

Visual Exploration of Graph Data

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Outline

- wish list for visualization of graph data
- ggobi: introduction and demos
- integrating ggobi in a software environment for graph data analysis
- (more demos in demo session)

Direct manipulation visualization of graph data

- graph layout algorithms
- visualizing nodes
 - linked views
 - ease of manipulation: painting, scaling, ...
 - projection operations
- visualizing the graph
 - data on edges treated just like data on nodes
 - linked views extended to edges
 - tweaking, subsetting, pruning, navigating the graph

Example

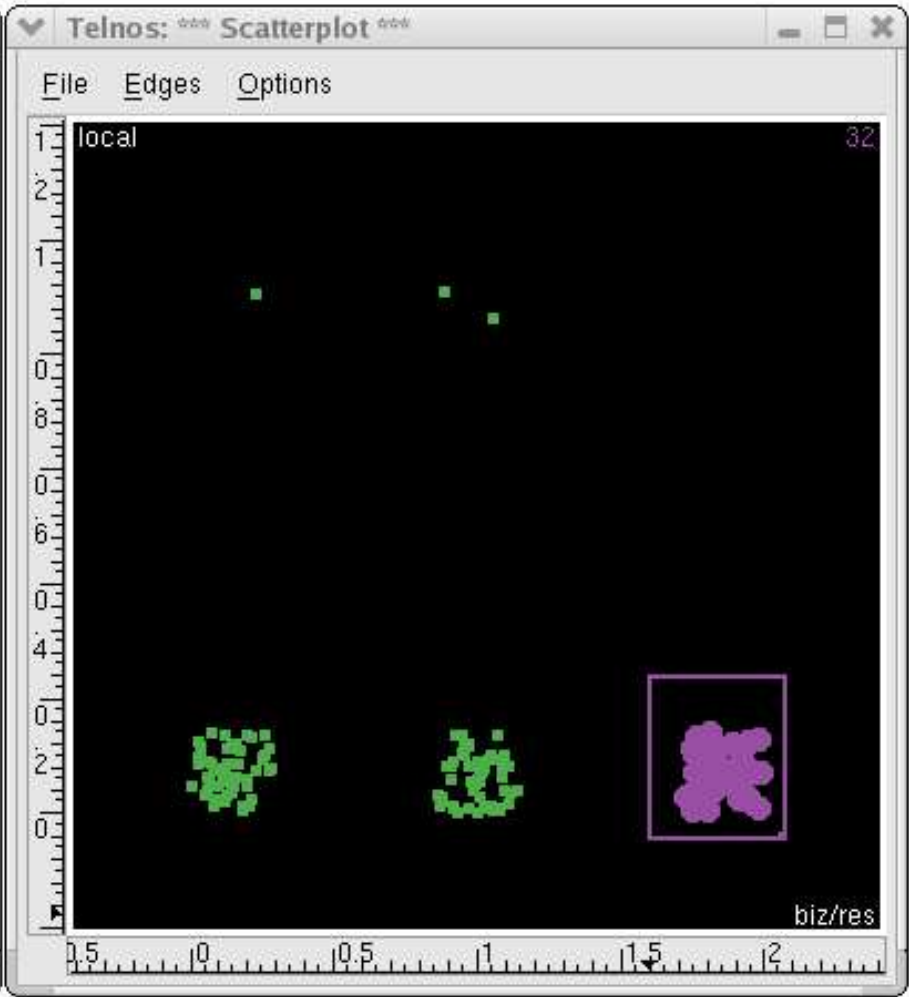
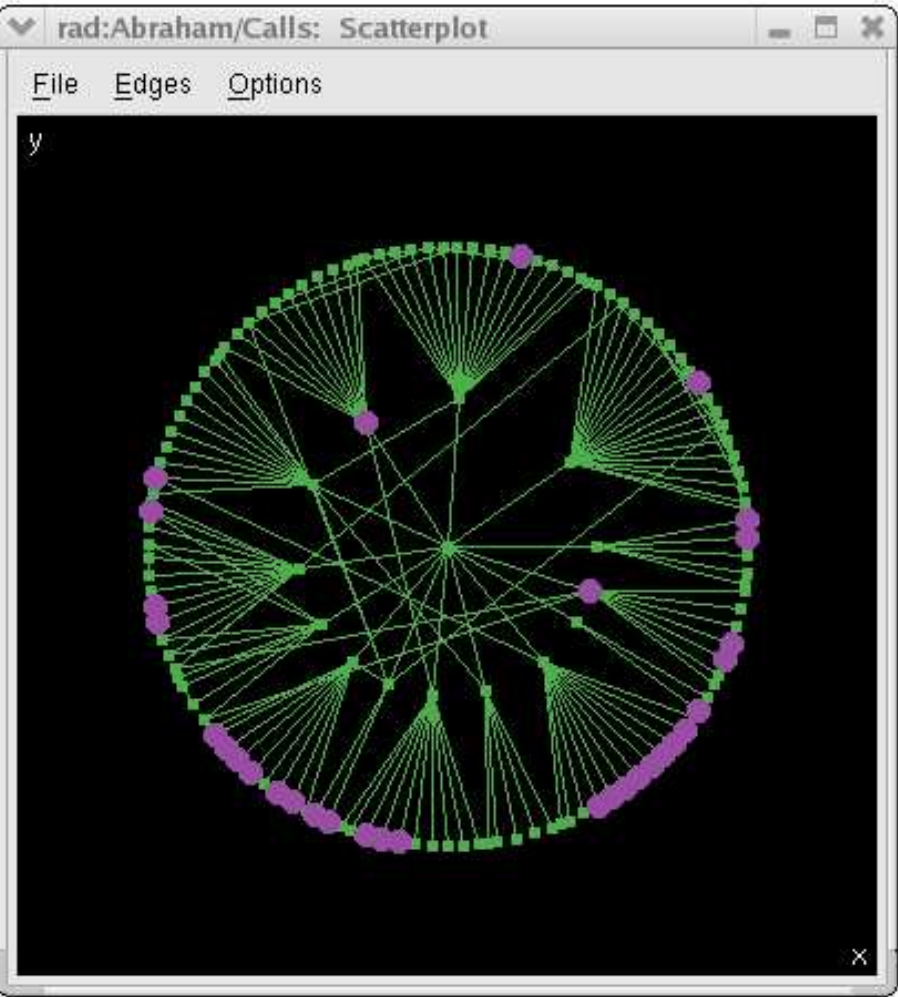
Software: ggobi (Buja, Cook, Swayne, Temple Lang)

Data: a “COI” with telephone numbers masked

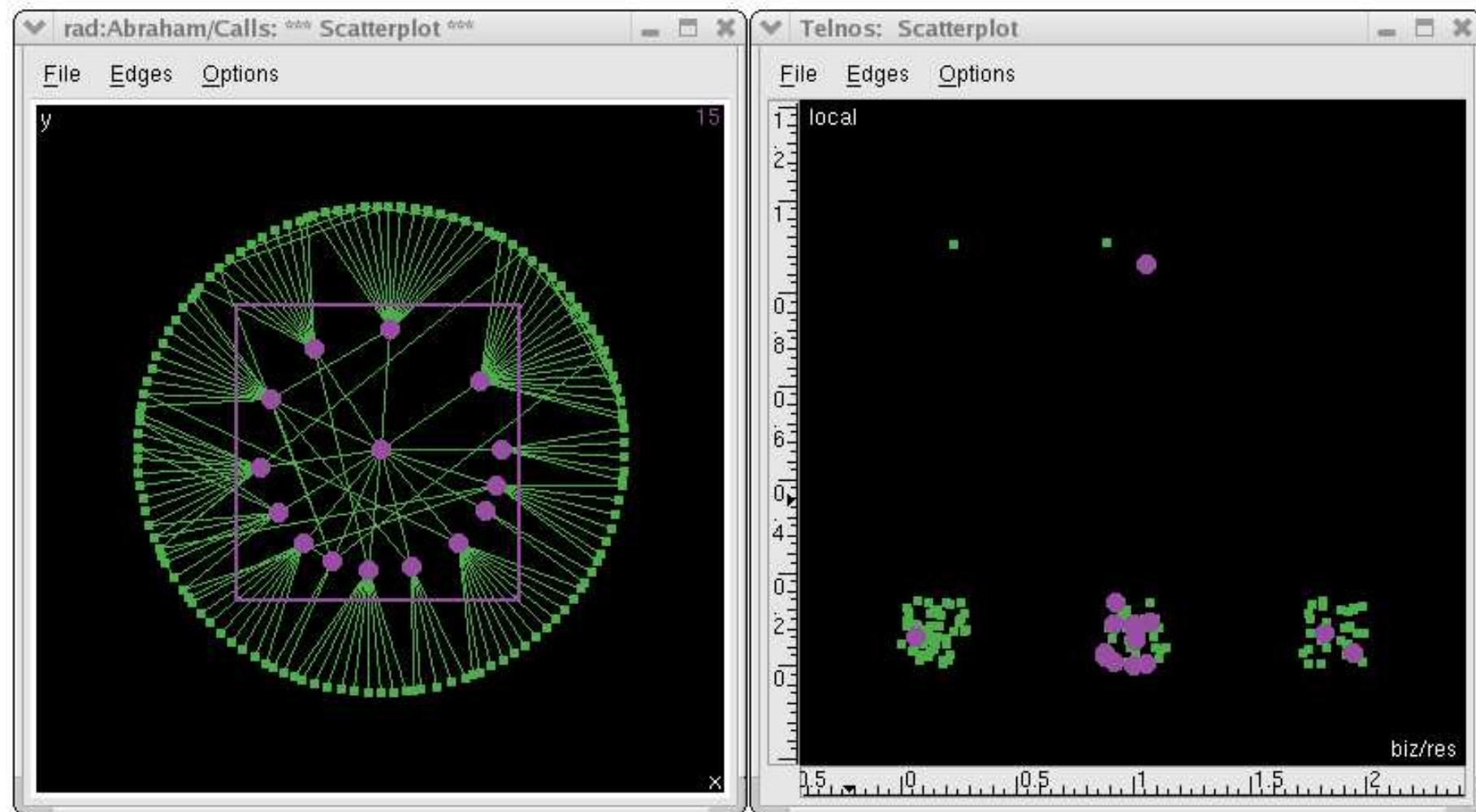
- two categorical node variables: biz/res/unknown, local
- one continuous edge variable: $\log(\text{weighted usage})$

Demos and still pictures:

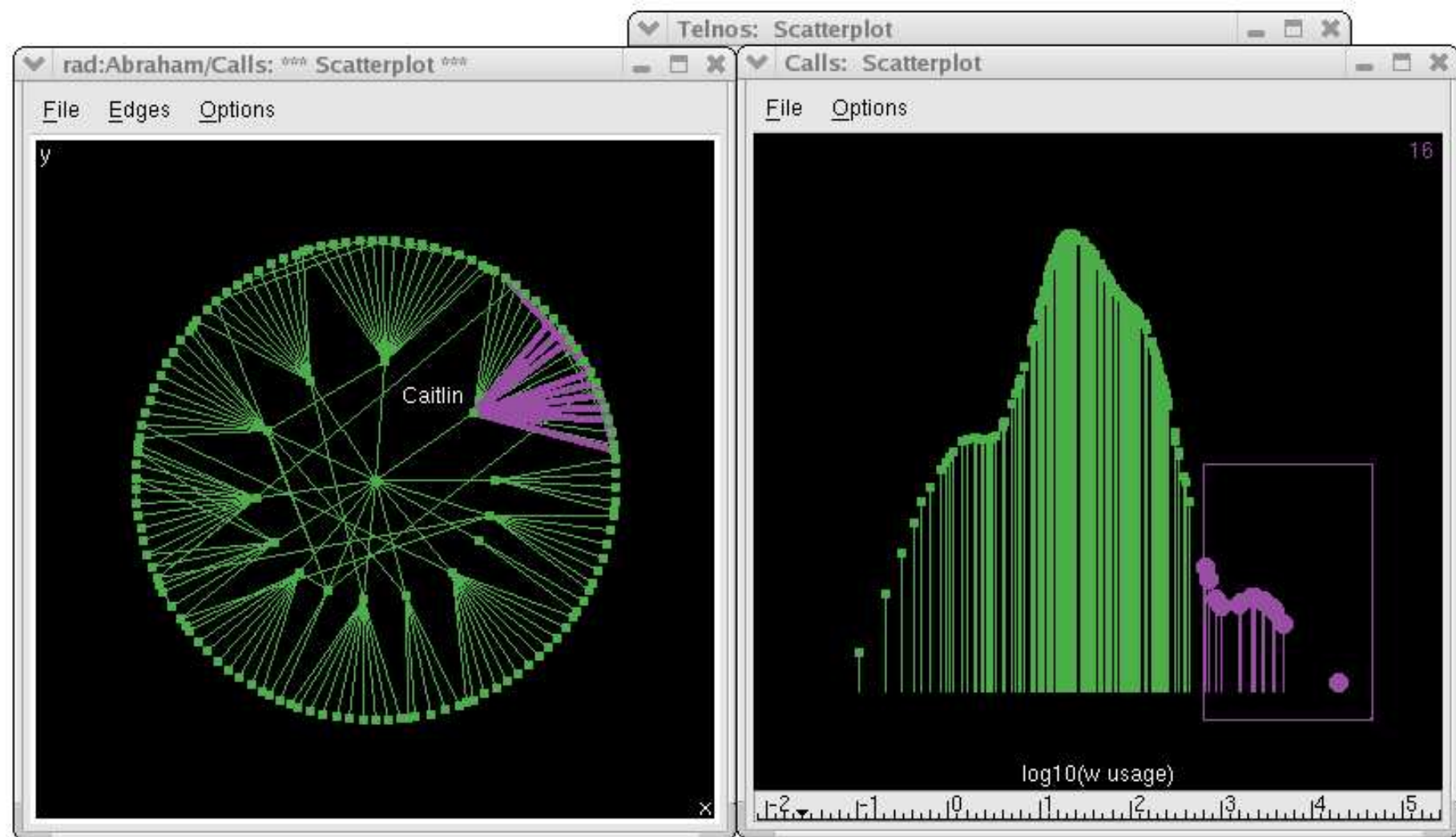
- layout: creating and manipulating
- linked views



Brush node variables, and the graph responds



Brush nodes in the graph, and the scatterplot responds



Brush an edge variable, and the graph responds

Plugins: extensions to ggobi

- layout methods
 - radial layout
 - “neato” and “dot” (www.graphviz.org)
- ggvis: multidimensional scaling
- pruning methods, navigation

Data format: an edge is just another record

- nodes

```
<record id="Banquo"> 2.4 7.7 </record>
```

```
<record id="Macbeth"> 1.0 2.5 </record>
```

- edges

```
<record source="Macbeth" destination="Banquo">
```

```
66.3 -4 .78
```

```
</record>
```

Goal: an environment for working with graph data

- visualization
 - graph layout algorithms
 - high-quality static graphics
 - direct-manipulation visualization
 - * a variety of views
 - * linking a variety of displays for brushing, ...
 - * tweaking, pruning, navigating the graph
- data manipulation, analysis and modeling
 - scripting language
 - tools and algorithms for data analysis
 - graph algorithms

Embedding ggobi: Rggobi

- ggobi can be embedded in R, and driven through its API
- Rggobi functionality includes:
 - construct a graph in R, hand it to ggobi
 - read results from ggobi displays back into R
 - respond to ggobi events

Further work

- R packages of graph algorithms are emerging, presenting opportunities for further integration
- other graph manipulations: aggregation, working with subsets
- other scripting languages: python

Where to get it: `www.ggobi.org`

Paper corresponding to this talk:

`www.ci.tuwien.ac.at/Conferences/DSC-2003`