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.

Essentialy, it works like **2D brushing** with **tangible interaction** to move the brush in **3D space**.
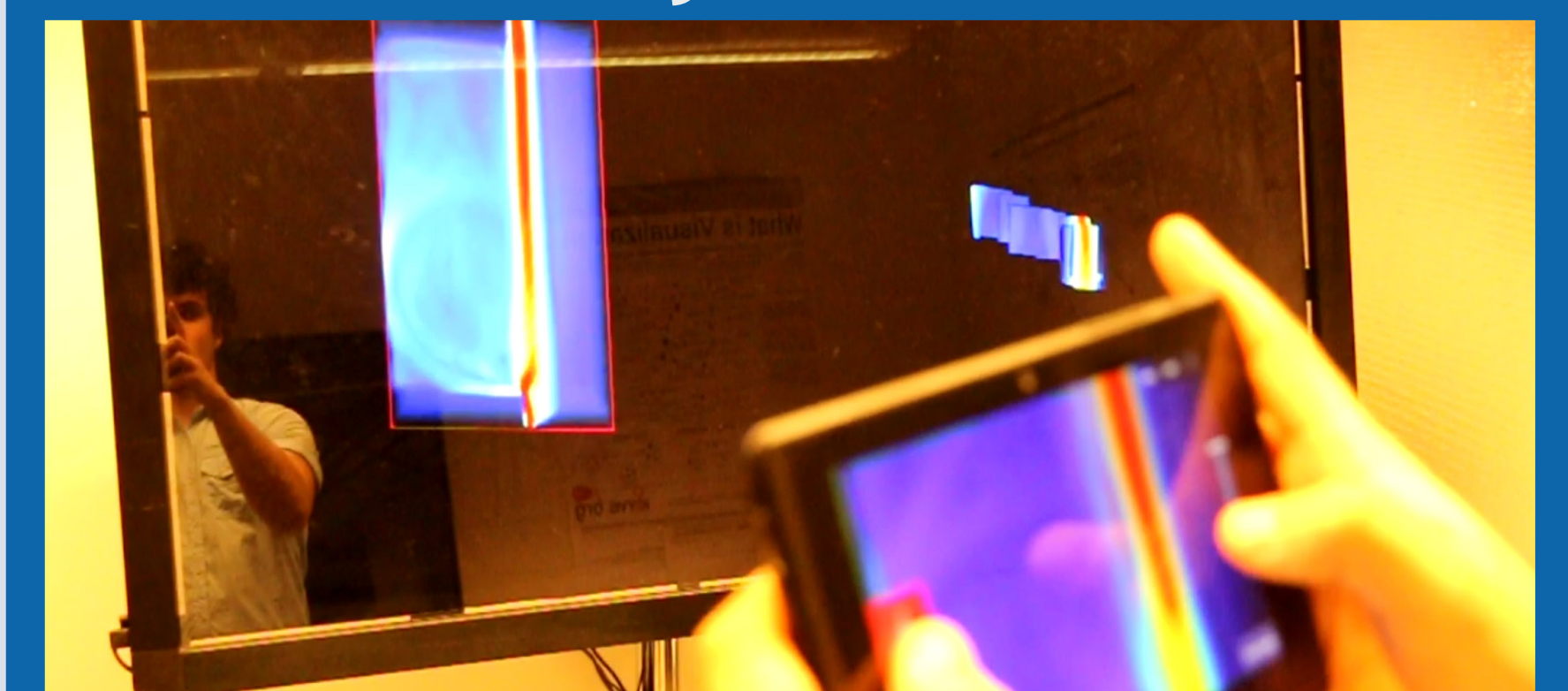

#1 Tactile Shape

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).

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References

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