Visualization of Typed Communication

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ABSTRACT

Electronic messages and documents are rapidly replacing the traditional hand-written messages exchanged for communication and collaboration between people. As we shift from hand-written to electronic modes of communication we lose the character and personality that is conveyed in hand-writing. We present a real-time visualization of typed text with the intention of adding back personality and character to electronic communication. We analyze how people type an electronic message and use their writing style and message patterns to create a visual representation of the typed text that can then be used for asynchronous distribution, for example, as an electronic postcard.

1. INTRODUCTION

Electronically written communications are becoming more prevalent. Email and instant messaging are slowly replacing handwritten letters. Even e-cards are now being used for special occasions in replacement of the physical card. People can converse across distances electronically quickly and cost-effectively making it a very popular choice for conversation. However, typed text messages lack the personal character of handwriting. Some of the writing style which characterizes the message author, such as writing speed, neatness of writing, or how letters are shaped gets lost in typed messages. This lack of personal character has lead to attempts to enliven electronic messages through ASCII art, emoticons, or through the development of particular chat styles. Visualizations that can automatically encode personal characteristics of typed text will enrich electronic communication between people. Previous visualizations explore graphical patterns to enrich text-based messages [1, 5, 7], semantics [2], real-time instant messaging for synchronous communication [1], or emotional content of a message [6, 3]. Our visualization system, called "'KeyStrokes"' differs from previous approaches in that we aim at adding personality back into the typed text in analogy to hand-written text to enrich asynchronously distributed messages. By looking at how people type an electronic message, we can notice many different typing styles involving typing speed, typing rhythm, hand-usage, or how many times letters or words are erased, reprinted, or replaced. We use these styles to create a visual representation of a message that can then be used for asynchronous distribution, for example, as an electronic postcard [4].

2. VISUALIZING ELECTRONIC TEXT

We use writing style and message patterns to enrich electronically created messages. Our visualization currently takes the form of an electronic postcard that can be filled with our visualization of a message on the front and the typed text of the message on the back. We explore different visual representations imitating art techniques following the process of painting to create an aesthetically pleasing visualization that the writer can identify with. We consider background and foreground objects as well stroke styles, splattering effects, and the movement of a stroke similar to a paint brush.

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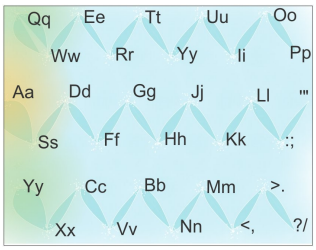
2.1 Visualizing Writing Patterns

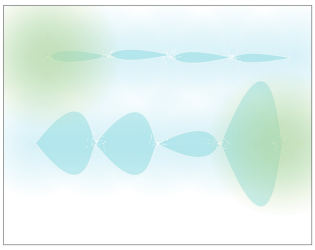
Each letter and common punctuation key is represented at a fixed location in our visualization representing the physical English QWERTY keyboard layout (Fig. 1(a)). When a key combination has been pressed we connect two key locations with a semi-transparent stroke in analogy to the strokes created with a brush or pen. Similarly to a hand-written message where the features of the writing can tell us how the pen has been moved, we show how and where the hands and fingers have been moved on the keyboard. Fig. 1(a) shows a visualization of strokes and key locations where each key on the keyboard has been pressed continuously from left to right for the three rows of letters on the keyboard (not including number keys). The strokes connecting each key combination can also reveal the movement of hand and fingers. In Fig. 1(b) the top row of strokes was typed quickly resulting in narrow strokes. Compare this to the second row where keys have been pressed very slowly resulting in much wider strokes depending on the amount of time between key releases. Strokes are wider close to the first key in a combination indicating the temporal sequence of key presses. The top row, in this image, has been pressed from left to right, whereas the lower connects keys from right to left showing the movement of the fingers. For many people writing style can also be distinguished by how many times letters have been erased, retyped, or replaced. We show the use of backspacing between key combinations by a curved white line connecting the two keys while erasing the previously created stroke. Note the many curved lines in Fig. 2 where an artistic placement of keystrokes has been attempted. The curved line is drawn to imitate a crossing out motion in hand-written text where mistakes are not completely erased even when an eraser or white-out are used.

2.2 Visualizing for Message Patterns

We show message patterns through the frequency of letters and key combinations. The frequency of key combinations becomes visible through the overlap of the semi-transparent strokes. The frequency of a letter is emphasized through a transparent circle in the background. When a key is more frequently pressed, the colour of the circle will change from cool to warm colours. To aid discrimination and comprehension, we additionally encode repeated key presses with a splash of white dots around the key location increasing the radius and spread of the splash after each key press. Additionally, at



(a) Key locations chosen for the TypoPaint layout.



(b) Fast left to right and slow right to left strokes.

Figure 1: Key locations (a) and stroke types (b).

the beginning of a word, vowels get a warm-coloured background and consonants get a cool-coloured background to visualize soft and hard sounds. The change in background colour is used to add dynamics and to balance the whole composition. Fig. 2 shows all of the mentioned characteristics combined.

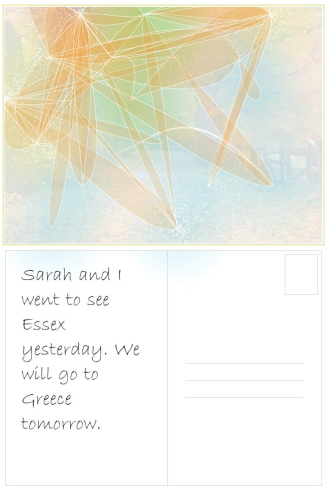
Figure 2: A painted message showing a combination of all visualization characteristics.

3. INTERACTION

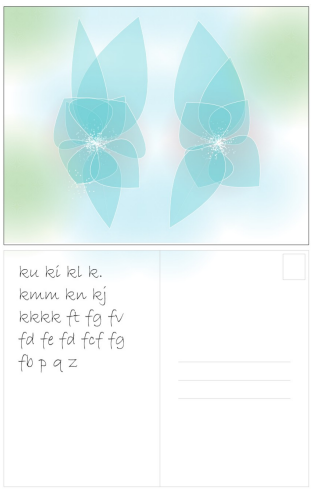
The interaction with our visualization system is very simple. As soon as one starts to type visualization space is filled with the painted strokes in real-time while recently placed strokes are animated. The animation shows the strokes vibrating in the display for a short period of time to enforce the dynamic nature of the visualization. The typed message can be shown below the visualization (see Fig. 3). During our use of the system we noticed two different usage patterns. Many people tended to compose a meaningful text that was conveyed in the visualization (Fig. 3(a)). Others started to create actual paintings after learning how and where keystrokes were displayed. The typed words did not have any meaning attached to it but the visualization created new semantics. In Fig. 3(b) a floral pattern was created to send to a close friend. When different people type the same text the individual writing styles become apparent by how the strokes are printed in the visualization.

4. CONCLUSION

We present a visualization that aims to bring back the character of hand-written text into electronic messages. Our initial exploration seems promising and an appreciable amount of interest has arisen from occasional users in our research laboratory. We plan to extend the work by including additional artistic elements and providing additional colour schemes and backgrounds for users to choose.



(a) A meaningful message on an electronic postcard using a different color scheme.



(b) A message with visual semantics but no meaningful words.

Figure 3: Different types of messages and visualization styles in electronic postcards.

We also plan to make a version of our program publicly available for the creation of personalized electronic postcards.

5. ACKNOWLEDGMENTS

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