Live Writing: Gloomy Streets

Sang Won Lee
University of Michigan
2260 Hayward St.
Ann Arbor, MI 48197 USA
snaglee@umich.edu

Georg Essl
University of Wisconsin,
Milwaukee
PO Box 413
Milwaukee, WI 53201 USA
essl@uwm.edu

Abstract

Live Writing : Gloomy Streets is an audiovisual
performance, realized on the web browser. Here, every
keystroke made on a laptop to write a poem is captured and
processed to create audiovisual responses on top of what's
written. The piece is built upon a poem about feelings of
being isolated from the general public and living in solitude,
the comfort zone. Revealing the process of writing a poem
to the audience, the writers emotional states emerge
through keystrokes and letters that are alive. Inspired by the
tradition of live coding, the text written in live writing
performance utilizes the expressivity of the language we
speak and the target object that the code influences will be
the minds of audience. In this sense, we consider live
writing to be a metaphorical form of live coding the
audience's mind.

Author Keywords

Music Performance; Writing; Live Coding; Sonification; Web
Audio

ACM Classification Keywords

H.5.5 [Sound and Music Computing]: Systems.; J.5 [Arts
and Humanities]: Music.

Figure 1: *Live Writing : Gloomy Streets* - Screen Capture

Introduction

We suggest a novel form of audiovisual performance - live writing - that transforms creative writing into a real-time performing art. The process of typing a poem on the fly is captured and augmented to create an audiovisual performance that establishes natural links among the components of typing gestures, the poem being written on the fly, and audiovisual artifacts. Live writing draws upon ideas from the tradition of live coding in which the process of programming is revealed to the audience in real-time. This paper discusses the motivation behind the idea and the intended experience for the audience. Live writing performance system is enabled by a custom text editor built on a web browser, writing-sound mapping strategies, a poem-sonification, and temporal typography for visualization. The author composed and presented the music piece in a series of peer-reviewed concerts (Two university wide events, NIME 2016 and ICMC 2016). This performance was recognized internationally, winning the ICMA Music Award 2016 (Student).

Motivation

Writing is a rich form of communication and we live in an age when we produce large volumes of writing through digital platforms such as the World Wide Web, and mobile devices. As writing is an expressive process guided and adapted by thoughts that evolve over time, the writing process includes improvisational aspects that resemble music performances. However, traditionally there is a separation between the process of writing and how written results are presented to an audience. At the highest level, a piece of writing tends to be presented to the readers is rather in a linear fashion. Static text does not expose the temporal dynamic of the actual writing process. Rather it presents a fixed, monolithic result that is usually consumed by readers at a pace of their choosing. What motivates this work is the dynamic expressive process that is hidden in the final text in order to transform the process of writing into a real-time performing art, called Live Writing [5]. We suggest a real-time audiovisual performance, *Live Writing: Gloomy Streets*, describe the intended experience of Live Writing, and elaborate the temporal dynamics that are normally overlooked in the writing process. The paper then discusses approaches to transform a piece of writing into an interactive performance with respect to the writing interface, input modalities and its mapping, and temporal typography, the technique of dynamic text rendering that we suggested in a previous work [4].

Writing as a real-time process

Writing is a real-time process and so is reading. But traditionally reading and writing are disjointed, giving writing the appearance of static monoliths that are presented for a reading that can have very different characteristics than the original writing had at the time of creation. If one writes in front of the public by sharing the screen of a computer (or hand-writing), one can already be providing a convincing
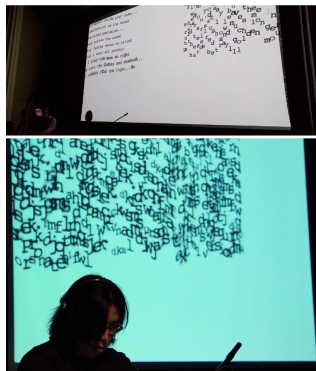
Figure 2: Footages of Live Writing Performances

performance. In fact, reading aloud a piece of writing is a common artistic expression of public reading, such as live poetry, authors' book reading events or verse drama. As the performative aspects of (verbal) live poetry was studied in [6], the oral presentation of a poem has the additional dimensions of expressivity for a reader such as accent, tone, and pace. What this paper argues is that live writing is a textual version of live poetry where the text is used as the medium.

The pace and rhythm of typing can be a powerful dimension for expressive writing. Various kinds of writer's cognitive and emotional states (such as contemplation, hesitation, confidence, or agitation) can emerge during typing, thanks to the temporal patterns of their keystrokes, for instance, pauses, bursts, or cursor highlights. In addition, corrective steps are ways to reflect changes in a writer's thought process. For example, if some of the text is deleted, it reveals the dynamic and often non-persistent nature of emergent ideas. Hence, deleted text builds a powerful message not only showing the initial, aborted thoughts but also showing the oscillation in the thought process. Some ideas that have been considered during writing may be completely absent from the a final product yet dramatically change the nuance of the final text.

Once a writer understands the real-time nature of writing, temporal patterns become part of a writer's expressive vocabulary and performance technique. Writers can deliberately take advantage of the additional expressive dimension to structure the writing as a real-time performing art. Deploying such expression in the process of writing is similar to choreographed visuals and organized sound in an audiovisual performance. This way a writer can "compose" a live writing music performance and rehearse it to deliver the piece as it is composed. On the other hand, the process of writing can be similar to a musical improvisation, where the writing itself can be written by a performer on the fly. We believe that for a performer both approaches have different potentials and challenges.

Writing as a real-time audiovisual performance

Live Writing transforms written communication into a real-time experience like a music performance, giving writers another dimension âĂŤtimeâĂŤin which to be expressive. The author developed an Live Writing environment that generates audiovisual artifacts in response to a performer's gesture of writing a poem, which makes writing into a real-time audiovisual performance. The author composed and presented an audiovisual music piece in a series of peer-reviewed concerts. In the canonical model of digital musical instruments – sensing, mapping, and sound – Live Writing practice replace the input gesture with the completely non-musical gesture: writing a poem. While it will be challenging to perform on a poem in musical ways as a live electronic piece, a piece of writing that shares the real-time emotional dynamics of a performer and communicates directly with the audience in a human readable form can resonate in readers' minds directly with strong messages coded in the text and sound. With the benefits of audience communication, a musician's challenge increases, with the musicality of the piece being the compound function of content, mapping, sound, and its execution. Text editor as a primary environment for performance compelled me to develop a new visualization technique that can connect music to visual rendering of the poem.

Live Writing Music
The basic gesture of live writing is typing. The keystroke is a physical action that can be used as an input gesture of a digital musical instrument. Fiebrink et al proposed [2]

mapping strategies to transform the "qwerty" keyboard into an instrument. Their intent was not to preserve writing but to use the keyboard as an input device. A similar approach can be applied to use each key as a direct trigger of certain sounds and map each letter to a different musical property of the sound. As a typical keyboard today allows binary interaction (key on/off) per key, the expressivity is limited to mapping each key to different musical properties (e.g., pitch) and the duration of keypress. The major difference of using a qwerty keyboard in live writing from previous approaches is that a performer presses keys under the set of syntax rules that are defined by the language in which it is written; the outcome of typed letters must be semantically meaningful. For example, if a key is mapped to generate a pitched note, playing a musical melody will generate random text that looks like gibberish. Therefore, if each keystroke triggers a certain sound, the generated sequence of sounds is the outcome determined by the combination of key-sound mapping and the written text. Word choices determines the composed melody. While it seems that generated sound is a random outcome determined by the mapping and the content, a performer can organize sound in musical way by arranging words and sentences. Due to the complex interdependency among language choice, creative writing, mapping choice, poetic elements, and the execution of rhythmic typing by a performer, live writing challenges a composer and performer to develop their virtuosity in a truly interdisciplinary way in order to turn a sequence of keystrokes into organized sound.

As noted above, due to the limits of a keyboard, keystrokes usually fail to capture the intensity of keystroke gestures, an intensity often linked to the dynamics in musical instruments. In turn, we find the typing sound captured from a microphone can be a good way to express the dynamics of the performer's gestures, similar to the case of using the

typewriter as an acoustic instrument [1, 7]. The dynamically changing typing sound, amplified directly through the main speaker, reflects the performer's intention in expressing the words and the sentences at the moment with their semantic meaning. In addition, the amplification of keystroke dynamics not only serves as the textual version of poetic feet in the writing process but also provides rhythmic and percussive components in the music. Note that the typing sound is synchronized with the visuals (letters on screen) and the keystroke-triggered sound. These actions effectively clarify the idea of live writing to an audience.

Inherently, poetry is a form of expression in which time, dynamic, and expression play particularly important roles. This makes a poem a particularly appealing form of written expression to be considered for live writing. While a keypress is an instant gesture that adds a letter to the editor and triggers a sound, the accumulation of letters forms words, sentences, and eventually an artistic expression in a poetic form. The sonification - composed specifically in response to the real-time progression of the poem - dominates the ambiance of the piece and further conveys the meaning of the composition to the audience. The mapping between the poem and the composition hence goes beyond a simple one-to-one mapping of the gesture-based sound (keystrokes) previously discussed. Rather, the music is generated based on the content and is close to a sonification piece of which data is the writing. Such a connection in mapping is similar to that of code and the sound outcome in live coding; it may be a subtle idea for an audience to understand how input gestures (content) cause the music. Using writing gestures in composition is explored in [8] and the work shares the idea of live text being used at multiple levels (from one-to-one character mapping to subtle word recognition). A musician can develop an online algorithm that sonifies interactively based

what is available to the editor on the fly. The algorithm must still be tightly connected to the central idea of the composition and should not be treated as a global sonification algorithm that can turn any piece of writing into a piece of music. The algorithm can take various mapping strategies to analyze at the syntactic, lexical, and/or semantic level. The algorithm can be as simple as a detection of a set of reserved keywords, triggering certain musical events whenever such words (or letters) are typed. On the other hand, it can be an intelligent algorithm that generate music based on machine learning. For example, the authors in [3] attempted to develop a stochastic algorithm that took into account various features of Chinese poetry at an acoustic level. Typically, existing techniques of natural language processing (e.g., sentiment analysis) can be grafted onto the algorithmic composition. Lastly, the algorithm need not depend on the linguistic features of a poem. Rather, the poem can be seen as time-series data that vary over time.

Temporal Typography
The progress of writing should be revealed to the audience by sharing with them the writer's screen. By default then, the visualization of live writing is of the poem projected on the screen. Similar to visualizations of live coding performances, the visualization of a poem in live writing engages the audience in the performance in synchronization with typing and sound.

Temporal typography is a technique that visualizes text dynamically in response to any input, for example, audio or sensors. This method utilizes GLSL shader language and GPU to make writing come to life, giving room for the CPU to process computationally heavy processes (such as audio synthesis). We presented this visualization technique that turns plain text into a highly interactive and semantically

meaningful medium. This is particularly effective in the context of live writing since the visual artifact is the text itself that needs to be read by the spectators. It allows developers to take any real-time input (from sensors or audio signals) and change the visual properties (shape, position) of the text rendered. For example, the algorithm can take input from the microphone where the typing sound is captured and mapped to the letter shapes (*sensor -> audio -> visual*). Alternatively, the temporal typography can be written to take input from the mouse control, which changes the viewport of the editor, and directly influence the sonification algorithm by scoping the input parameters (*sensor - visual - audio*). Lastly, the built-in microphone can be useful for visualization purposes. It should be noted that the mic captures both typing sounds and the music being played in the concert hall. This compound audio input actually makes the visuals highly responsive and interactive since the temporal typography responds to both a performer's play and the music. For the technical details and suggested examples, see [4] and the following link for the interactive demo of temporal typography.

List of Performances
Live Writing : Gloomy Streets has been presented in the following performances.

- Mar. 2015 Performing and Arts Technology Showcase 2015, University of Michigan, Ann Arbor

    – https://youtu.be/Ng1YSxiIXq0

- Apr. 2015 Mobile Phone Ensemble Concert, University of Michigan, Ann Arbor

- Apr. 2016 Web Audio Conference (peer reviewed), Georgia Tech, Atlanta, GA

- July. 2016 New Interface on Musical Expression (peer reviewed), Brisbane, Australia

    – https://vimeo.com/176701163

- Sep. 2016 International Computer Music Conference (peer reviewed), Utrecht, Netherlands - won ICMA Music Award (Student)

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