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Content Selection Based on Gesture Speed

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ABSTRACT

Many touchscreen apps that support stylus or finger input provide a lasso tool, which is a free-hand selection tool. The lasso tool enables users to select strokes by drawing a closed path around a set of strokes to select them. However, selection using the lasso tool can be imperfect (not matching the user intent) and requires subsequent manual refinement. This disclosure describes a lasso tool for stylus apps that determines selection tolerance based on the speed with which the stylus is moved at different points of the selection path. A relatively slow stylus speed is taken as an indication that the user intends a precise (less inclusive) stroke selection, whereas a relatively fast stylus speed is taken as an indication that the user intends for a more inclusive (coarse) stroke selection. The described speed-sensitive lasso tool enables flexible, accurate, and efficient selection of strokes.

KEYWORDS

- Lasso tool
- Content selection
- Selection tool
- Stroke selection
- Selection tolerance
- Variable speed input
- Gesture speed
- Speed-based selection
- Touchscreen user interface

BACKGROUND

Many touchscreen apps that support stylus or finger input provide a lasso tool, which is a free-hand selection tool. The lasso tool enables users to select strokes by drawing a closed path around a set of strokes to select them. However, the lasso tool either selects only strokes that are completely inside the path or that are partially within the path. This behavior often causes the user input gesture to either accidentally miss a stroke or to include an unintended stroke. Strokes selected by the lasso tool tend to be imperfect (not matching the user intent) and require subsequent manual refinement.

DESCRIPTION

This disclosure describes a lasso tool that determines selection tolerance based on the speed with which the stylus is moved at different points of the selection path. A relatively slow stylus speed is taken as an indication that the user intends for a precise (less inclusive) stroke selection, whereas a relatively fast stylus speed is taken as an indication that the user intends for a more inclusive (coarse) stroke selection. As with physical pencil-and-paper, slow stylus movements are associated with intricate detailing, whereas fast stylus movements are associated with rough strokes. Additionally, the percent of the stroke that was included in the lasso selection is taken into account to determine whether the stroke was fully or partially included in the selection.

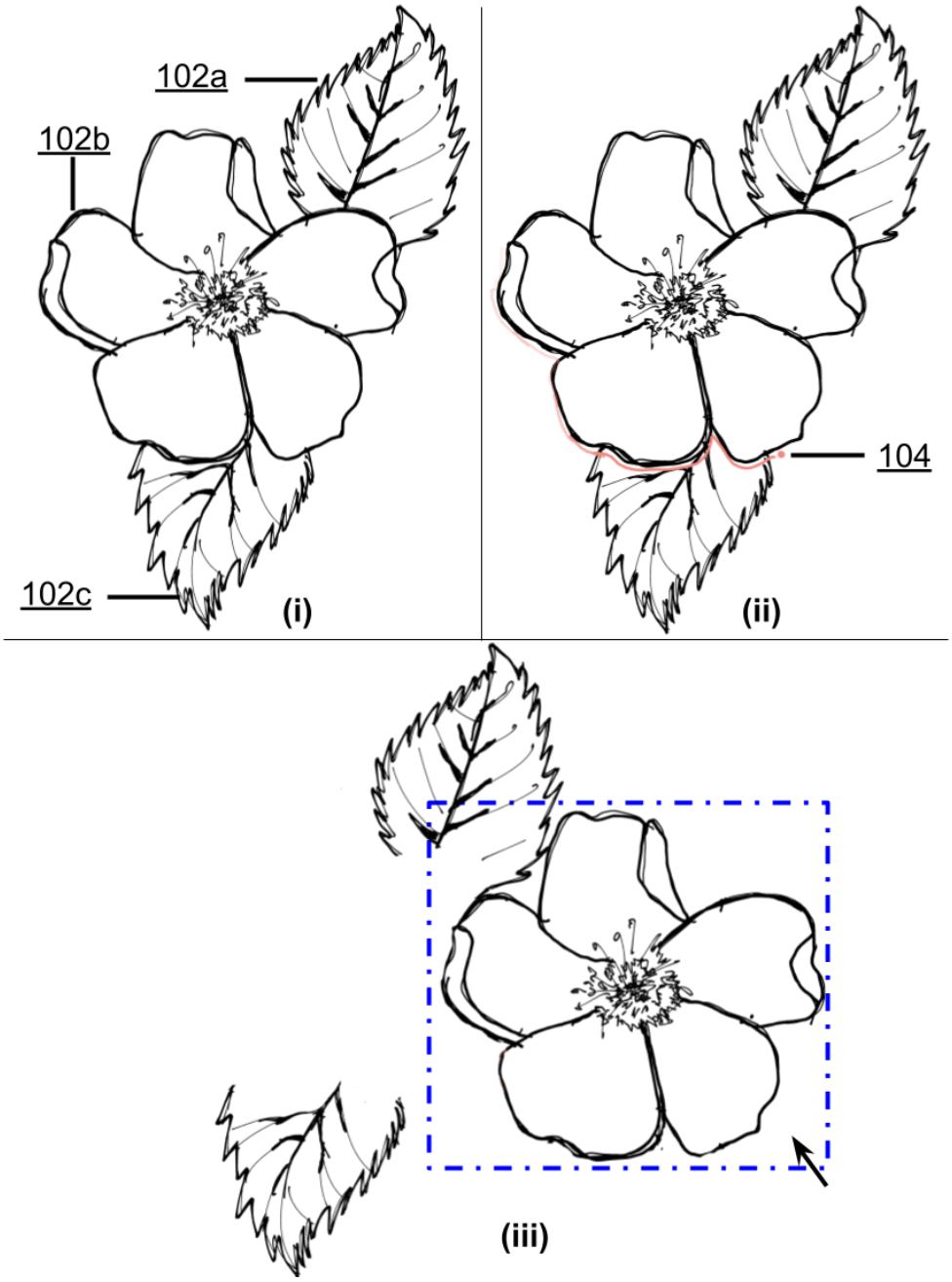

Fig. 1: Slow stylus movement results in precise stroke selection

Fig. 1 illustrates slow stylus movement that results in precise stroke selection. Fig. 1-i illustrates a drawing made on a touchscreen, comprising an upper leaf (102a), a flower (102b), and a lower leaf (102c). To precisely select just the flower, the user draws slowly and deliberately around it. The trace of the user's stylus, in pink, is seen to be thin (Fig. 1-ii, 104), its

diameter proportional to the speed of the stylus. The thin stylus trace indicates a low tolerance of stroke selection: in this case, a stroke is selected only if it is very close to the trace of the user's stylus. A slow stylus speed results in the precise selection of just the flower without the leaves (Fig. 1-iii).

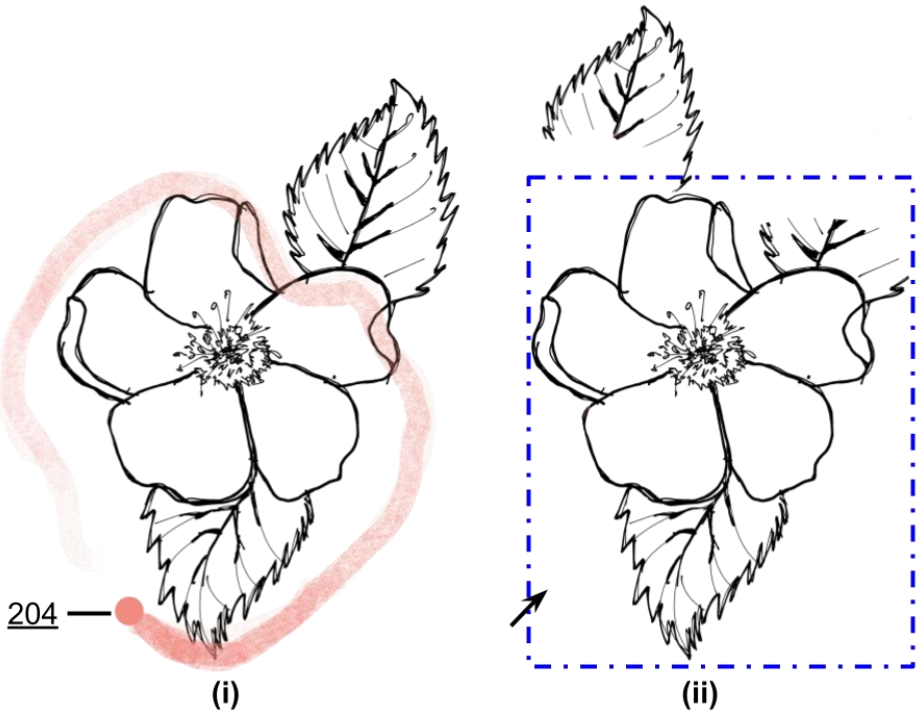

Fig. 2: Fast stylus movement results in coarse stroke selection

Fig. 2 illustrates fast stylus movement that results in coarse (more inclusive) stroke selection. To roughly select strokes that include the flower and the lower leaf, the user draws quickly around the region of interest. The trace of the user's stylus, in pink, is seen to be thick (Fig. 2-i, 204), its diameter proportional to the speed of the stylus. The thick stylus trace indicates a high tolerance of stroke selection: in this case, a stroke is selected even if it is not fully included in or somewhat away from the movement of the stylus. The fast stylus speed results in a coarse selection, e.g., the flower, the lower leaf, *and* bits of the upper leaf are selected (Fig. 2-ii).

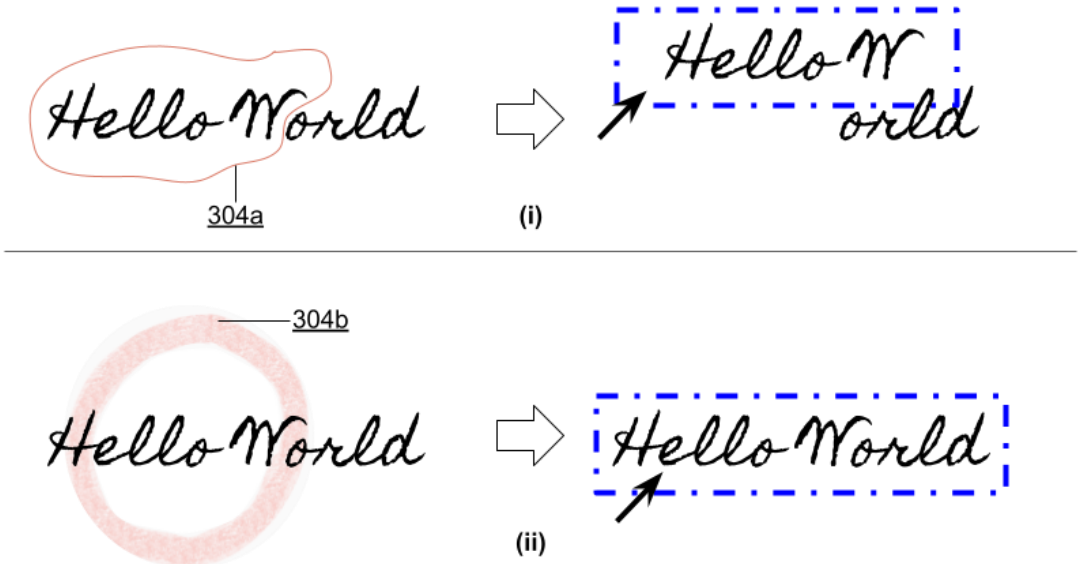

Fig. 3: Slow (fine) vs. fast (coarse) selection of handwritten text

Fig. 3 illustrates similarly slow (fine) versus fast (coarse) selection of text that is handwritten on a touchscreen. In Fig. 3(i), the user moves the stylus slowly and deliberately (indicated by a thin stylus trace, 304a) to select particular characters out of a phrase. In Fig. 3(ii), the user moves the stylus quickly and covers coarsely a region (indicated by a thick stylus trace, 304b), which results in entire words being selected, with even sections of words that are just outside the stylus trace being included in the selection.

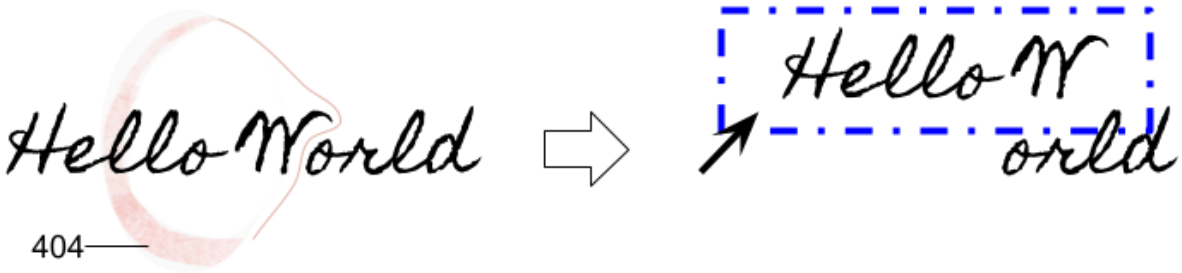

Fig. 4: Varying stylus speed within a single lasso trace

As illustrated in Fig. 4, the user can vary the stylus speed within a single trace of the lasso tool. The resulting lasso trace (404) has sections of varying fineness (selectivity). Where the

lasso trace is fast, the stroke selection is coarse, such that more strokes are included. For example, as seen in Fig. 4, the entire word ‘Hello’ is included, although the trace doesn’t encircle ‘H’ and ‘e’). Where the lasso trace is slow, the stroke selection is fine, such that strokes are included only when very close to the lasso trace. For example, as seen in Fig. 4, only the letter ‘W’ of ‘World’ is included. In this manner, the variable speed of stylus movement serves as a signal for the selection tool of stylus apps.

Fig. 5: Eraser tool

The speed of stylus movement can serve not only as a signal for selection of strokes, but also for other types of stroke manipulation, e.g., deletion, movement, re-scaling, etc. For example, Fig. 5 illustrates an eraser tool (504) that is moved at varying speeds around handwritten text (or other hand-drawn content) to erase strokes with a tolerance that is based on the speed of movement of the eraser tool.

CONCLUSION

This disclosure describes a lasso tool for stylus apps that determines selection tolerance based on the speed with which the stylus is moved at different points of the selection path. A relatively slow stylus speed is taken as an indication that the user intends a precise (less inclusive) stroke selection, whereas a relatively fast stylus speed is taken as an indication that the user intends for a more inclusive (coarse) stroke selection. The described speed-sensitive lasso tool enables flexible, accurate, and efficient selection of strokes.