InfoVis in ParaView

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Topics

- Applications
- Data Structures
- Data Sources
- Data Transformations
- Algorithms
- Views

Applications

- ParaView
  - All of the capabilities mentioned here are ParaView plugins.
  - Use them in ParaView today!

- OverView
  - The OverView client provides a simplified (relative to ParaView) client intended for Infovis use.
  - The OverView UI can be "branded" and bundled with a specific set of plugins to provide a domain-specific solution.
  - The OverView UI will continue to evolve relative to the standard ParaView UI.

- Vertical Applications
  - Some problem domains will merit their own custom clients, with simplified, specialized user interfaces.
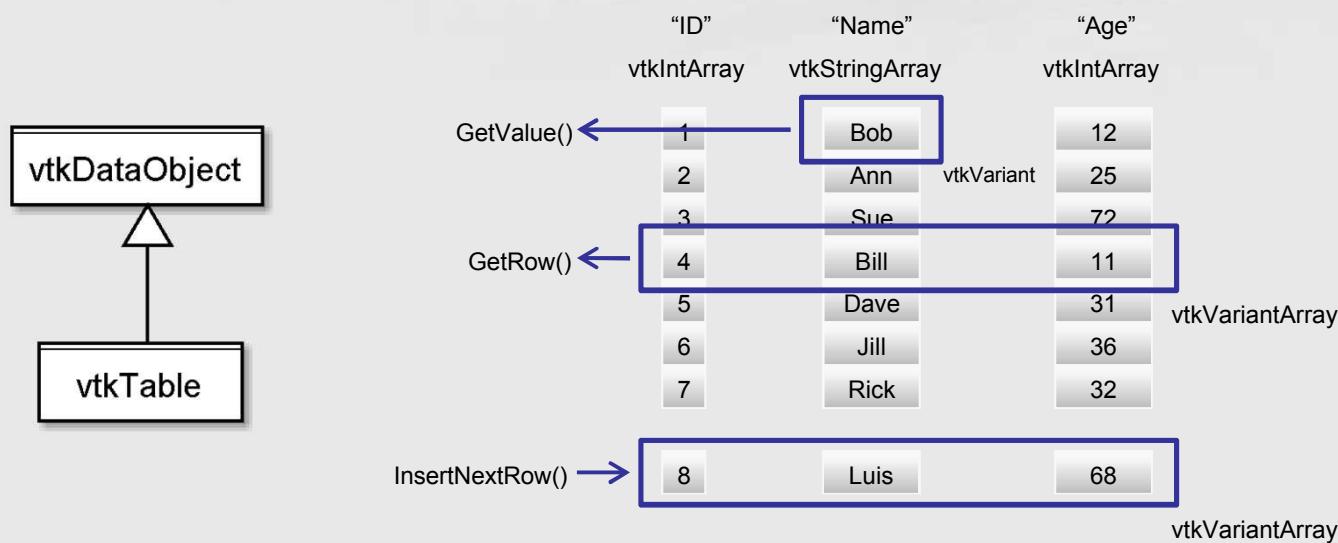
Data Structures

- Tables
- Graphs (Directed, Undirected, Directed Acyclic, Trees)
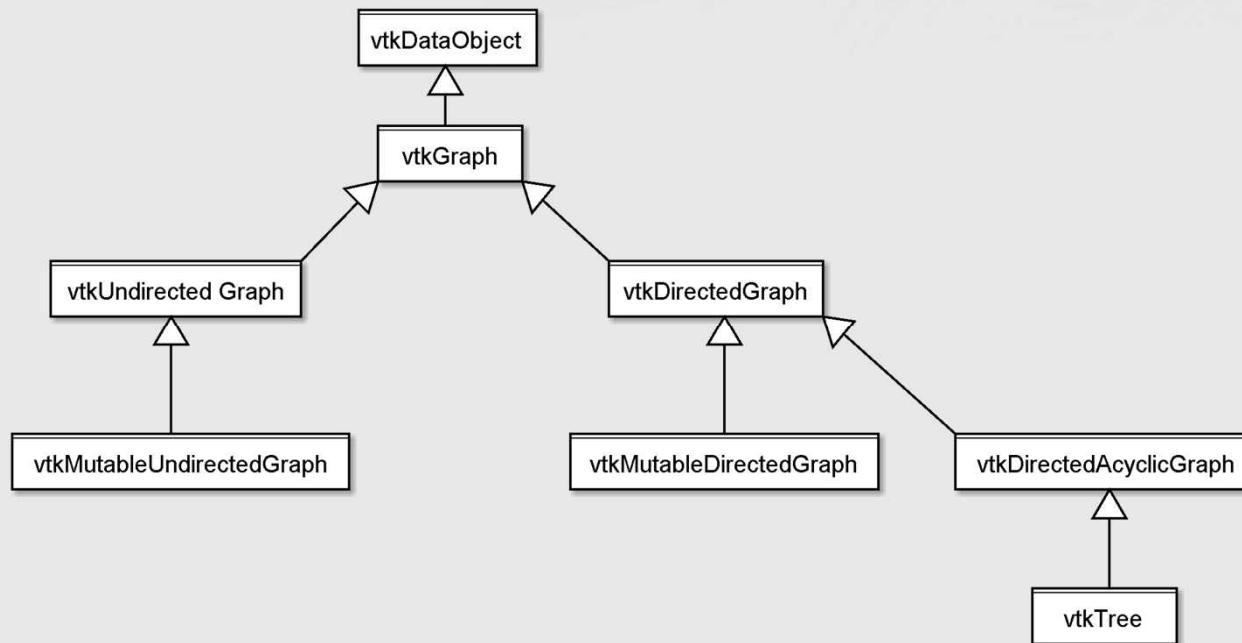- N-Way Arrays

Tables

- vtkTable: manages a heterogeneous collection of VTK arrays†.
- API enforces equal lengths for every column.
- Provides API for getting / setting individual "cells" or entire rows.

Graphs

- vtkGraph provides a generic, read-only interface to an arbitrary graph.
- Derivatives provide increasingly-specialized interfaces.
- Provides per-vertex and per-edge attributes.
- Distributed graph work with Indiana University is ongoing.

N-Way Arrays

- Arbitrary-dimension sparse and dense arrays.
- Several different levels of abstraction:
  - Generic arrays without type.
  - Arbitrary-dimension arrays with type.
  - Arrays with specific dimension and type.
  - Storage-specific interfaces.
- Sparse arrays use coordinate storage.
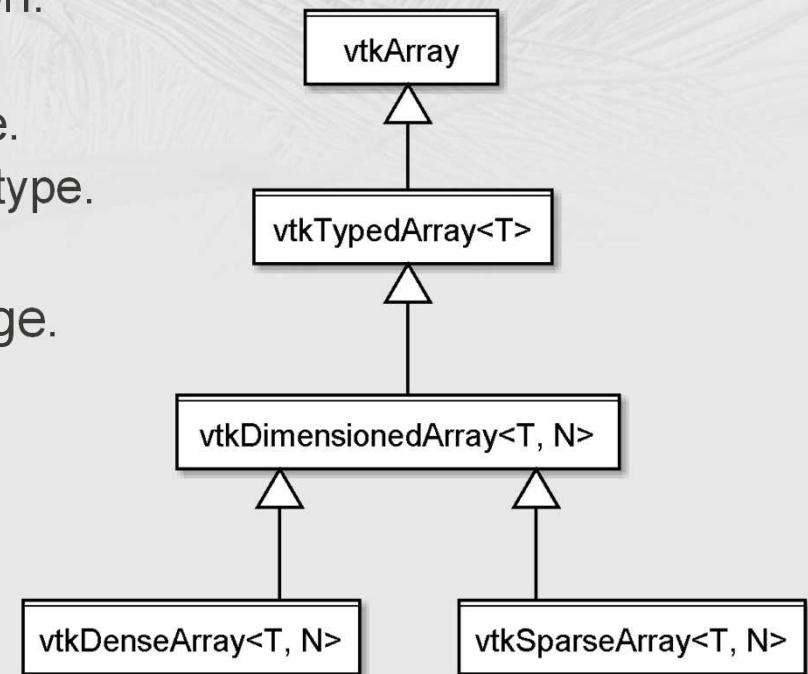
Data Sources

- Graph Sources
  - Random Graph Source
- Array Sources
  - Diagonal Matrix Source
  - Random Sparse Array Source
- Table Readers
  - DelimitedText
  - FixedWidth
  - ISI, RIS
- Graph Readers
  - Dimacs
  - DOT
  - GXL
  - Chaco
  - XML
  - Tulip

- Databases
  - MySQL
  - Postgres
  - Oracle
  - SQLite
  - ODBC / Netezza

Data Transformations

- Data Object to Table
- Table to Graph
- Table to Tree
- Adjacency Matrix to Edge Table
- Array to Table
- Table to Sparse Array

Algorithms

- Table Algorithms
  - Univariate Statistics
    - Descriptive Statistics
    - Order Statistics
  - Bivariate Statistics
    - Contingency Statistics
    - Correlative Statistics
  - Merge Columns
  - Split Table Field
  - Merge Tables
  - Threshold Table

- Graph Algorithms
  - Brandes Centrality
  - Breadth First Search
  - Connected Components
  - Extract Selected Graph

- Array Algorithms
  - Cosine Similarity (Thresholded)
  - Log Weighting
  - Matricize Array
  - Matrix Column Norm
  - Normalize Matrix Vectors
  - Transpose Matrix

Views

- Table View
- Record View
- Attribute View
- Geospatial View
- Graph View
- Hierarchy View
- Landscape View
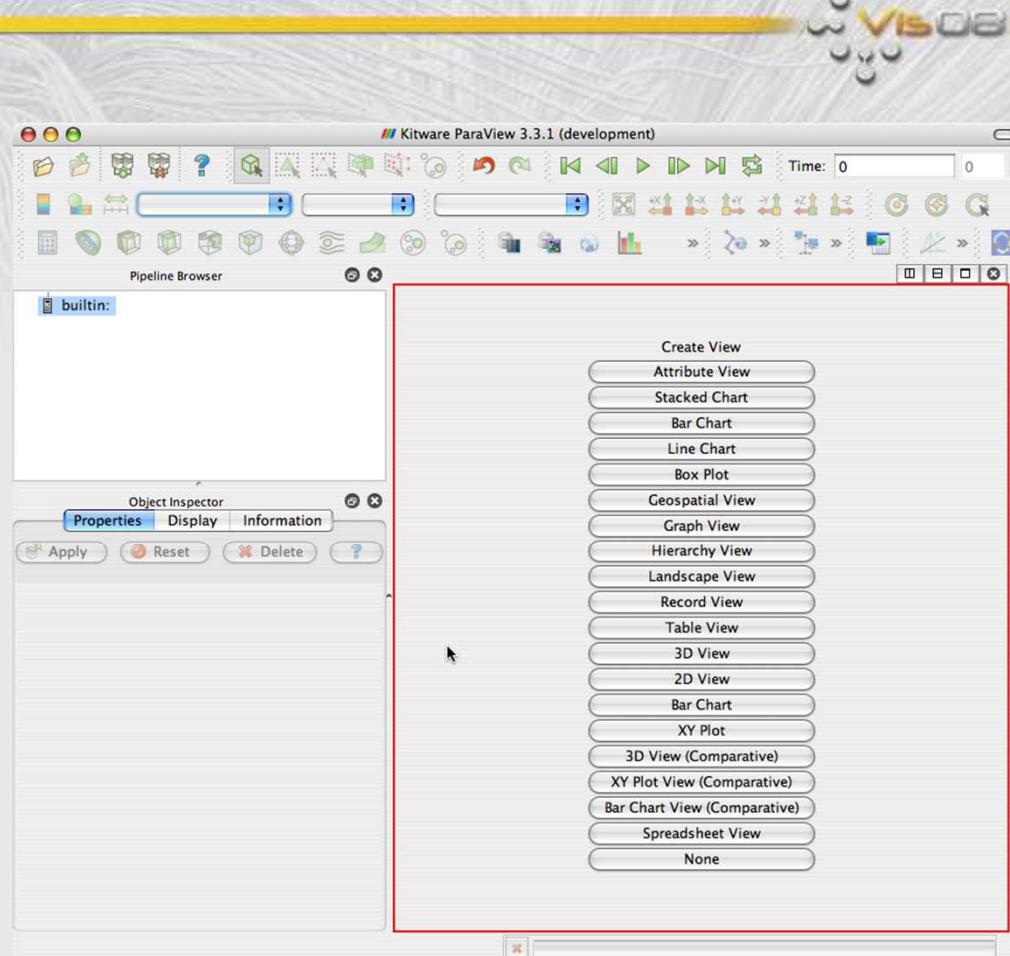
Table View

- Simple client-side spreadsheet-like display of table data.
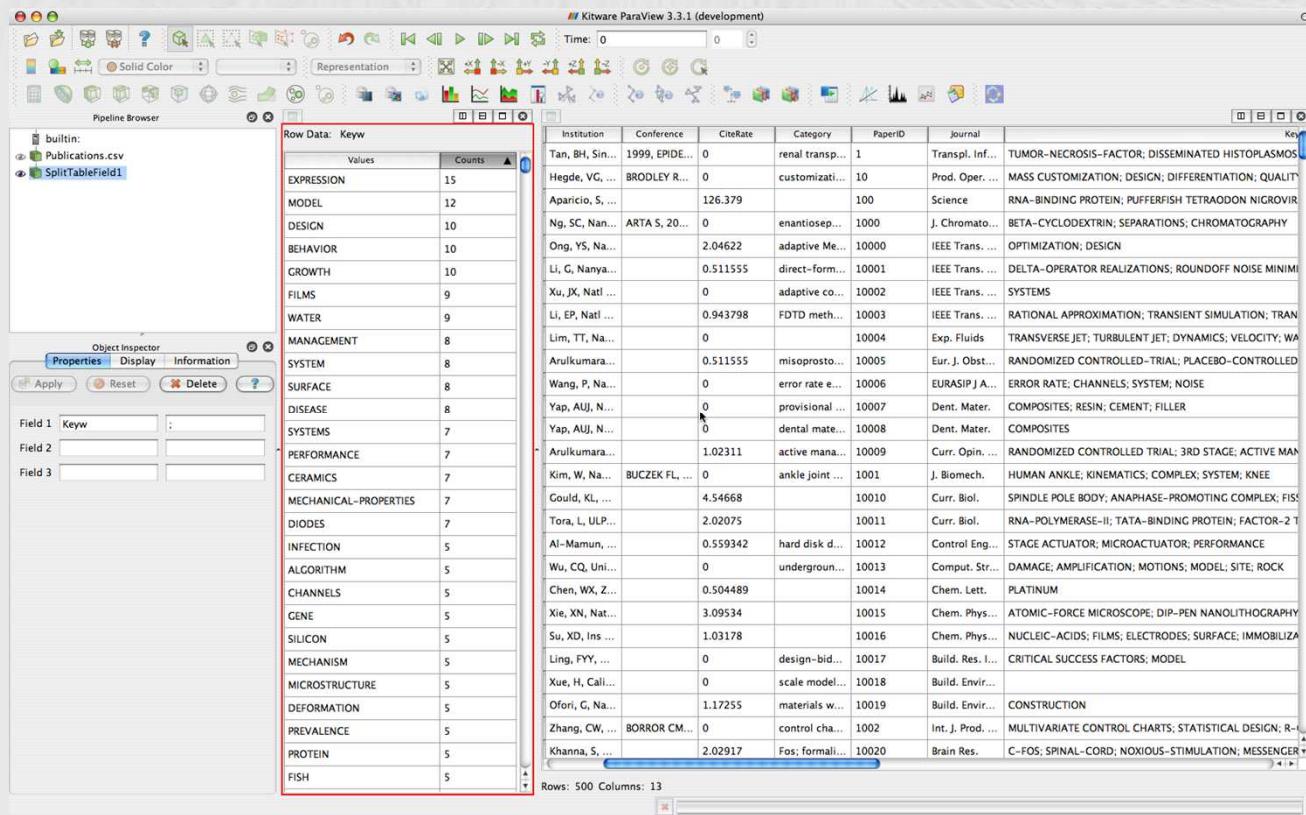- Needs to be merged with ParaView Spreadsheet View.

Record View

- Displays a single record (row) from a table.
- Useful when the size or number of columns make it impractical to browse using a Table View.
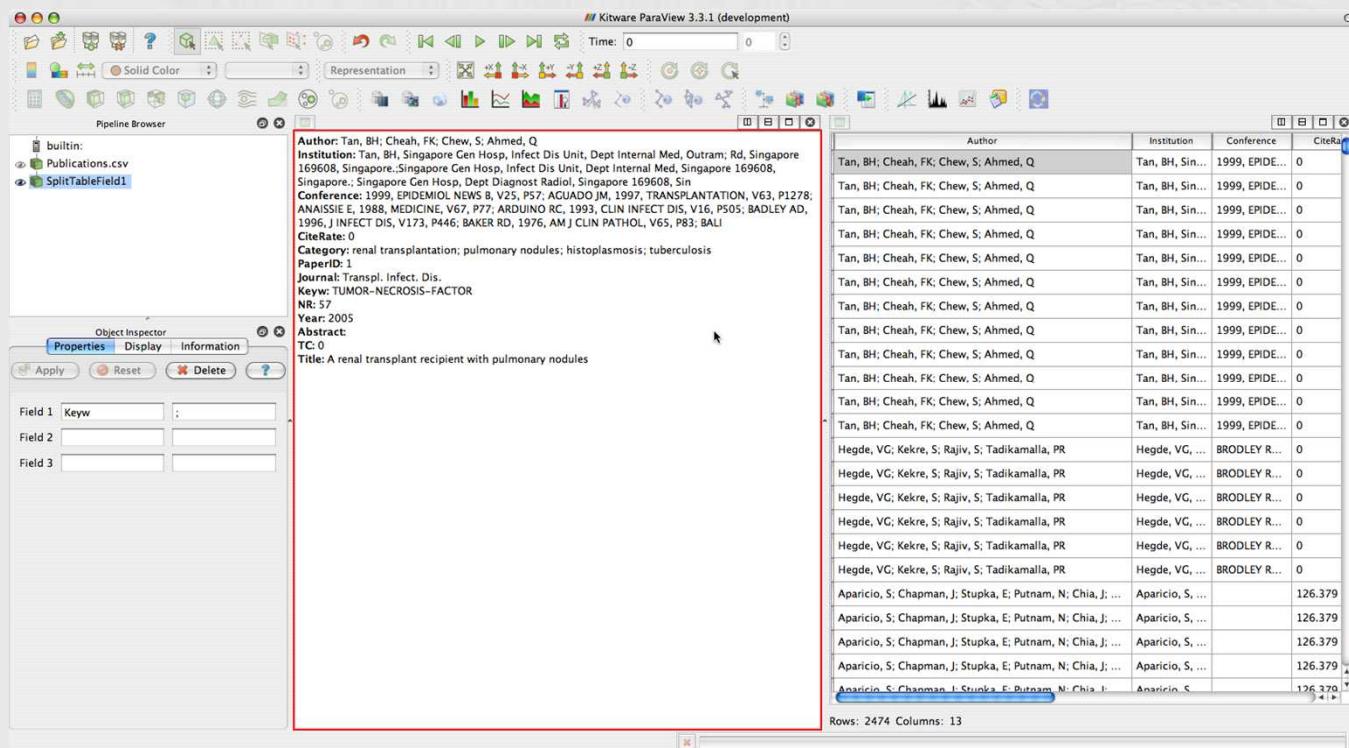
Attribute View

- Provides a "textual histogram" of table data.
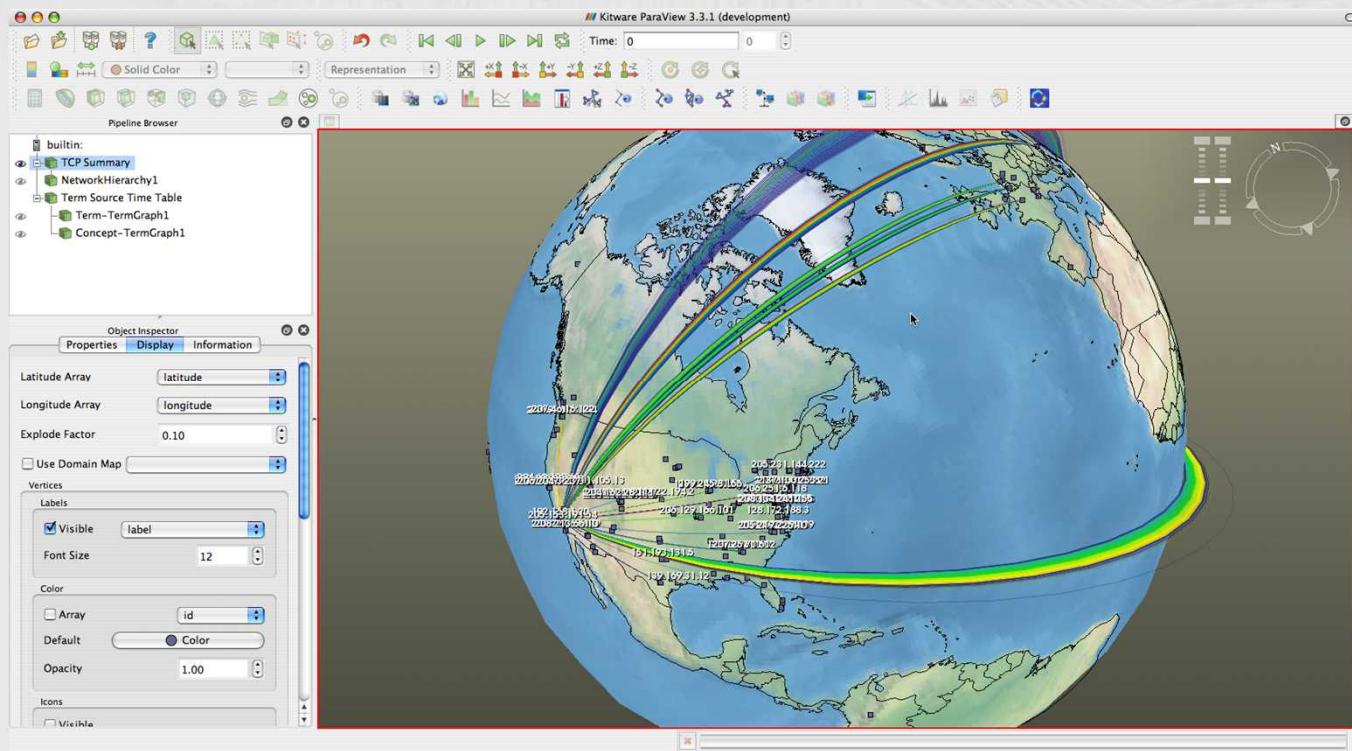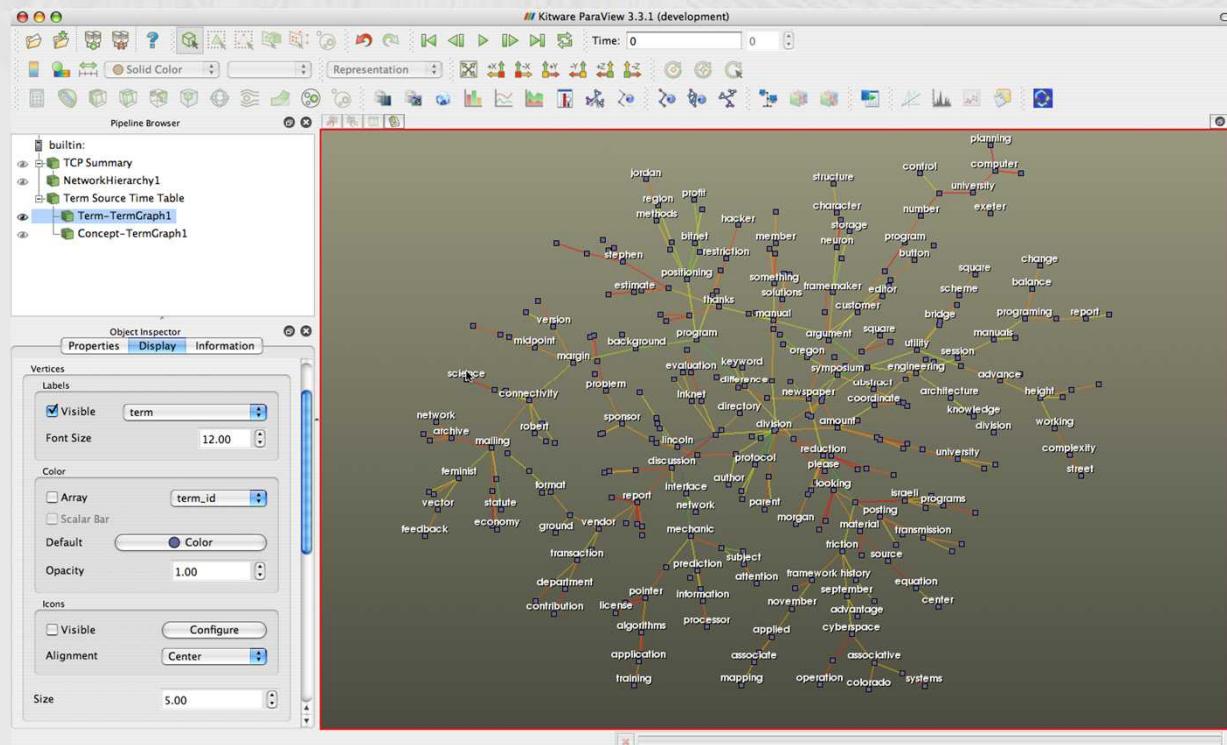- Sort values or counts

Geospatial View

- Displays geo-referenced data on an interactive globe.

- Variable-resolution background texture maps.

- Polyline-based political boundaries.

Graph View

- Arbitrary layout algorithms.
- Attribute-based rendering: vertex / edge labels, vertex / edge color, vertex icons.
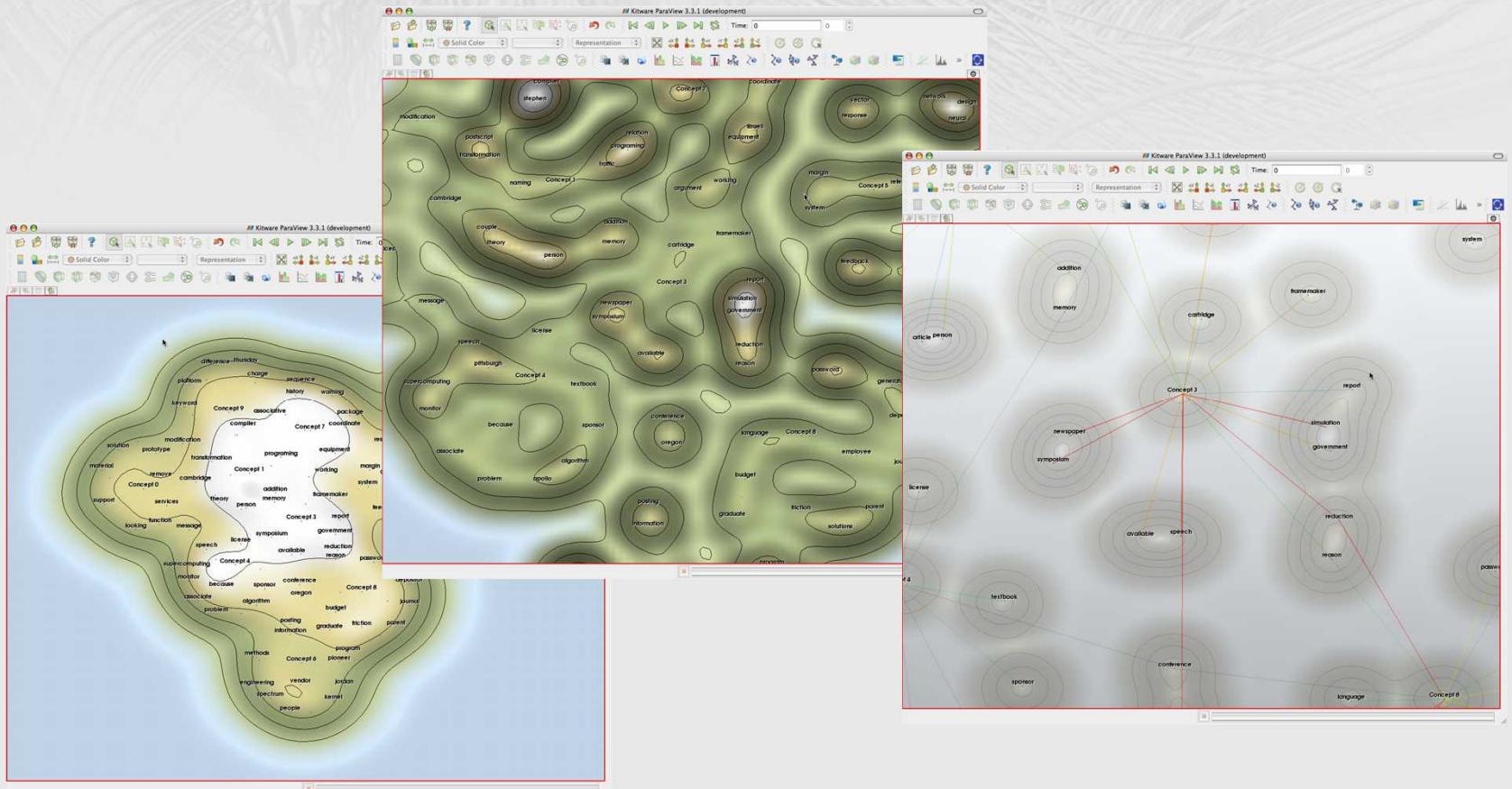
Hierarchy View

- Displays a graph, embedded within a hierarchy (tree).

- All of the rendering functionality of a Graph View.

- For data that incorporates hierarchies, provides a fast layout that's more meaningful than force-directed.
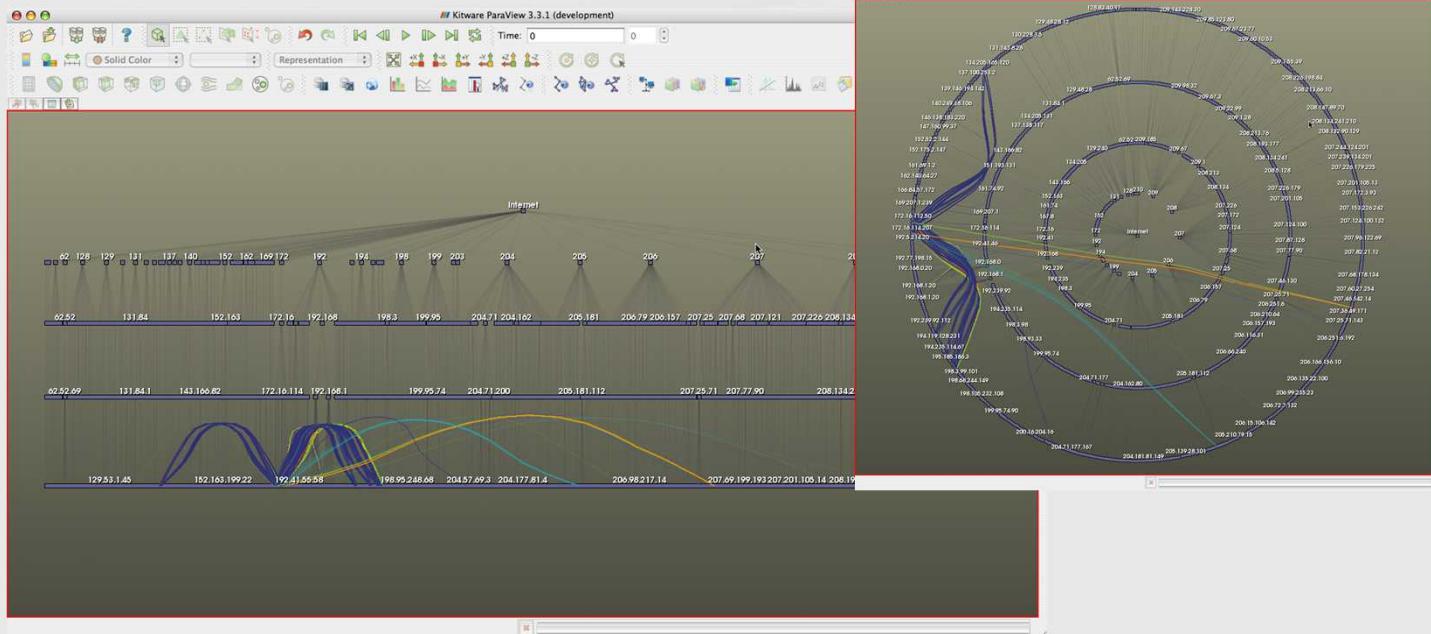
Landscape View

- Renders a graph using a heightfield to accentuate vertex clusters.

Infovis Demo