Graph Layout Algorithms - Readings

# Representations of polygamy

Hott, J. R., Martin, W. N., & Flake, K. (2018). Visualization of Complex Familial and Social Structures. Electronic Imaging, 2018(1), 314-1-314–319. \

Based on chord and flow diagrams for family units.

Mormons -> polygamy, concept of “marriage”

Recognises complexities.

The objects of study in this research are the relationships people form at many different levels: parent/child, spouse/spouse, individual/family unit, family unit/family unit, individual/group, and group/group.

“We found that current visualization techniques are insufficient to fully express the level of complexity found in our familial structures.”

“This visualization breaks a few guiding principles for family unit depictions: the depiction should maintain a temporal ordering (temporality), participants should be displayed together as a unit (locality), and the types of spousal and parental relationships should be quickly discernible (distinguishability).”

GeneaQuilts [6], was created by Bezerianos, et al, to display large-scale genealogies of thousands of individuals

TimeNet visualization for genealogical data to better address and visualize each family unit’s temporal relationships.

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Ball and Cook [2] define a similar time-line-based visualization scheme to address the connection of individuals in a common family unit. Their work depicts time vertically, with individuals as time-lines from their birth to death; Our approach attempts to capture and visualize the temporal aspects of family units, similar to Kim and Ball, while at the same time maintaining family unit cohesiveness and providing a depiction of the larger genealogical flow and its evolution

We don’t care about timelines though.

A lot of them distinguish between gender, but in our case it is irrelevant / not important.

Also too many colours, difficult to discern.

The genealogical diagram is standard (Figure 4) yet the expanded version is difficult to understand. The chord diagram is highly unintuitive as a genealogical chart. Very esoteric.

Plus would certainly not work for other complexities such as disputed connections, and also multiple types of unusual relationships. Only works for polygamy types. Doesn’t look right without accompanying text.

Also the unusual parts of the polygamy is only distinguished by colour – ununintuitive. Something that looks more like a standard genealogy chart would be better. We also don’t care about gender, or whether the relationship was a co-parent or spousal relationship, so this style is unnecessariy complicated (Rube Goldberg machine)

Despite its emphasis on showing the famly units and the density, the whole timeline diagram is extremely unintuitive.

However I like the interactivity elements – clicking on the nodes to show the specific lineage (chord diagram) of that node clicked. For us the edges would make more sense though, and just change to the new node’s page when clicked.

Seems like each diagrammatic representation has a different purpose – different cultures value different types of representations:

“These lineage flow diagrams are still in their infancy: they can showcase familial interactions, cross-generational anomalies, and multiple concurrent marriages. We are considering further refinements and extensions to express more of the richness within the Nauvoo dataset.”

# Representations of Divorce/Remarriage - TimeNets

Kim, N. W., Card, S. K., & Heer, J. (2010). Tracing Genealogical Data with TimeNets. Proceedings of the International Conference on Advanced Visual Interfaces, 241–248. https://doi.org/10.1145/1842993.1843035

TimeNets – new visualisation technique to genealogical data.

According to TimeNets, there are two types of genealogical data:

“In a broad sense, there exist two types of genealogical relations. Parent-child relationships (consanguine relations) define a hierarchy in genealogical data. Relationships through marriage (conjugal relations) are non-hierarchical and merge family trees. Together these form a network of relationships— complex but simpler than a general graph. The most common genealogical research is ancestral research—tracing ancestry of self—and descendant research—finding descendants of an ancestral couple. They correspond to constructing a tree of ancestors and a tree of descendants. This observation verifies why ancestor (pedigree) and descendant charts (Figure 2) are canonical charting methods for genealogical data.”

TimeNets prioritizes temporal relationships and family structure over traditional genealogical representations.

Interesting premise, but given the immortal nature of gods, this approach is not really feasible for our project.

The reasoning is:

“The most common task confronting genealogists is to correctly identify individuals and their familial and temporal relations. To keep track of their findings, people typically use genealogical diagrams, or “family trees,” such as ancestor (pedigree) charts and descendant charts (Figures 2a-b). By aligning people by generation, the charts prioritize the display of kinship relations, facilitating the identification of marriages, parent-child relations, siblings, and cousins. However, such representations often omit other aspects of genealogical data, particularly time. For instance, genealogists must frequently cope with temporally ambiguous evidence in order to establish kinship [15].“

However I liked their ideas in Figure 8 – laying different connections over each other. Separating different spousal relationships – but in our case not over time but to reduce total overlap.

# Efficient Genealogical Graph Layout

<file:///Users/yaya/Downloads/Marik%20.pdf>

Marik R. (2017) Efficient Genealogical Graph Layout. In: Cherifi H., Gaito S., Quattrociocchi W., Sala A. (eds) Complex Networks & Their Applications V. COMPLEX NETWORKS 2016 2016. Studies in Computational Intelligence, vol 693. Springer, Cham

(See Greta’s document)

“

<https://link.springer.com/chapter/10.1007/978-3-319-50901-3_45>

# Interactive graph layout – Henry

http://scholar.google.com.au/scholar\_url?url=https://dl.acm.org/doi/pdf/10.1145/120782.120788&hl=en&sa=X&scisig=AAGBfm1slYZtFUQg5PXAB1WNPQyp7WCDLQ&nossl=1&oi=scholarr

# Hierarchical edge bundles: Visualisation of adjacency – Holten

http://scholar.google.com.au/scholar\_url?url=http://citeseerx.ist.psu.edu/viewdoc/download%3Fdoi%3D10.1.1.220.8113%26rep%3Drep1%26type%3Dpdf&hl=en&sa=X&scisig=AAGBfm2kGCn\_dINd\_7Sr2WjCb\_CWYJZqTg&nossl=1&oi=scholarr

# Online hierarchical graph drawing – North

http://scholar.google.com.au/scholar\_url?url=https://link.springer.com/content/pdf/10.1007/3-540-45848-4\_19.pdf&hl=en&sa=X&scisig=AAGBfm0hU\_yjwtQ-9WiSeQUOWq5a9qOEXQ&nossl=1&oi=scholarr

# An Algorithm for Drawing a Hierarchical Graph – P EADES

<http://www.cse.unsw.edu.au/~lxue/publication/tute.ps>

# A layout algorithm for hierarchical graphs with constraints – M Slade

<https://scholarworks.rit.edu/cgi/viewcontent.cgi?article=1638&context=theses>

# Graph Hierarchical Layout Algorithm – ASAP Scheduling Algorithm – Lecture

<https://stackoverflow.com/questions/13861130/graph-hierarchical-layout-algorithm>

# On-Line Hierarchical Graph Drawing – Graphviz – SC North

https://graphviz.gitlab.io/\_pages/Documentation/NW01.pdf

# Hierarchical Drawing Algorithms – Brown CS – rtamassi

<http://cs.brown.edu/people/rtamassi/gdhandbook/chapters/hierarchical.pdf>

# Graph Layout Algorithms

<http://www.bii.a-star.edu.sg/achievements/applications/cellware/tutorial/page7-4.html>

# A Hierarchical Layout Algorithm for Drawing Directed Graphs – J Reynolds

<https://www.collectionscanada.gc.ca/obj/s4/f2/dsk2/ftp04/mq20694.pdf>

# Layout of hierarchical flow charts – T Tusla

<https://dspace.cvut.cz/bitstream/handle/10467/70124/F3-DP-2017-Tusla-Tomas-Layout_of_hierarchical_flow_charts.pdf?sequence=1&isAllowed=y>

# A fast heuristic for hierarchical Manhattan layout – G Sander

<https://link.springer.com/content/pdf/10.1007/BFb0021828.pdf>

# Steps of a hierarchical layout algorithm – Hanspeter Mossenbock

<https://www.researchgate.net/figure/Steps-of-a-hierarchical-layout-algorithm_fig18_221302634>

# A Survey of Multiple Tree Visualisation (Ben’s recommendation in the abstract)

Graham, M., & Kennedy, J. (2010). A Survey of Multiple Tree Visualisation. Information Visualization, 9(4), 235–252. https://doi.org/10.1057/ivs.2009.29