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Thomas Buckley

Robert Mickle

Abraham Murray

Tayeb Al Karim

Hiu Ying Chan

See next page for additional authors

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Inventor(s)

Thomas Buckley, Robert Mickle, Abraham Murray, Tayeb Al Karim, Hiu Ying Chan, and Maria Cirimele

Visual Treatment of Handwritten Gestures

ABSTRACT

Many apps support handwritten gestures for common actions by providing a mode to distinguish strokes from gestures. However, mode switching can create friction. Moreover, attempting to reduce friction by eliminating the mode switch can lead to gestures being triggered unintentionally, unreliably, or unpredictably. This disclosure describes the use of special visual treatment of touchscreen traces that are detected as potential gestures to distinguish the trace from both strokes and gestures, and to convey to the user the potential behavior of the trace. Per the techniques, a trace made on a touchscreen can be either a gesture or a stroke. For example, a circle around a word could be a gesture that selects the word, or it could be a stroke that is part of the handwritten text. A circle that triggers selection can have a subtle glow to indicate that it can select strokes inside it.

KEYWORDS

- Sketching
- Visual affordance
- Glow indicator
- Handwriting input
- Mode switching
- Gesture input
- Gesture disambiguation
- Suggestive user interface
- Touchscreen interface

BACKGROUND

Applications that make use of a stylus or finger-based input, e.g., a sketching app, a note-taking app that accepts handwritten input, etc., recognize multiple types of input such as stroke, gesture, etc. performed using the stylus. A stroke is a trajectory traced by the stylus (or finger) on

a touchscreen. A stroke can leave behind an electronic trace or mark, such as a squiggle, on the touchscreen. A gesture is an action, e.g., select, move, erase, rotate, rescale, etc., on a stroke.

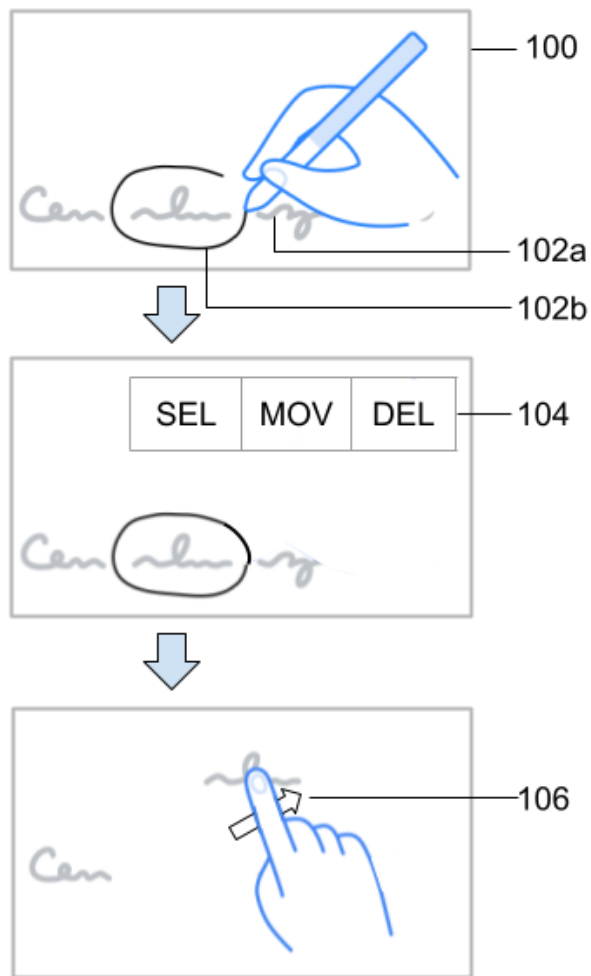


Fig. 1: Stroke and gesture

Fig. 1 illustrates an example sequence of input operations performed by a user on a touchscreen. The user enters a series of handwritten strokes (102a) on a canvas (100) to compose a handwritten note. To move a section of the note, the user marks the section by circling it (102b). At this point, it is unclear if the circle is intended as a stroke or a gesture. Note-taking or drawing apps typically pop up a menu (104) that offers gesture options, e.g., select, move, delete, etc. Alternatively, the menu is not a popup menu but provided as a continuous presence at an

edge of the canvas. If the circle is intended as a gesture (as it is, in this example), the user selects the appropriate option (MOV) from the menu to move the selection (106). Upon completion of the operation, the circle disappears.

Such switching of context between the canvas and the menu to disambiguate stroke from gesture is strenuous, especially when performed multiple times, as is likely the case for any note or drawing of ordinary complexity. While some stylus apps attempt to support hand-drawn gestures for common actions by providing a mode to distinguish strokes from gestures, the switching of mode can create friction. Moreover, attempting to reduce friction by eliminating the mode switch can lead to gestures being triggered when not intended. Also, it's not always clear to the user as to what will happen when a gesture is triggered, leading to confusion and lack of adoption. Gestures sufficiently unusual to be easily disambiguated from strokes are difficult to learn and awkward to trigger. Apps that use heuristics to disambiguate stroke from gesture, e.g., by using timing information, can be unreliable and can act unpredictably.

DESCRIPTION

This disclosure describes visual treatment of touchscreen traces that have been detected as potential gestures to distinguish the trace from both strokes and gestures, and to convey to the user the potential behavior of the trace. Per the techniques, a trace made on a touchscreen can be either a gesture or a stroke: for example, a circle around a word could be a gesture that selects the word, or it could be a stroke, e.g., a diagram, that is part of the handwritten material. A circle that triggers selection can have a subtle glow to indicate that it can select strokes inside it. A line across the page meant to create more space can have a glow pulsing downwards, indicating it can create more room in that direction.

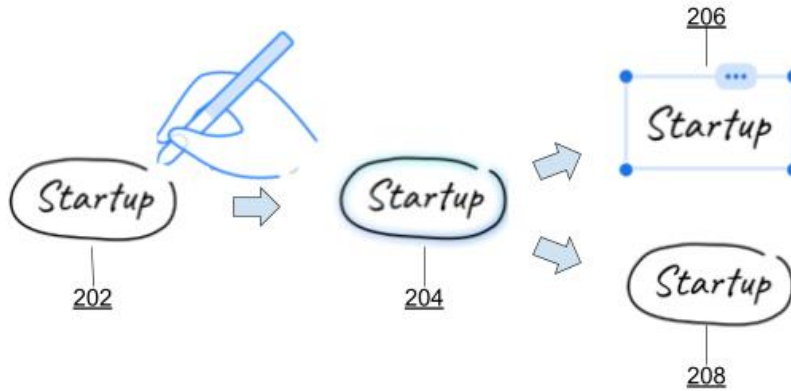


Fig. 2: A state intermediate between stroke and gesture is indicated by a visual glow

Fig. 2 illustrates an example of visual treatment of handwritten gestures. A user circles a word “startup” (202) on a touchscreen using a stylus or finger. The circle is initialized to an intermediate state between stroke and gesture which is indicated by a visual glow (204). If the user taps or drags on the glowing circle, it is interpreted as a (select-and-move) gesture (206). If the user doesn’t interact further with the circle, e.g., continues writing or drawing, then the circle is interpreted as a stroke (208).

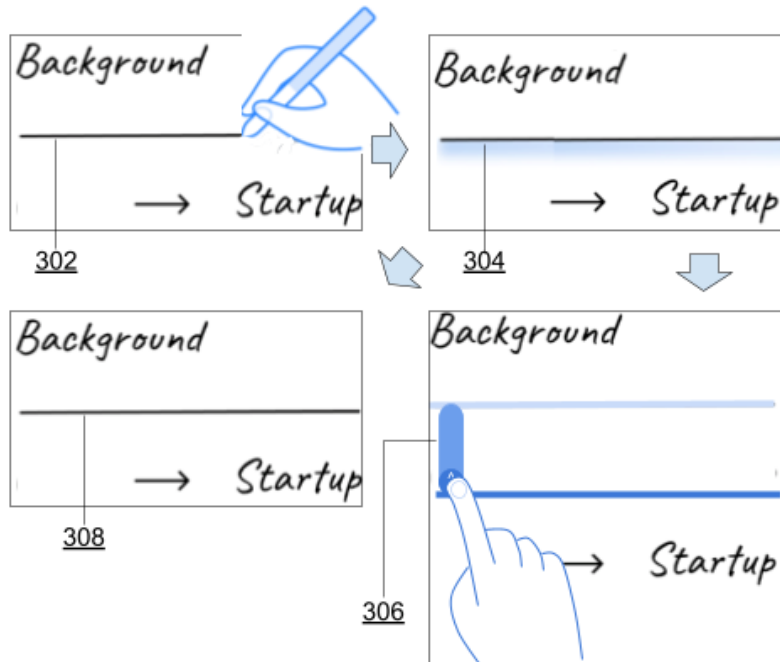


Fig. 3: Another example of an intermediate state intermediate indicated by a visual glow

Fig. 3 illustrates another example of visual treatment of handwritten gestures. A user draws a line (302) across a touchscreen using a stylus or finger. The line is initialized to an intermediate state between stroke and gesture, which is indicated by a visual glow (304). If the user taps or drags on the glowing line, it is interpreted as a (make-space) gesture (306). If the user doesn't interact further with the line, e.g., continues writing or drawing, then the line is interpreted as a stroke (308). The glow itself can provide a hint as to the type of gesture available. For example, glow that pulsates downward can be a hint that the trace can be used to create space in the downward direction.

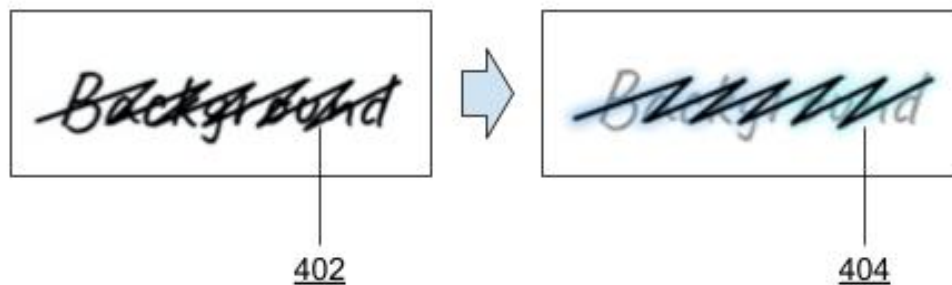


Fig. 4: Another example of intermediate state indicated by a visual glow

Fig. 4 illustrates another example of a trace (402) in an intermediate state between (deletion) gesture and stroke, indicated by a visual glow (404). Again, depending on subsequent user action, the trace is interpreted as one of a deletion gesture (in which case the trace along with the underlying word 'Background' is removed from display) or a stroke (in which case the trace persists on the touchscreen). The glow can hint at the type of gesture available. For example, glow that fades in and out and causes the underlying word to move in and out of transparency can be a hint that the trace is a deletion gesture.

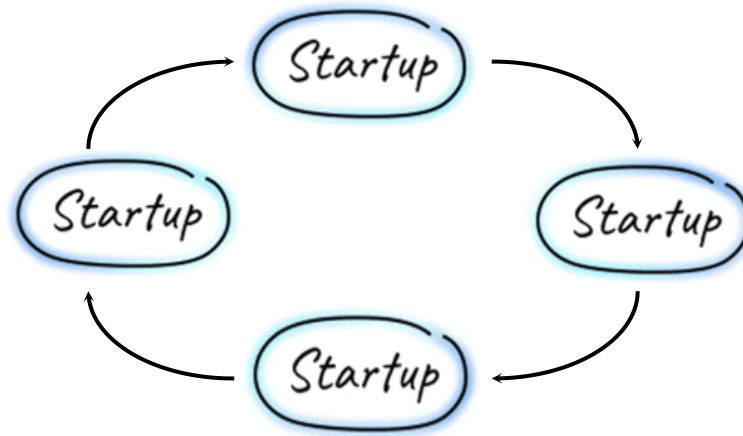


Fig. 5: Traveling glow

Fig. 5 illustrates a type of glow, e.g., a traveling glow, on a trace that is intermediate between gesture and stroke. In the traveling glow, the colors travel around the trace, as illustrated by the four intermediate states in Fig. 5.

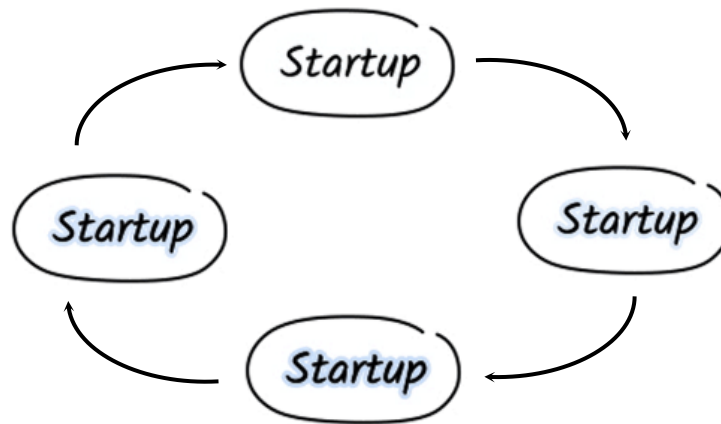


Fig. 6: Text glow

In another type of glow, illustrated in Fig. 6, the trace itself doesn't glow; rather, the text encircled by the trace glows, either constantly or in a varying manner, to indicate a potential (selection) gesture.

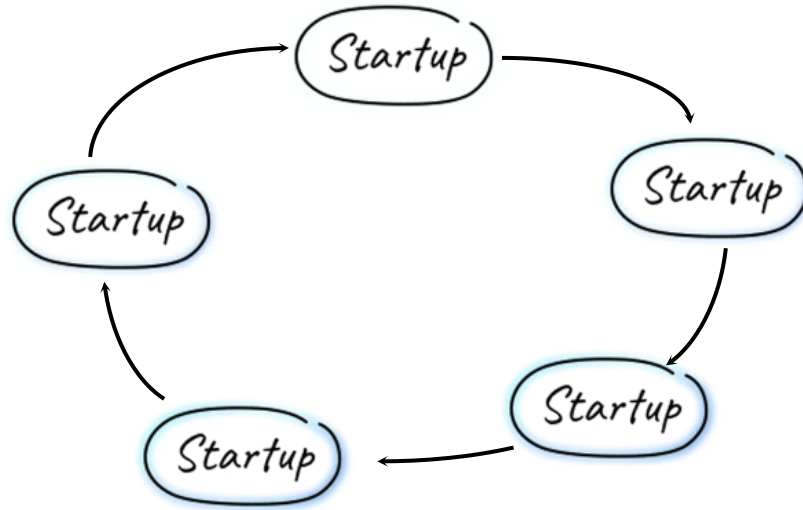


Fig. 7: Fade-and-glow

In another type of glow, illustrated in Fig. 7, the glow on the trace fades in and out (as seen in the successive images), where the fade can be applied to the thickness, opacity, luminosity, or other properties of the glow.

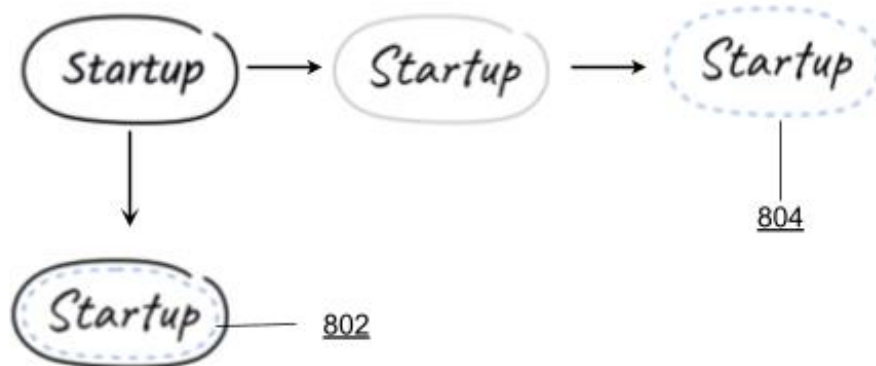


Fig. 8: Marching-ants style visual indicators

Fig. 8 illustrates types of marching-ants style visual indicators. In one type of marching-ants visual indicator, a set of dashes travels concentric (or parallel) to the trace (802). In another type of marching-ants visual indicator, the trace itself transforms into a set of traveling dashes (804).

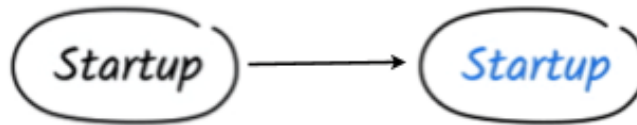


Fig. 9: Encircled text turns color

Fig. 9 illustrates another example of a visual indicator for traces in a state intermediate between gestures and strokes. In this type of visual indicator, the color of the encircled content is changed to indicate a potential (selection) gesture that can be performed for the content.

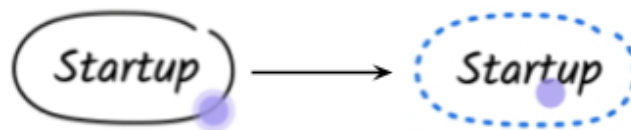


Fig. 10: Long-press indicator

Fig. 10 illustrates an example of how a visual indicator can accompany a long-press-to-select. The user long-presses a trace (shown with a purple circle) to select the strokes inside the trace. This causes the trace to assume a visual indication of gesture, e.g., a marching-ants style indication.

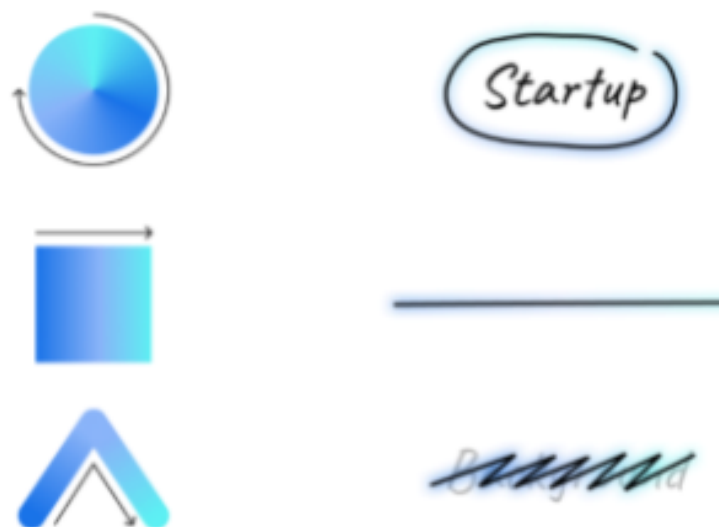


Fig. 11: Example color gradients

Fig. 11 illustrates example color gradients that can be applied over traces to indicate a state in between gesture and stroke. Color gradients, rather than flat colors, are advantageous due to their animated quality and their subtlety, e.g., the ease with which they can be ignored in case the user chooses to continue with their drawing flow to convert the trace to a stroke. At the same time, a color gradient is more visible, especially if the underlying trace is of a color similar to the glow. For example, a flat blue glow on a blue stroke can be nearly invisible, whereas a gradated blue glow on a blue stroke is more visible. Gradated colors on the glow are also easier for users with visual disability, e.g., color blindness, to spot.

The techniques of this disclosure provide clear visual indication of potential gestures without requiring an explicit mode. The trace input by the user is so rendered that it visually offers a clue to the function and use.

CONCLUSION

This disclosure describes the use of special visual treatment of touchscreen traces that are detected as potential gestures to distinguish the trace from both strokes and gestures, and to convey to the user the potential behavior of the trace. Per the techniques, a trace made on a touchscreen can be either a gesture or a stroke. For example, a circle around a word could be a gesture that selects the word, or it could be a stroke that is part of the handwritten text. A circle that triggers selection can have a subtle glow to indicate that it can select strokes inside it.