Visualizing Dynamics of Complex Familial Structures

John R Hott, Worthy N Martin, Kathleen Flake
University of Virginia

(a) 1843
(b) 1846
(c) 1847
(d) 1856

Visualizing Lineages
• Generation flow left-to-right organized around reference individuals (oldest generation on left)
• Family units are nodes (green disks)
  • Vertical alignment by generation from reference individuals
• Individuals are hyperedges from the family unit of their birth to their adult marriages (line with square at center)

Visualizing Family Units
• Adapted chord diagrams to visually arrange complex familial structures
• Use the imposed lineage flow
  • Parents on left
  • Children on right
  • Chords connect intra-familial relations
• Distinguish relationships with color
  • Marital relationships: pink, purple, yellow
  • Parent/child relationships: green, gold

Nauvoo Marriage Project
Goals and Description
• Investigate and understand the concept of “marriage” in the early Mormon church
• Mid-1800s Nauvoo, IL
• Polyandrous and polygynous marriages

Dataset
• 50,000+ individuals and marriages
• 3 types of marriage relationships
• 2 types of parent/child relations

Depicting Change
• Family unit visualizations display state of family at one point in time
• Stacking the slices conceptualizes a 3D temporal cylinder
• Step through time using a timeline slider

Future Work
Visualization Refinement
• Lineage Flow
  • Allow cycles
  • Visualize adoptions
  • Show evolving lineage over time
• Familial Chord
  • Connect with lineage display

Network Analysis
• Analyze changing lineage networks over time
• Compare and contrast related matriarchal and patriarchal lineage networks
• Time-Varying Graph representation

Navigating the Interface
Mouse-overs and popups allow the user to focus on and zoom into an individual, inter-familial and intra-familial relationship

Implementation Details
Interactive Web Interface
• D3js
  • Adapted chord and Sankey diagram layout engines
  • Time slider to update chord display

Database and storage
• PostgreSQL
• Custom PHP Rest API

demo available online at http://www.cs.virginia.edu/~jh2jf/nauvoo