Reimagining the Computer Keyboard as a Musical Interface

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ABSTRACT
This paper discusses the use of typed text as a real-time input for interactive performance systems. A brief review of the literature discusses text-based generative systems, links between typing and playing percussion instruments and the use of typing gestures in contemporary performance practice. The paper then documents the author’s audio-visual system that is driven by the typing of text/lyrics in real-time. It is argued that the system promotes the sensation of liveness through clear, perceptible links between the performer’s gestures, the system’s audio outputs and the its visual outputs. The system also provides a novel approach to the use of generative techniques in the composition and live performance of songs. Future developments would include the use of dynamic text effects linked to sound generation and greater interaction between human performer and the visuals.

Author Keywords
Text, typing, computer keyboard, live performance, Max, system

ACM Classification

1. INTRODUCTION
1.1 Text as Musical Input
The link between text and musical notation is well established. In recent years, real-time computer music systems have facilitated the exploration of this link in live performance. For example, Guido’s eleventh-century method for composing chant melodies can be implemented as a real-time system for live text input [1]; speech recognition software has been used to convert vocal performances into text streams that control sound generators [2] and live text input can be used to generate and manipulate scores for instrumental performers during a concert [3].

1.2 Typing as Musical Gesture
There is a clear similarity between the act of typing on a keyboard and that of playing a percussion instrument such as a piano [4]. A recent study has demonstrated that proficient piano-players are able to generate text at comparable speeds to touch-typists [5]. This gestural relationship has been exploited in compositions such as Leroy Anderson’s “The Typewriter” [6] and Steve Reich and Beryl Korot’s “The Cave” [7], which also featured the live projection of the text as it was rhythmically typed by the performers. It has been argued that many computer users display a degree of virtuosity on a computer keyboard that is comparable to virtuosity on a musical instrument. Digital instrument designers have exploited this to create computer keyboard-based instruments that do not require extensive practice [8]. Furthermore, each key does not need to be tied to a particular pitch, meaning that similar gestures can be easily transformed to yield very different sonic results [9].

2. SYSTEM DESCRIPTION
2.1 Aims of the System
The author’s system aims to incorporate several elements described in the previous section. The text of the piece is treated as the score, which is performed through typing. The live stream of text controls and influences melody, rhythm, timbre and visuals. This stream is projected as it is typed, letter by letter, to reinforce the perception of liveness (a strong connection between a performer’s physical gesture and resultant sound [10]) for both audience and performer. A variety of gestural extraction techniques (detailed below) process this live stream to control audio and visual outputs.

2.2 Compositional Goals
Just as Robert Ashley’s “Automatic Writing” explored speech gestures that are produced involuntarily and therefore lack conscious design [11], “Kafka-esque” explores how the rhythmic and melodic aspects of typing can be captured to create musical output that is not totally consciously designed by the performer. It is anticipated that audiences will sense that the music has a rhythmic and melodic quality, but that these qualities remain tantalizingly elusive. This kind of approach to songwriting and performance is indicative of the author’s wider creative goals [12].

2.3 System Overview
The system is realized in Max. An overview of its architecture is given in Figure 1. The inputs (under direct control by the performer) are a computer keyboard and a USB control surface to manipulate the volumes and stereo positions of the various sound-producing elements.

2.4 Score Following and Visuals
Several keywords in the text are identified which serve as triggers for visual outputs, such as fading between video sources and initiating effects. Combined with the real-time display of the text, this creates a score/narrative for both the performer and the audience to follow. A feedback loop in which the overall video output affects the timbre of the synthesizers further strengthens the audio-visual relationships.

2.5 The Singing Computer
Stored samples of sung vowel sounds as well as synthesized vowel sounds are triggered by the live text input. For example, typing “you” or “room” would initiate playback of a sung “oo” sound.
The pitches of vocal sounds are controlled by a real-time version of Guido’s system, a basic generative system that assigns incoming vowels a pitch value [1] and by a cyclical, pre-determined melody in which each press of the space bar instigates the next note in the sequence.

While there is a lot of time-consuming pre-programming in terms of selecting videos, sound samples, keywords and vowel combinations, the system is still highly adaptable and configurable for different pieces to be performed.

Further possibilities for exploration include the creation of dynamic text effects that map to audio generators, further reinforcing the link between the audio and visual elements. This could be developed further through using additional sensors to enable the performer to interact with the projected text in a more physical sense [14].

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5. REFERENCES


6. APPENDICES

The software for this system is available by request to the author at the above email address. A video demonstrating the system can be found at http://vimeo.com/83867750