indications, a delay is required between the signal for a simultaneous start and the downbeat. An arbitrary time of 2000 ms was chosen, to allow for two pickup beats at a tempo of 60 bpm. This "lead time" is always present, but individual users could easily alter this value as suits their own needs. When a signal for a start time is received, the player's screen shows the red "X" indicator, meaning "get ready to play" (see Figure 1). Parallel client-side versions of the pickups-bpm.abs abstraction then calculate beat timings and beat number for the appropriate player, whose screen then shows numerals (as appropriate for the current meter) indicating the last two beats of the pickup measure (see Figure 2).

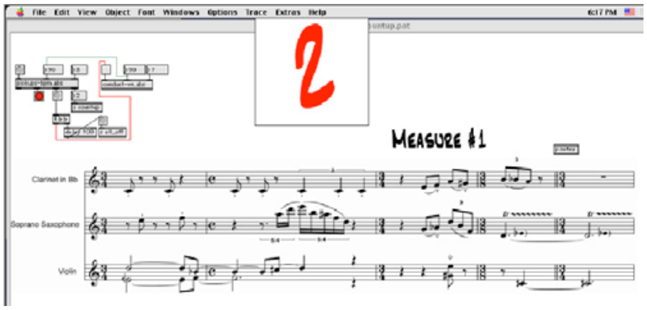
File Edit View Object Font Windows Options Trace Extras Help
2
Measure #1
Clarinet in Bb
Soprano Saxophone
Violin

Figure 2: The pickup corresponding to beat #2 within whatever meter is currently in use (3/4, in this case)

3. DOWNBEATS

At the downbeat of measure 1, the X and numeral indicator box shows video frames of a conductor. Playback speed is controlled by the tempo argument to the conduct-[inst].abs abstraction. The system uses a combination of beat patterns (2, 3, 4, 5, and 7) and externally-loaded text files to allow for metrical and tempo changes from measure to measure within a given phrase (e.g. the change from 3/4 to 3/8 back to 3/4 in Figure 2). It also displays the current measure within each phrase using a numerical indicator as shown in Figure 3.

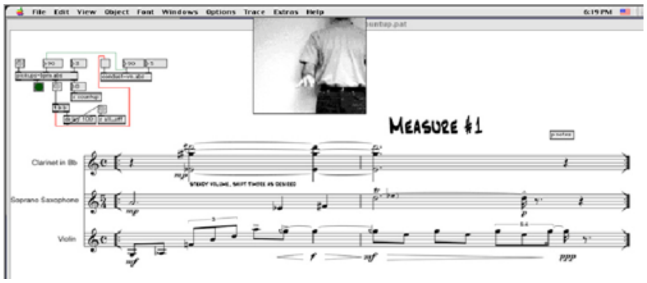
File Edit View Object Font Windows Options Trace Extras Help
Measure #1
Clarinet in Bb
Soprano Saxophone
Violin

Figure 3: The downbeat of mm1

Video playback continues, looping until new information indicating iteration is received. New tempo information takes effect at the next downbeat of measure 1.

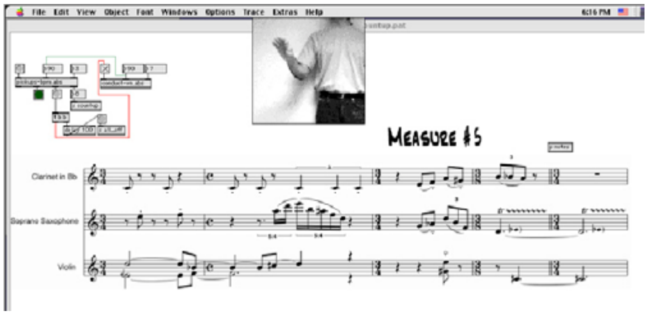
File Edit View Object Font Windows Options Trace Extras Help
Measure #5
Clarinet in Bb
Soprano Saxophone
Violin

Figure 4: Mid-beat in mm5

4. OVERHEAD/PERFORMER FEEDBACK

Rather than true video files (.mov, .avi, etc.), the patch uses the PICS object, which stores successive stills in the PICT image format. This allows for a simple dividing operation to determine the bang rate from a metro object used to step through the PICS array. Each image has been downsampled to 3-bit grayscale, which seems to be the smallest file size which still maintains enough image quality for reasonable visibility. The patch has a memory overhead of approximately 76 Megabytes to load the PICS arrays into RAM. As systems become more powerful and especially as RAM becomes cheaper, this requirement does not seem terribly onerous.

The placement and type of notational information was explicitly chosen to accommodate performers' existing training and expectations. Early feedback from performers suggests that players should have minimal difficulty in adjusting to the conducting and notation method used in the patch.

5. ACKNOWLEDGMENTS

Thanks to Erik Oña of the University of Birmingham, England, Cort Lippe, Director of the LeJaren Hiller Computer Music Studios at the University at Buffalo, and Susan Fancher of the Amherst Saxophone Quartet for their helpful feedback and suggestions.

6. ACQUISITION

The newest version of this software is available at http://www.kevinbaird.net/Multi-Conductor/index.html.

7. REFERENCES

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