Adding Context to Multi-touch Region Selections

Multi-touch Region Selections

Selection Techniques Currently Used
- Based on metaphors designed and developed for desktop computers with a mouse
- Touch point acts as mouse cursor
- Multi-touch implementations only offer simple rectangular selections
- The full potential of multi-touch is not used
- Room for improvement using a technique that was actually designed for multi-touch interaction

Our Technique: Designed for Multi-touch
- Use two touches to completely define the selection region
- The order and relative position of the two touch points (their context) can be mapped to different selection modes

Extending, Modifying and Refining Selections

Extending Existing Selections
- The first touch is placed inside the currently selected region
- The second touch is placed outside

Deciding Selection Modes
- If the first touch is inside the selected region and the second touch is outside the newly defined region will be added
- If the first touch is outside the selected region and the second touch is inside the newly defined region will be subtracted
- If both touches are placed outside the selected region is dismissed and replaced by a new selection
- Selection mode is decided based on the initial placement of the touches and does not change if the touches are moved

Subtracting from Existing Selections
- The first touch is placed outside the currently selected region
- The second touch is placed inside

Creating Holes in Selections
- The first touch is (initially) placed outside the selected region and the second touch inside to signal a subtraction
- By moving both touches inside the selected region once the selection mode is set it is possible to cut holes into the selected region

Complex Selections

Selecting Disjoint Regions
- The first touch is (initially) placed inside the selected region and the second touch outside to signal an addition
- By moving the touches afterwards it is possible to select disjoint regions

Creating Holes in Selections
- The first touch is (initially) placed outside the selected region and the second touch inside to signal a subtraction
- By moving both touches inside the selected region once the selection mode is set it is possible to cut holes into the selected region

Preliminary User Study: Comparison with Desktop Techniques

- Complex selections are combinations of simple rectangular selections
- Examine our technique compared to two related techniques
  - Touch and Drag (DRAG): Touch to place the first corner, then drop touch point to define the selection region
  - Selection Widget (WIDGET): Handles for modifying the selection are placed around the actual selection region
- 21 participants were asked to perform a number of region selections with each technique
- Target regions were displayed and had to be selected as precisely as possible

Touch positions relative to the target rectangle scaled to a unit square. Actual touches of DRAG (left) and MULTI (middle) are shown. The final position of WIDGET (right) is shown for comparison. Mean distances from the target corner are shown in orange. Yellow circles represent the standard deviation from these means.