MyBrush: Brushing and Linking with Personal Agency

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CMV, Brushing and Linking

• CMV stands for coordinated multiple views

• Brushing

• Linking
Personal Agency

• People “strongly desire that they are in charge of the interface and that the interface responds to their actions”¹

• “Interaction techniques that facilitate a high sense of personal agency are likely to have a strong empowering effect for users”²

Source, Link, and Target

1. **Source** is the set of one or more selected data points in a view.
2. **Link** is the expression of relationship between the source and the related data points in other views (target).
3. **Target** is the set of data points that are related to the source.
Example
Existing techniques
Source

- Visual attributes
  - Fill color
  - Outline color
  - Size
  - Shape
  - Focus and blur
  - Transparency
  - Container
  - Label

- Temporality
  - Transient
  - Temporary
  - Persistent

- Group selection
  - Mouse
  - Rectangle
  - Circle
  - Polygon
  - Lasso
  - Angle
  - Line

- Multiple selections
- Logical combination
- Degree-of-interest functions
  - Binary
  - Non-binary
Link

- Visual attributes
  - Stroke color
  - Color gradient
  - Thickness
    - Thin
    - Ribbon
    - Variable
  - Curvature
    - Straight
    - Stepwise
    - Curved
  - Transparency
  - Link stubs

- Animation

- Routing
  - Context-preserving
  - Bundling

- Selective linking of views
  - View to view
  - Brush to view
Target

- Visual attributes (similar to source’s attributes)
  - Fill color
  - Outline color
  - Size
  - Shape
  - Focus and blur
  - Transparency
  - Container
  - Label
  - **Hide unselected**
- De-aggregation
Design goals

• **DG1.** Provide direct access to brush components.

• **DG2.** Offer choice in degree of personal agency.

• **DG3.** Support complex personal agency.
Demo
Flexibility of MyBrush
Qualitative study

12 participants (5F, 7M):
- vis group (2F, 2M)
- sports group (4M)
- mixed group (3F, 1M)

- six views
- sofifa.com dataset of the 50 most valuable soccer players
- shown at 65” multi-touch SMART Board 6000 series with 3840×2160px resolution
- prelude (10 min), training (10 min), exploration (30 min), wrap-up (10 min)
Users’ feedback

- “had a bit of a learning curve”, but “it was easy to learn” and “very fun”
- the brush menus were “nicely done” and “very helpful”
- they were able to “so easily connect this many views
- “I really like the many possibilities cause every person is gonna try differently”
- “I could learn about the players [...] and was able to search for answers to the questions I had”
Limitations (mentioned in the paper)

• Scalability
  • Explicit links (link bundling, routing)
  • More features -> change of UI
  • Mobile devices

• More configurable attributes needed (?)

• Ordering

• Conflict resolution

• Collaborative interfaces
Critique (screen-dependent)
Critique (intractable links)
Critique (hard to choose individual points)
Critique (unnatural behaviour)
Critique (lacking UI)
Critique (summarized)

- Very screen-dependent
- Links can be virtually intractable
- Hard to choose individual points
- Unnatural behaviour for some views
- Lacking in UI elements
  - Zoom-in, zoom-out
  - Undo, redo
  - Overlapping layers

- Involves personal agency
- Clean breakdown
  - Source
  - Link
  - Target
- Immediate visual feedback
- Allows more complicated analysis
- Flexibility at design choices
Summary

• Includes extensive survey of existing brushing and linking papers.
• Deconstructed brushing and linking into three components:
  • Source
  • Link
  • Target
• Introduced MyBrush – a tool for flexible brushing and linking.
• Conducted a qualitative study and received positive feedback.
• Minor UI problems, scalability is the main issue.
Links

Demo:
  • https://philippkoytek.github.io/mybrush/

Paper:
  • http://innovis.cpsc.ucalgary.ca/supplemental/MyBrush/2018_VIS_mybrush.pdf

Source code:
  • https://github.com/philippkoytek/mybrush
Thank you!
Questions?