Towards Combining Mobile Devices for Visual Data Exploration

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Introduction

- Many visualization systems (multiple coordinated views in particular) use traditional desktop environments → only little use of mobile devices
- Our goal: Developing a visualization interface that makes use of multiple mobile devices such as smartphones and tablets
- Concept: Distribute, connect, and coordinate multiple visualization views across a number of mobile devices
- Managing visualizations: focus on the dynamic placement, spatial arrangement, and combination of visualizations

Concept for Tangible Visualization Views

Device Proximity and Combination

- Three proximity-based coupling states describe the type or coupling intensity of a logical connection between devices

- Decoupled
  - Devices show separate, individual visualization views

- Synchronized
  - Devices share settings and other visualization properties, such as selections, filter options, or color themes
  - Distributed visualization views are aligned and combined

- Adapted
  - Synchronization and adaptation of coupled devices also depends on the views that are displayed

Selection Views

- Selection Views: By offloading menus or distributing different views across multiple devices we improve display usage.

- Selection Views
  - Load a specific application case or data set, select a visualization technique

Vis Views

- Vis Views: linked brushing, zoom and pan, visually align views or data objects, or synchronize visual properties

Settings/Parameter Views

- Settings/Parameter Views: adjust data mapping (attribute to visual variable), show/hide elements of a visualization

Visualization Use Cases

Multivariate Data Visualizations

In the synchronized state, linked brushing is activated and if applicable, shared axes are highlighted. When combined side by side (adapted), the views are aligned to improve readability, here by rotating (bar charts) and/or scaling (parallel coordinates, scatter plot).

Map-based Visualizations

A simple overview and detail setup can be achieved by moving multiple map views close to each other (state synchronized). Maps combined with other views can be used to filter objects.

Network Visualizations

Similar to maps, overview and detail is important in node-link visualizations. The combination with an adjacency matrix enables an easier manipulation of relations within the displayed graph.

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