

## CSE 564: Visualization

### Information Visualization Toolkits

Klaus Mueller

Computer Science Department  
Stony Brook University

### Popular Toolkits

#### Infovis Toolkit

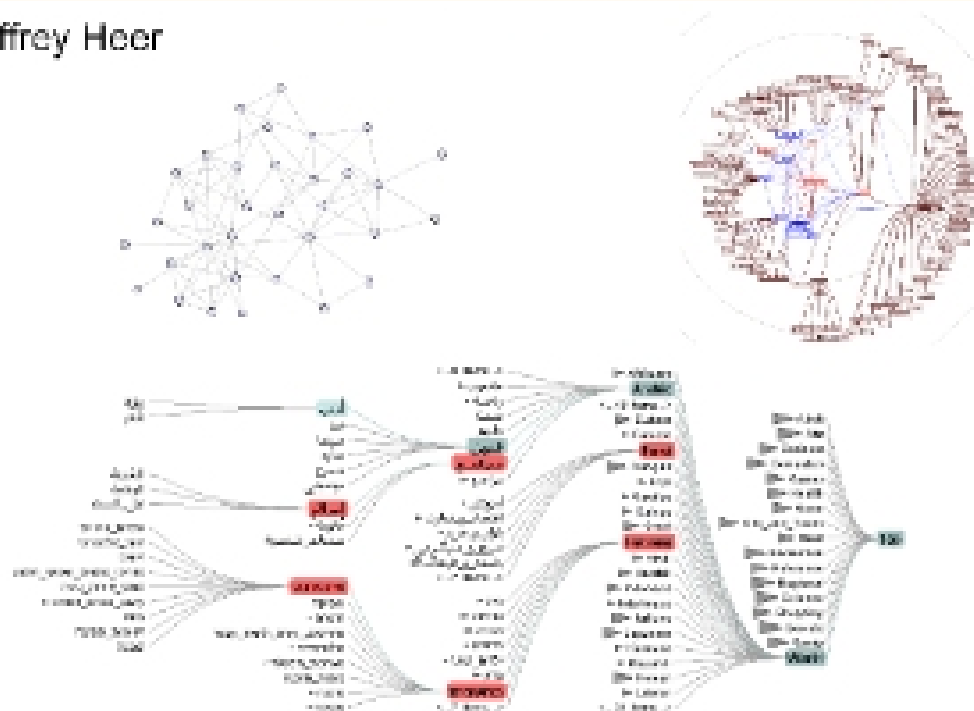
- scatter plots, time series, parallel coordinates, ...
- <http://ivtk.sourceforge.net>

#### Prefuse, Flare, Protovis

- toolkits developed by J. Heer, Stanford
- **prefuse**: based on Java (<http://prefuse.org>)
- **flare**: prefuse + flash animations (<http://flare.prefuse.org>)
- **protovis**: javascript (<http://vis.stanford.edu/protovis>)
- can all run in your web browser
- declarative and data-driven

### Examples

Jeffrey Heer



### Protovis

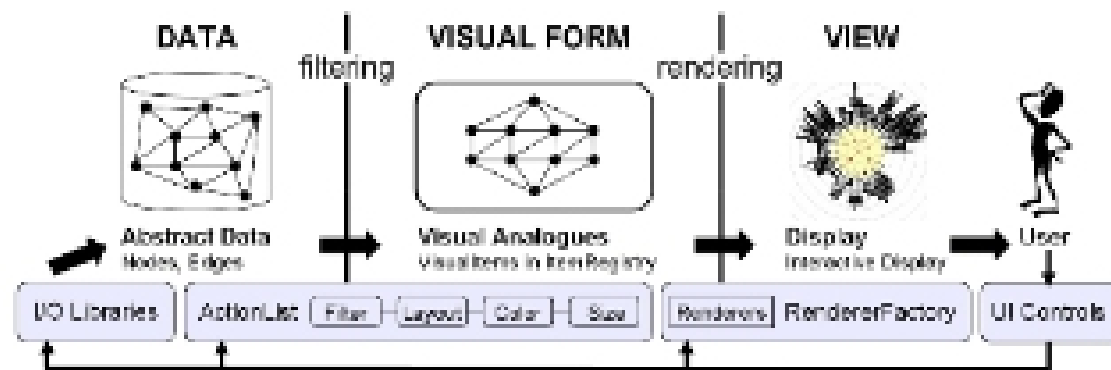
A javascript user interface toolkit for constructing interactive information visualization applications

Supports visualization, animation, and interaction

- application building by stringing together fine-grained, reusable components
- layers of indirection between source data, visualized data, and rendering



## System Architecture



## Toolkit Features

Data structures and I/O libraries

Multiple visualizations, multiple views

Application design through composable modules

A library of provided layout and distortion techniques

Animation and time-based processing

Graphics transforms, including panning and zooming

A full force simulator for physics-based interfaces

Interactor components for common interactions

Integrated color maps and search functionality

Event logging to support visualization evaluation

## Protovis

Similar to other graphics libraries such as Java or Processing

- has mechanisms to draw rectangles, circles, polygons
- but uses declarative syntax (not imperative)

## Protovis

In Processing you might draw a pie chart as follows:

```
for (int i = 0; i < data.length; i++) {  
  fill(data[i] * 120);  
  float ang = data[i] / sum * 2 * PI;  
  arc(75, 75, 140, 140, lastAng, lastAng + ang);  
  lastAng += ang;  
}
```

In Protovis:

```
vis.add(pv.Wedge)  
  .data(data)  
  .left(75)  
  .bottom(75)  
  .outerRadius(70)  
  .angle(pv.Scale.linear(0, pv.sum(data)).range(0, 2 * Math.PI));
```

## Protovis: Further Features

Inheritance

Property chaining

Smart Properties

Interaction and animation

- smooth animations a-la Flare not yet implemented

## For Lab 3

Choose any of these toolkits to implement your infovis lab assignment

Each has unique features

Check out the toolkit webpages for detailed manuals