Robust Genealogy Drawings

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Problem "Definition"





3 Straighten the Edges

Straighten long paths

- For every path try to straighten it on one vertical line
- When the path does not fit on one line pop node from the top

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ALGORITHMS AND

COMPLEXITY GROUP

• Retry with the two parts

Repeat until both parts are straight or we popped all nodes
 No guarantee that paths are straight, but performs well enough on our examples.

4 Route Edges

Route edges orthgonally with two bends

Compute via Linear Program

• One Variable Y(e) for every edge e with a value between 0 and 1

there are all these cross-layer edges and
a lot of undirected cycles.
Can we still draw it automatically?





Yes, we can augment the graph to use Sugyiama's Framework for an initial Layout and with some clever post-processing we get a nice drawing of our family tree.

1 Preprocess the Graph for Sugyiama¹

Find sets of nodes with same set of parents

- Add node for every such set
- Connect the new nodes to source and target nodes
- Adds a layer of virtual nodes between children and parents
- Introduces no cycles if virtual nodes are connected correctly

Split cross-layer edges for each layer they cross

- No cross-layer edges anymore
- Can be done since layers do not change afterwards



• Variable will be interpreted as y-position of the bends



Edges interacting with splitting couple

- Only applied when nodes are left and right of split
- Differentiate if source node is inside the split nodes range or not
- If in the range we can draw the edge above the split couple
- Otherwise draw it below to potentially reduce drawn crossings



Splitting and merging edges

- If edges go into the same direction sort them appropriately
- Prevents the creation of new crossings

2 Sugyiama on the Augmented Graph

- In-layer node order is fixed afterwards
- Nodes don't overlap if drawn at the given coordinates
- Good crossing minimization



Remaining constraints in two steps

- So far created constraints indude order for most edges
- All pairs of conflicting edges not yet sorted get a constraint based on the sources x-coordinate

Example - Excerpt from the GD 2016 Contest Graph



1) McGuffin, M.J., Balakrishnan, Interactive visualization of genealogical graphs, IEEE Symposium on Information Visualization, 2005. pp. 16–23