Tangible Brush:
Performing 3D Selection with Portable and Position-Aware Devices

Problem
Visualization systems rely on exploratory data visualization and analysis [1] that allows domain experts to explore unknown datasets to discover specific regions of interest. An essential aspect of exploratory analysis is the selection of these specific regions of interest [2]. Many datasets are defined in 3D space, yet selection is often performed based on 2D input. While 2D selection can be efficient for datasets with explicit shapes, it is less efficient for data without such objects.

Proposed Solution
We propose a fully portable and affordable system to perform 3D selections. Our approach combines two input modalities through the use of a position aware tablet. We make use of Google's Project Tango tablet and combine it with a vertical display to propose different synchronized views. Essentially, it works like 2D brushing with tangible interaction to move the brush in 3D space.

#1 Tactile Shape
First, a view is selected with tangible or tactile manipulation. The brush shape is created with tactile input. The current implementation only supports rectangle shapes.

#2 Tangible Extension
The tangible motion of the tablet is used to move the 2D shape and derive a 3D selection volume. Interaction can be constrained to use the motion perpendicular to the tablet's orientation only or its full 6 DOF motion.

#3 Adjustments
This approach can be repeated to adjust the selection volume. Users can create a new tactile shape and extend it with tangible interaction. This process can be used to refine the selection.

Conclusion and future work
Our 3D selection technique relies on both tactile and tangible modalities made possible with commercially available fully-portable position-aware tablet. The technique can be further improved with:
- the possibility to draw arbitrary shapes on the tactile screen
- the support for more Boolean operations (using user-centric moding to select the desired operation).

References