KronoMiner: Using Multi-Foci Navigation for the Visual Exploration of Time-Series Data

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Multivariate Data
Iterative Design Process

- 7 experts
- 4 domains
  - Computer networks
  - Weather forecasting
  - Biology
  - Financial markets
- Direct Manipulation
- Visual Feedback and Visual Cues
- Comparison and Matching

- Multi-Scale and Multi-Foci Views
- Time Dimension Operations
- Visual Representations
Graphical Layout

- **Overplotted**
  - a

- **Stacked**
  - b

**Circular**

- **Stacked**
  - c

- **Sequential**
  - e

**Linear**

- **Stacked**
  - d

- **Sequential**
  - f
Graphical Layout

- Overplotted (a)
- Stacked (b)
- Circular (c)
- Stacked (d)
- Sequential (e)
- Linear (f)
Circular Temporal Hierarchy
Context-based Manipulation

- **Segment**
- **Branch**
- **Ring**
- **All**

<table>
<thead>
<tr>
<th></th>
<th>1 Select</th>
<th>2 Drag</th>
<th>3 Drag</th>
<th>4 Wheel</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td></td>
<td>Collapse</td>
<td>Rotate Ring jump</td>
<td>Create and adjust a new segment</td>
</tr>
<tr>
<td>b</td>
<td></td>
<td>Extend</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td></td>
<td></td>
<td>Shrink inner rings</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td></td>
<td>Rotate</td>
<td>Pan</td>
<td>Zoom</td>
</tr>
</tbody>
</table>
Time Segment Adjustment
Glowing Effects and Tooltips
Analytical Functions
Plot Styles
“It took me weeks, even months to learn how to use Matlab because I had first to learn code. I can do a lot with your tool, and I don’t even have to think about it”

“In Matlab you have to generate tons of graphs. Even if you have enough space to display them, you don’t have enough brain. Here, all you have to do is to simply drag [the segment]”

“This saves me a lot of time. Normally I have to eyeball all the data first because I don’t want to go into every pieces because it is tedious”
Thank You!