Unfolding Edges for Exploring Multivariate Edge Attributes in Graphs

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WHAT?

APPROACH: UNFOLDING EDGES

Building up on existing techniques for edge encoding and interaction, we propose »Unfolding Edges« as an approach to network visualization that expands the capabilities for interactive exploration through on-demand detail enhancement of edges and their multivariate attributes. In contrast to techniques that are intended to reduce overall complexity and to minimize occlusions, our aim is to interactively add more detail to selected edges.

HOW?

TYPICAL EXISTING EDGE ENCODINGS

- color
- line thickness
- gradient
- added glyph
- arrows
- label
- texture
- parallel lines
- curvature
- line tapering
- embedded visualization
- animation
- transparency

A selected edge is separated into multiple sub-edges, allowing additional data encoding possibilities for each sub-edge.

A graph is rotated to bring a selected edge into the horizontal position and the edge unfolds into additional space for a timeline.

Typical existing edge encodings include:
- Situated and transitioned detail enhancements of edges induced through interaction
- Individual and combined use of edge attribute encoding strategies without additionally cluttering a visualization
- Detail enhancement of edge attributes without losing global context, facilitating open-ended exploration of other nodes and edges

WHY?

MOTIVATION \& PROBLEM STATEMENT

- In fields like historical network analysis observations of individual links between nodes and their attributes can be central factors for interpretation of and trust in a visualization
- Typically multivariate edge attributes in node-link diagrams are visualized through forms of on-edge encoding
- Restricted available space and representation of edges as lines limits the potential for multivariate on-edge encoding possibilities
- Adding on-edge encoding globally to all edges of a graph, oftentimes leads to over-plotting and clutter
- Only few techniques are available that focus on addressing space limitations of edge attribute representations through interaction

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ACKNOWLEDGEMENTS

This research is part of the projects SuNAR (DFG) and GEMS 2.0, which are funded by the DFG—German Research Foundation (project no. 414792379 and no. 214484876).