

# 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



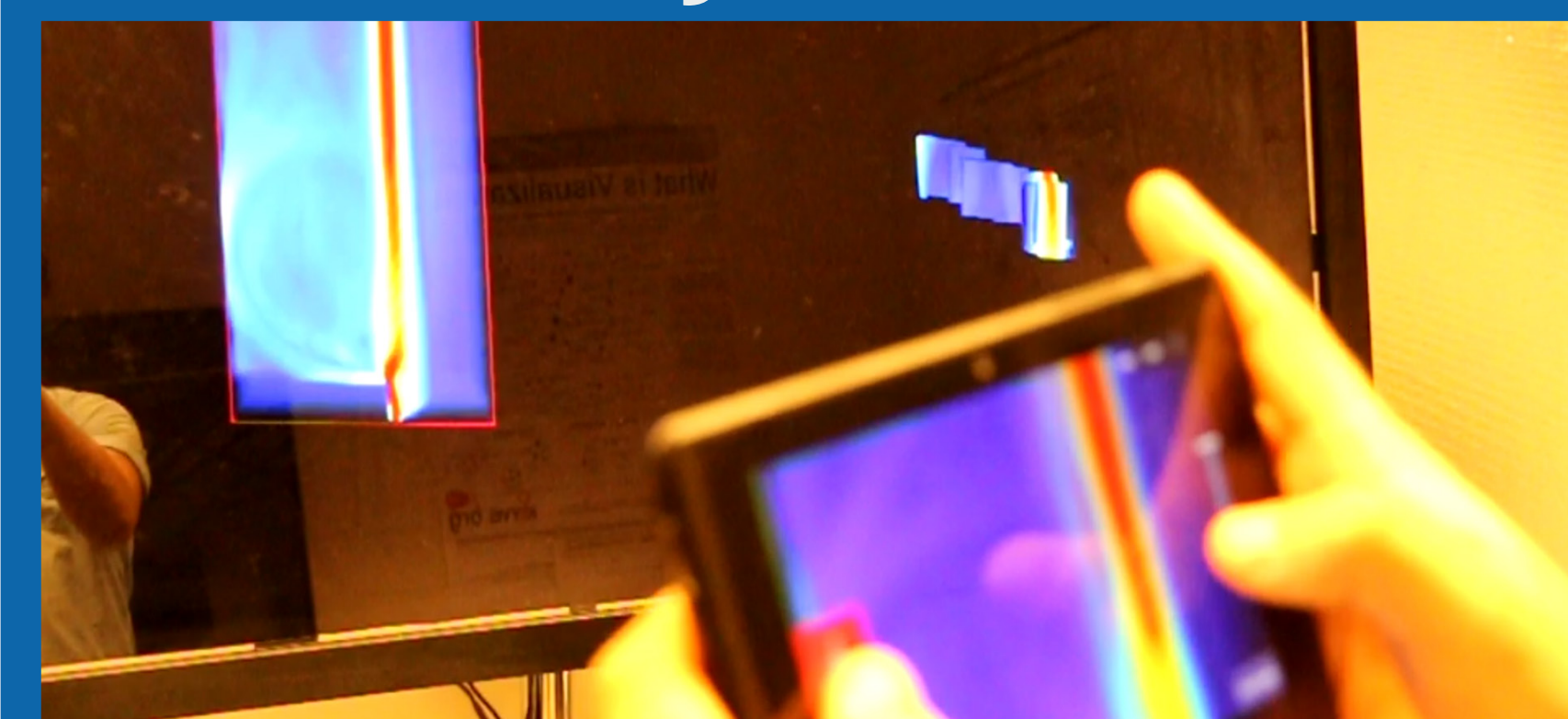
First, a view is selected with **tangible or tactile manipulation**. The **brush** shape is created with **tactile input**. The current implementation only supports rectangle shapes.

### #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

- [1] J. W. Tukey. Exploratory data analysis. 1977.
- [2] G. J. Wills. Selection: 524,288 ways to say “this is interesting”. In Proc. InfoVis, pp. 54–60. IEEE, 1996. doi: 10.1109/IN- FVIS.1996.559216