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

¹ B. Shneiderman and C. Plaisant. *Designing the User Interface: Strategies for Effective Human-Computer Interaction (4th Edition)*. Pearson Addison Wesley, 2004 ² D. Coyle, J. Moore, P. O. Kristensson, P. Fletcher, and A. Blackwell. *I did that! Measuring users' experience of agency in their own actions*. CHI '12, pp. 2025–2034, New York, NY, USA, 2012.

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

The technique in row features attribute in column				SOURCE											LINK									TARGET										
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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:

• <u>https://philippkoytek.github.io/mybrush/</u>

Paper:

<u>http://innovis.cpsc.ucalgary.ca/supplemental/MyBrush/2018_VIS_mybrush.p</u>
 <u>df</u>

Source code:

• <u>https://github.com/philippkoytek/mybrush</u>

Thank you! Questions?