Visual Analysis of Set Relations in a Graph

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Outline

Motivation: data model and research questions

Approaches

Previous works

Technical details

Case studies

Limitation and future works

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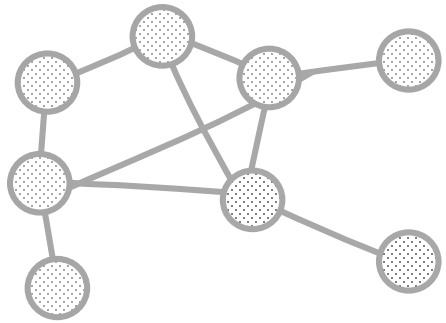
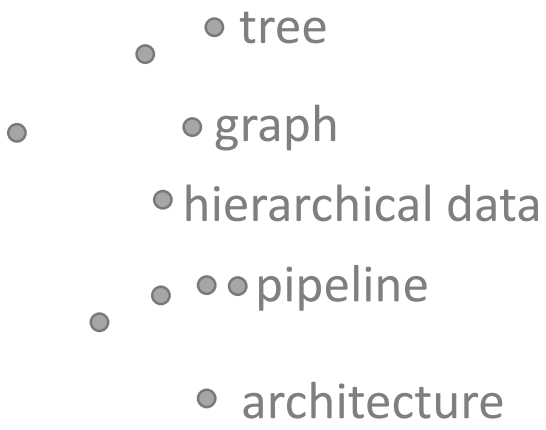
Limitation and future works

Outline

Collaboration network

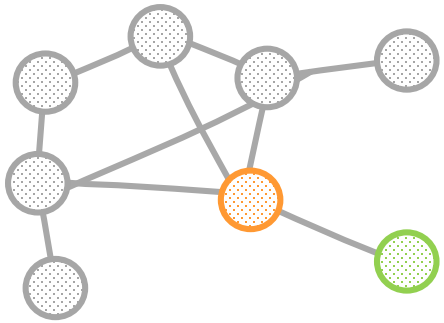


Research topics



Data

Collaboration network



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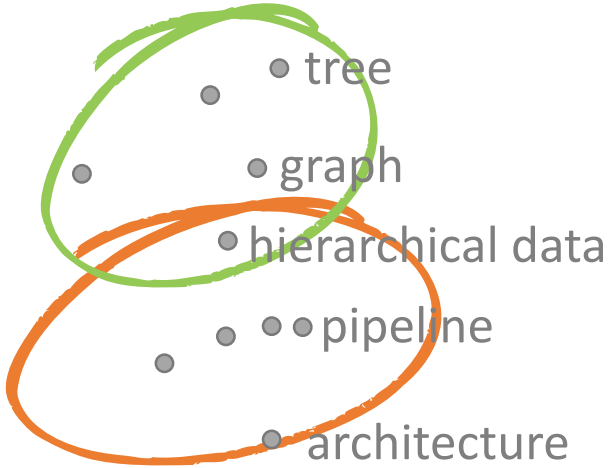

Data

Homophily effect

Research questions

Homophily effect

Do “birds of a feather flock together”?

Research questions

Homophily effect

Do “birds of a feather flock together”?

How proximity of nodes correlates to set relation?

Research questions

Homophily effect

Do “birds of a feather flock together”?

How proximity of nodes correlates to set relation?

Set relation over item clusters

Distribution and implicit overlap of the sets

Research questions

complementary perspectives

Homophily effect

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Glyph design at graph nodes correlates set relation and node distance

Set relation over item clusters

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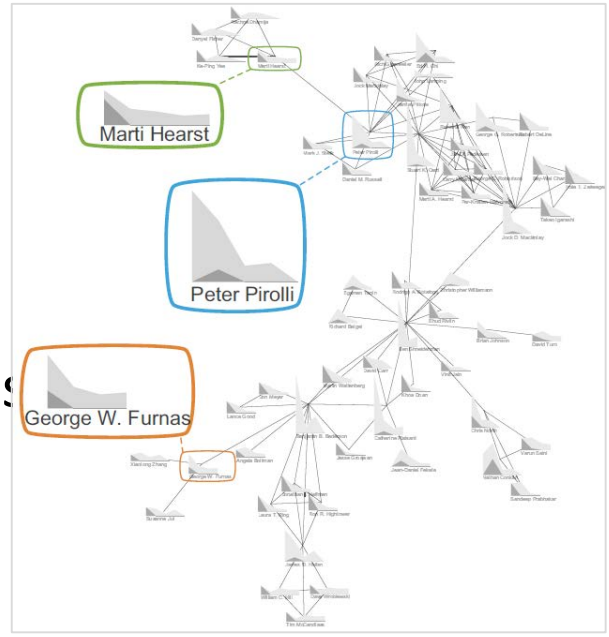

Set relation over item clusters

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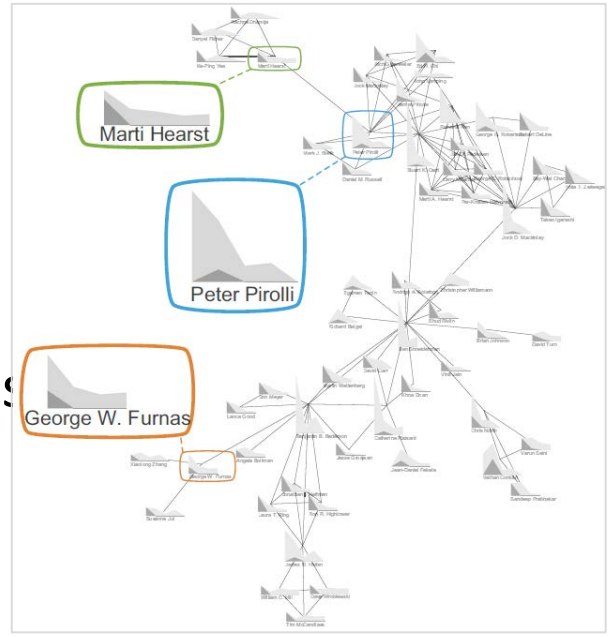

Set relation over item clusters

Contour map + visual link design

Layout algorithm trades precise location of the items for visual simplicity (inspired by metro map drawing, storyline visualization)

Approaches

Homophily effect

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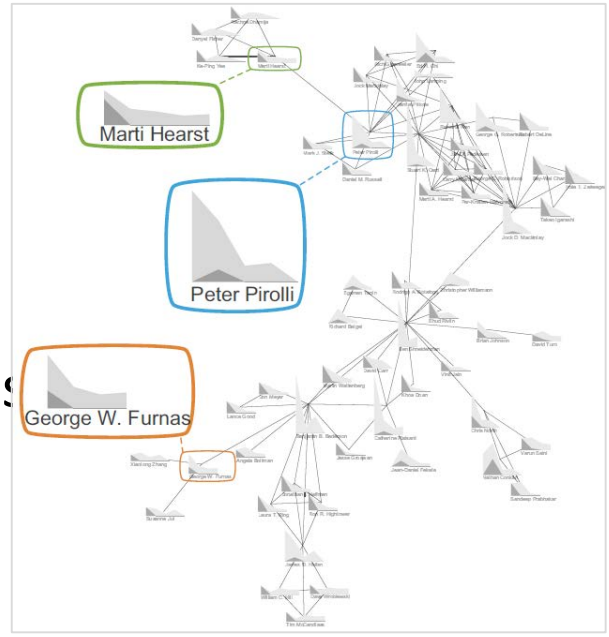

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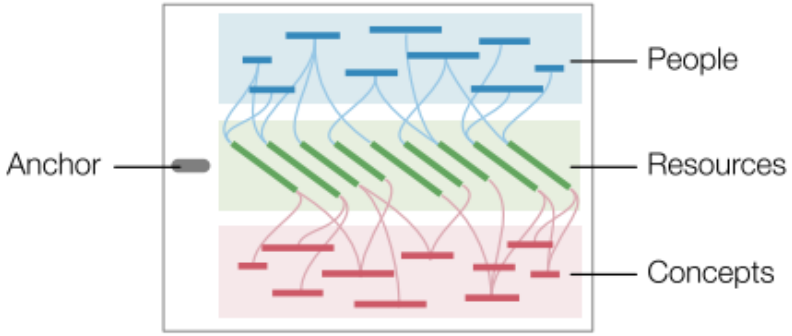
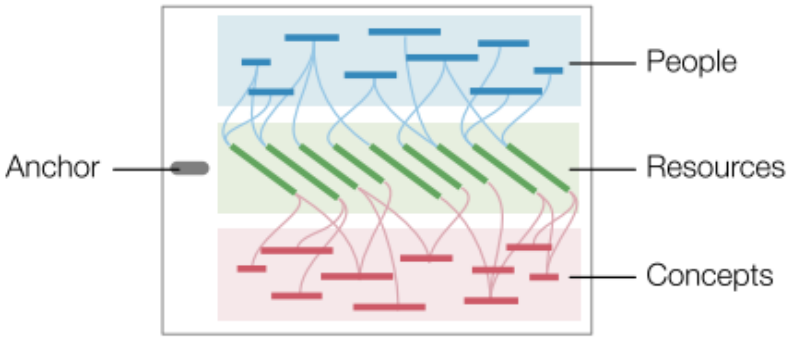


PivotPath [Dörk et al. 12]

Facetatlas [Cao et al. 10]

Previous works – graph visualization



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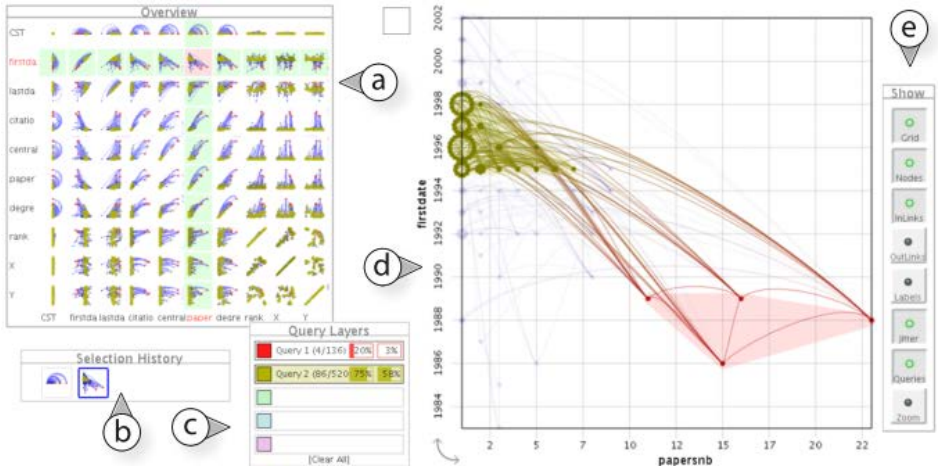
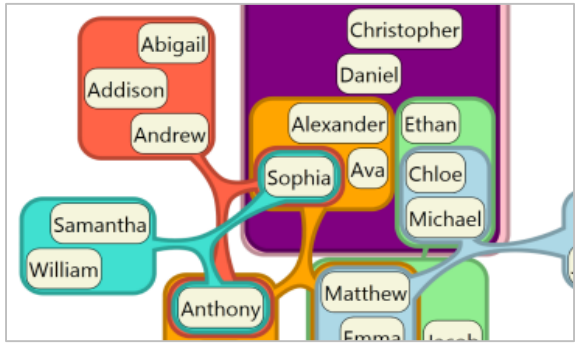
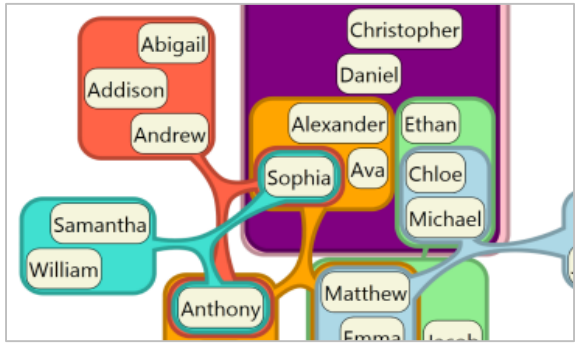


GraphDice [Bezerianos et al. 10]

Previous works – graph visualization



Untangling Euler diagrams
[Riche and Dwyer, 10]



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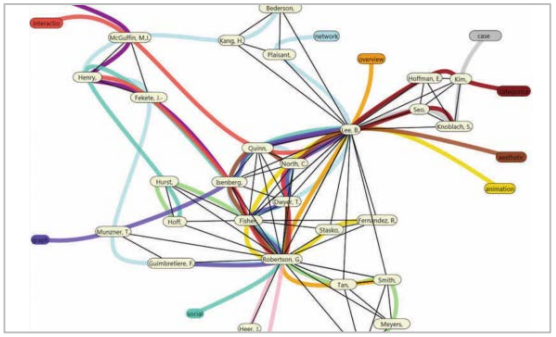
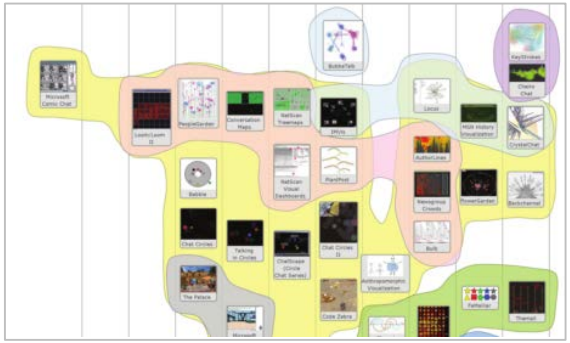
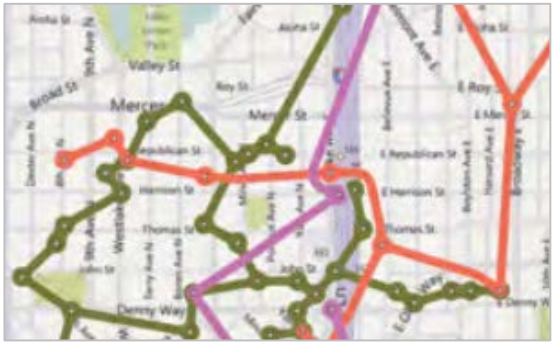


Line Set [Alper et al. , 11]



Bubble Set [Collins et al., 09]



Kelp Diagram [Dinkla et al., 12]

Previous works – set visualization

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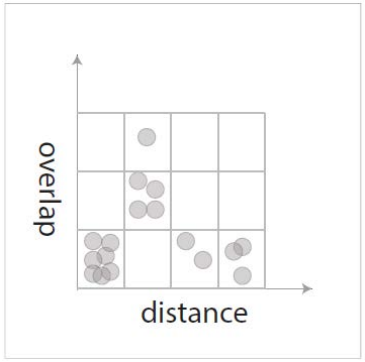
Correlate set overlap and node distance

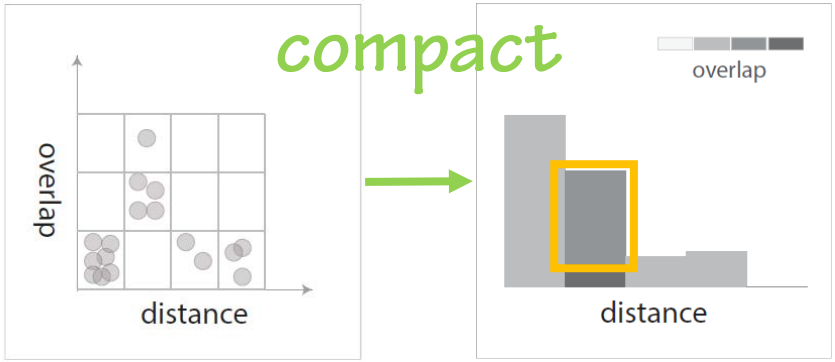


Scatterplot

Glyph design

Correlate set overlap and node distance

more compact



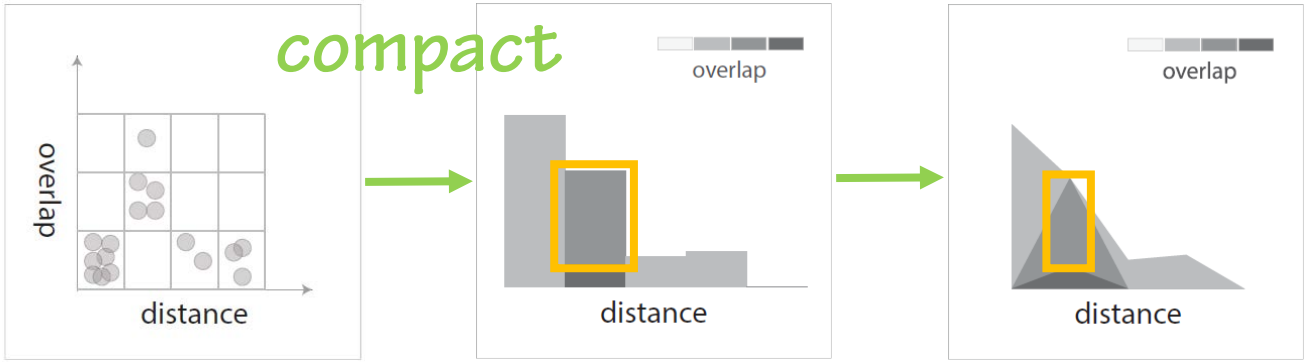
Shade ∝ amount of set overlap
Height ∝ the number of nodes at same distances and with similar amount of overlap

Scatterplot Stacked Barchart

Glyph design

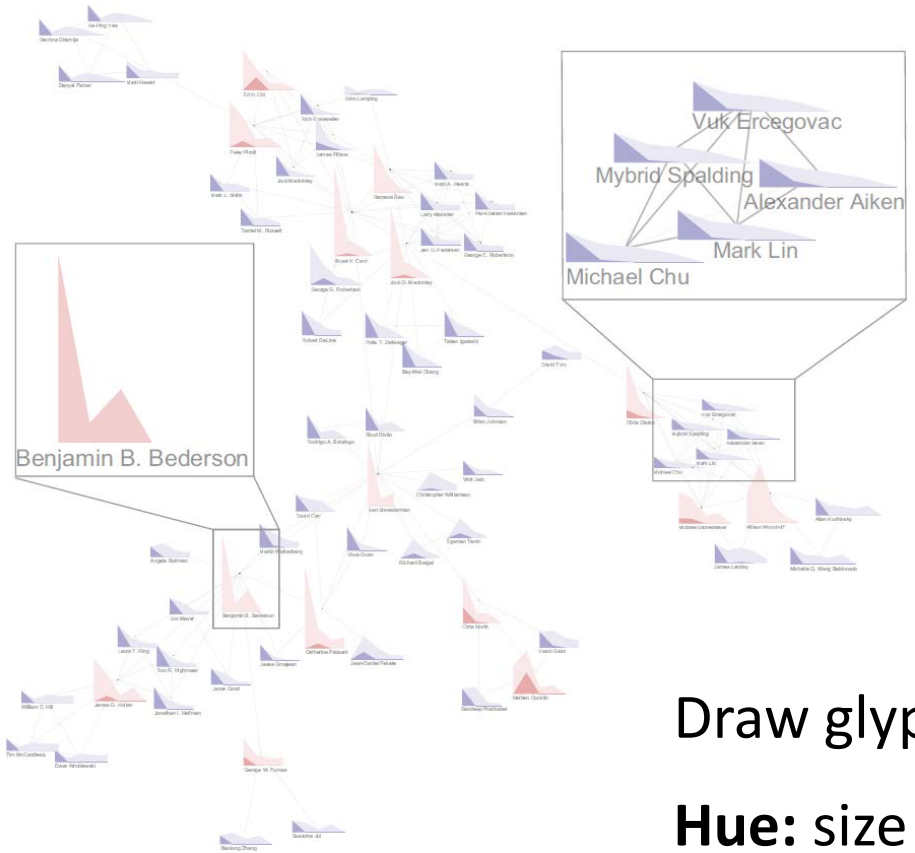
Correlate set overlap and node distance

more compact



Scatterplot Stacked Barchart Stacked Graph

Glyph design

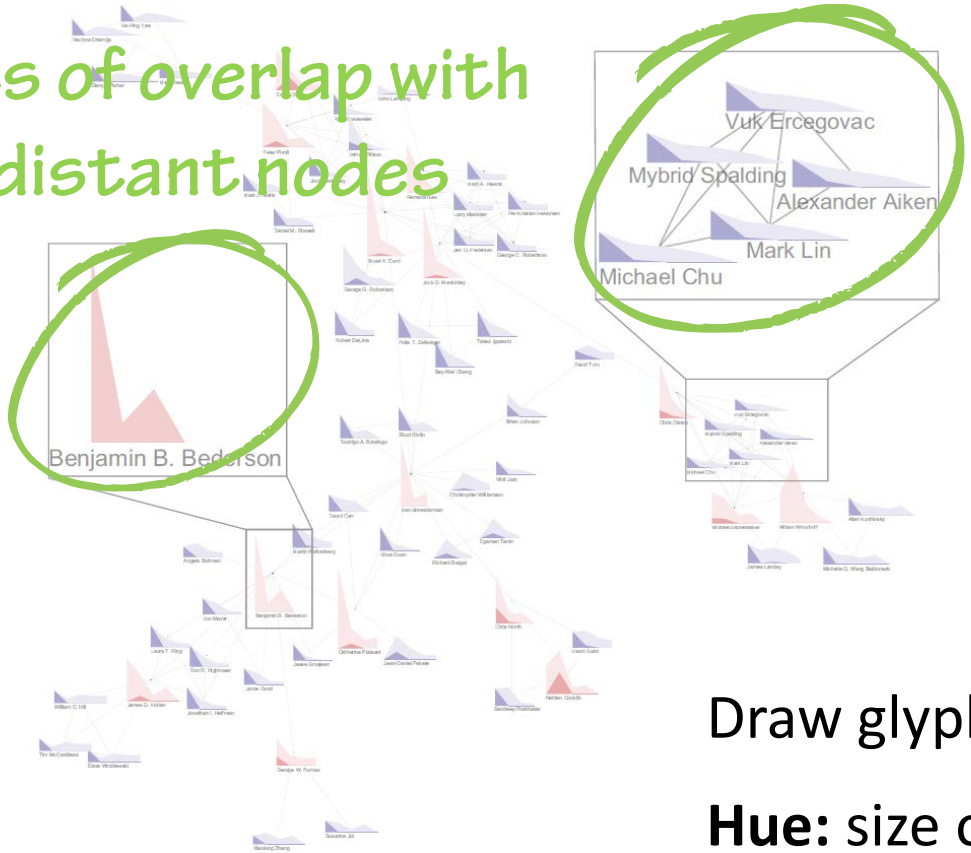


Draw glyphs for each node on a graph

Hue: size of the set compared to its neighbors

Glyph design

lots of overlap with distant nodes

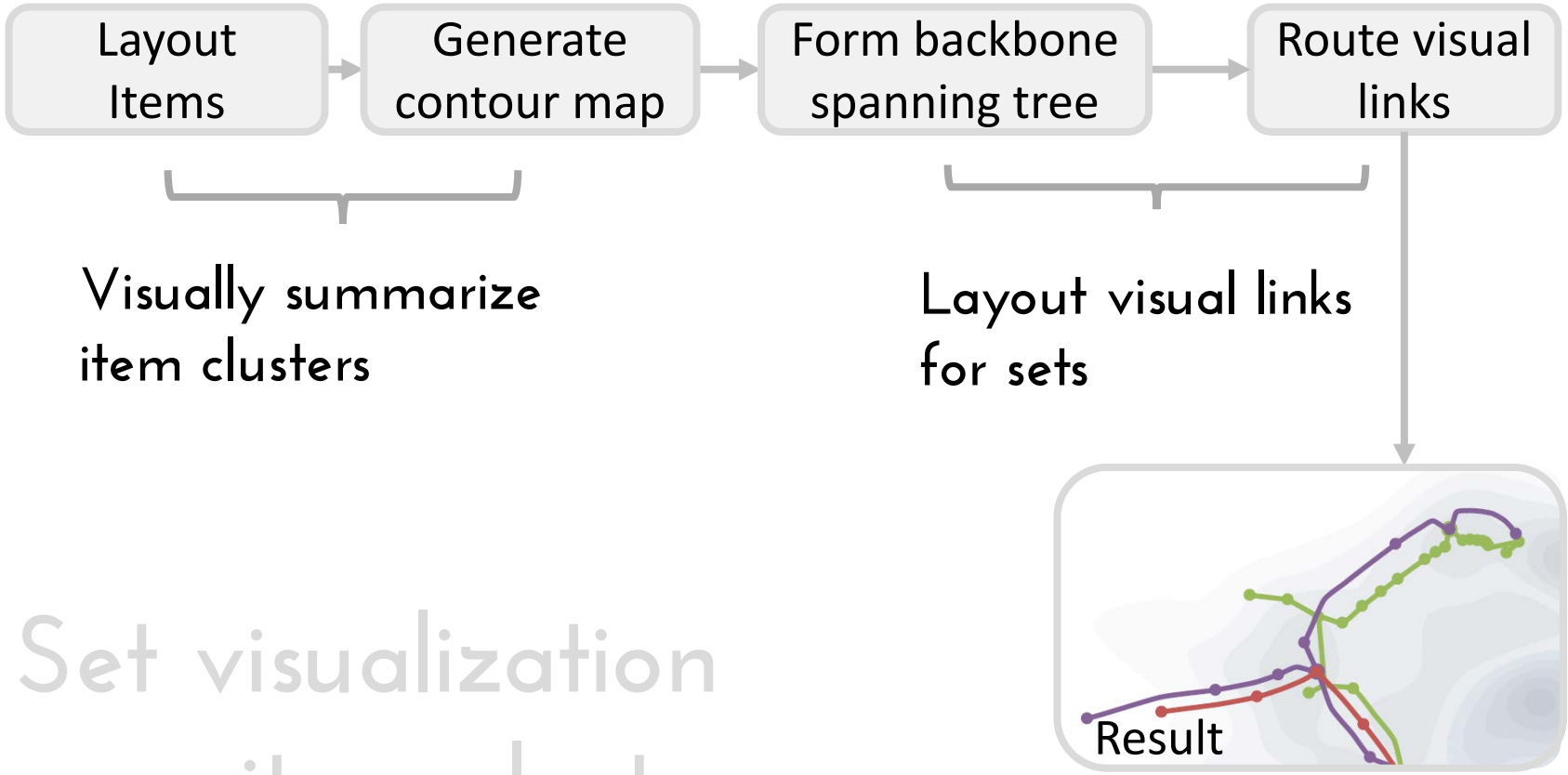


community with locally distributed interests

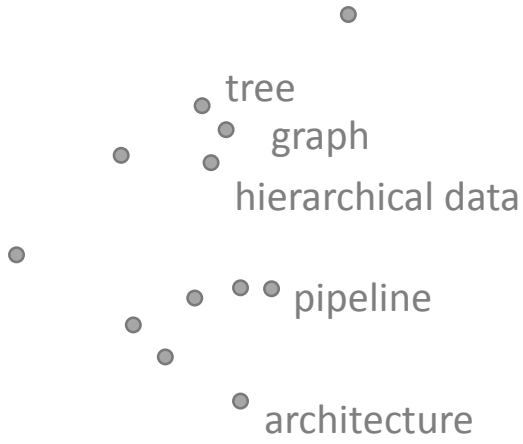
Draw glyphs for each node on a graph

Hue: size of the set compared to its neighbors

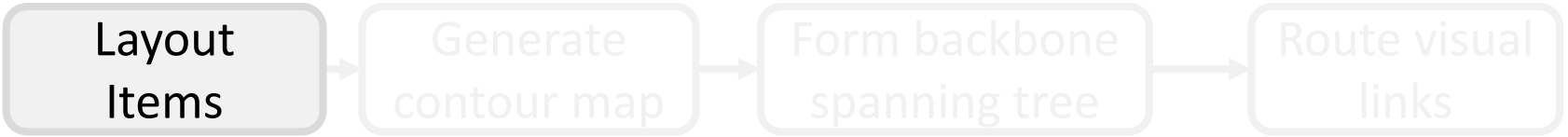
Glyph design

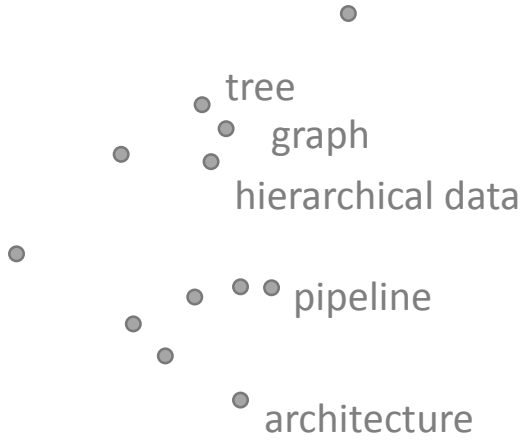


Set visualization over item clusters



MDS: similar items form visual clusters

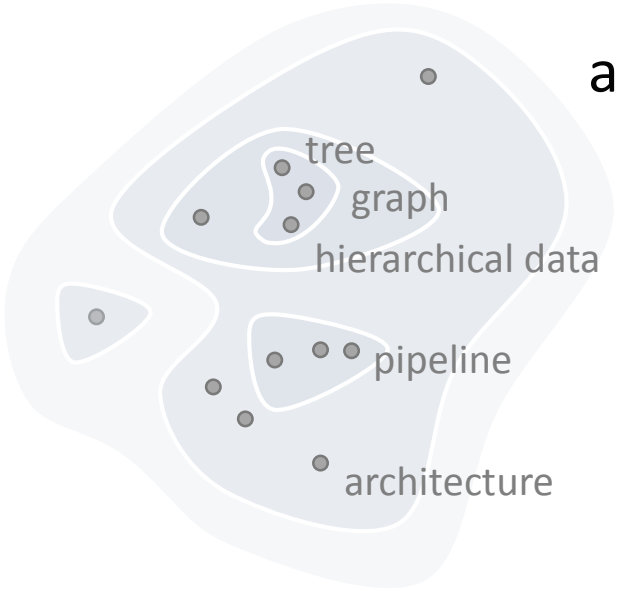




MDS: similar items form visual clusters

Layout Items → **Generate contour map** → Form backbone spanning tree → Route visual links

Contour map with KDE:
abstracted display of item clusters



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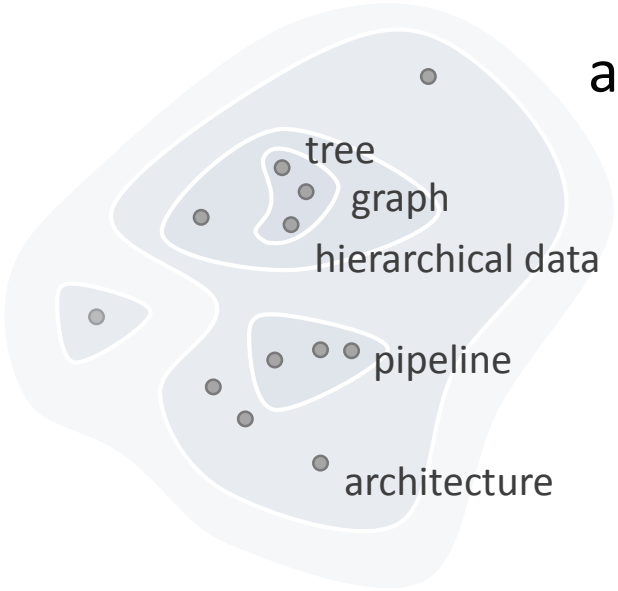

Contour map with KDE:
abstracted display of item clusters

form context for drawing the sets

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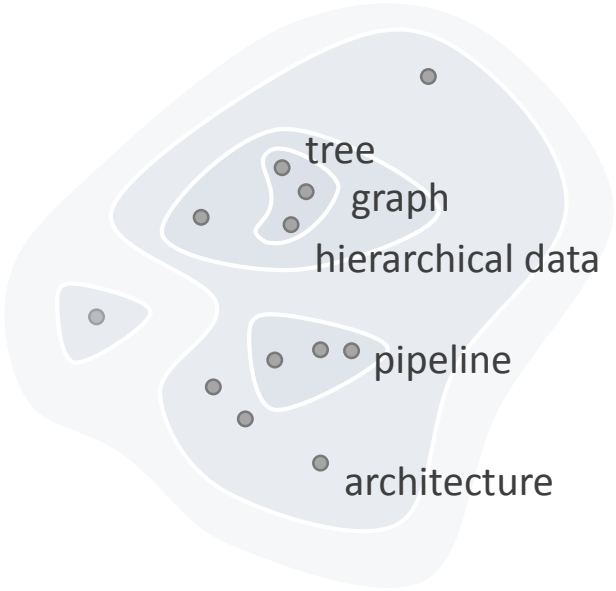

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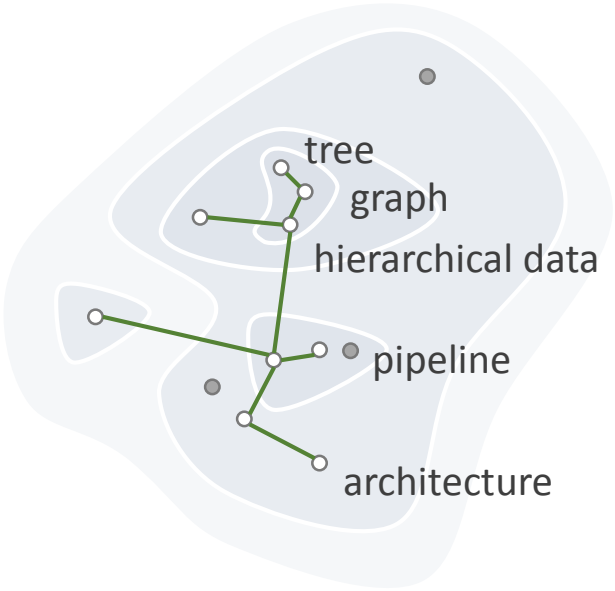
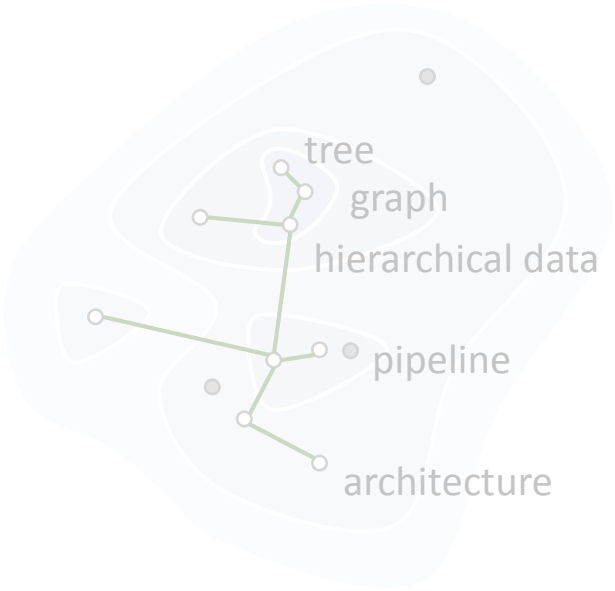


Form MST for items in selected sets

Layout Items → Generate contour map → Form backbone spanning tree → Route visual links



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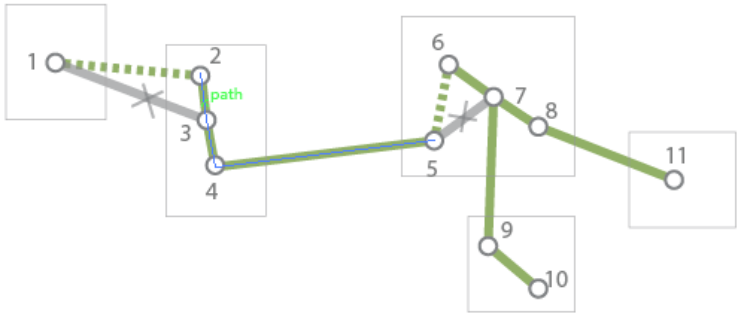
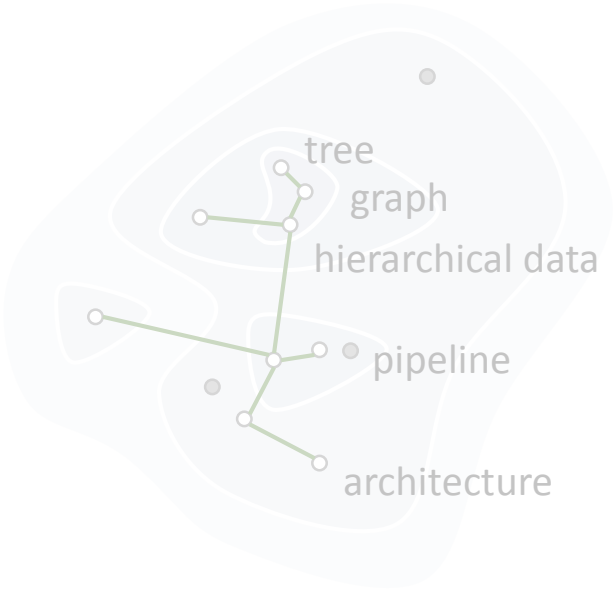


Fold small branches on MST

Layout Items → Generate contour map → **Form backbone spanning tree** → Route visual links



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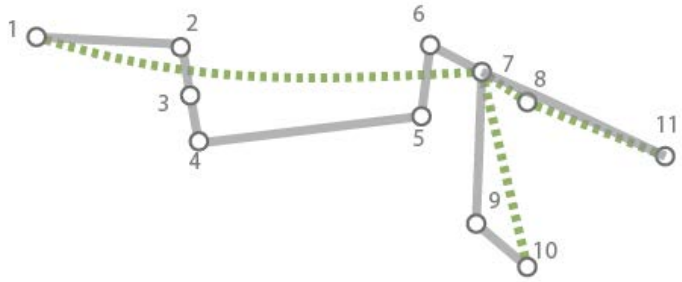
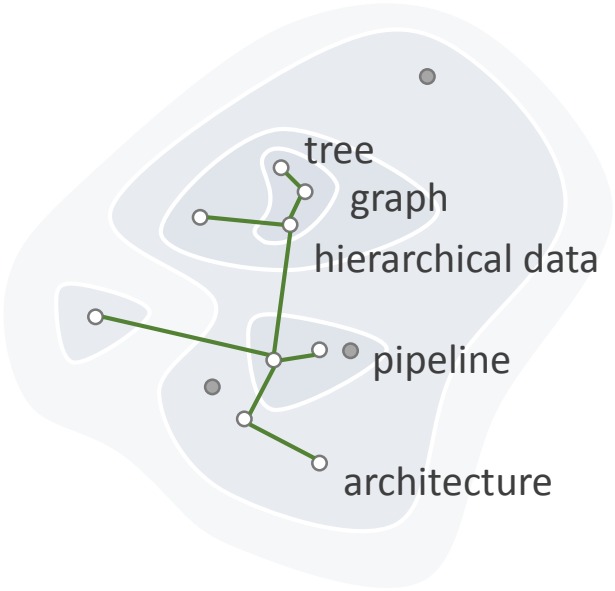


Straighten branches

Layout Items → Generate contour map → **Form backbone spanning tree** → Route visual links



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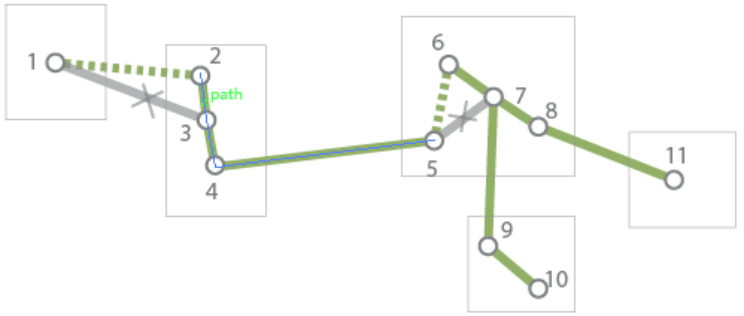

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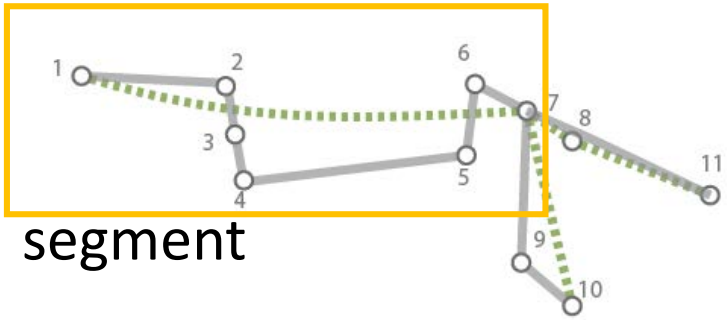
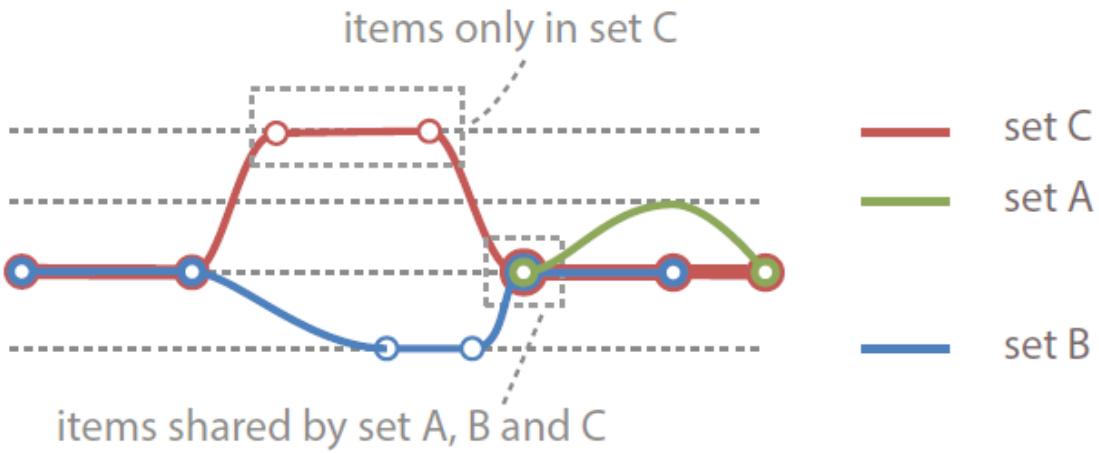


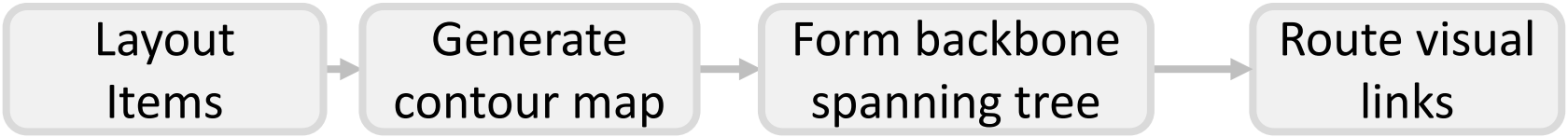
Straighten branches

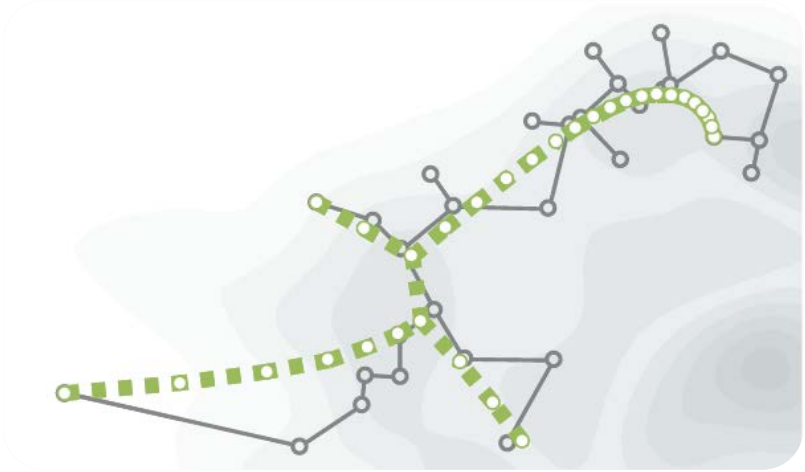
Layout Items → Generate contour map → Form backbone spanning tree → Route visual links



Draw visual link for individual sets

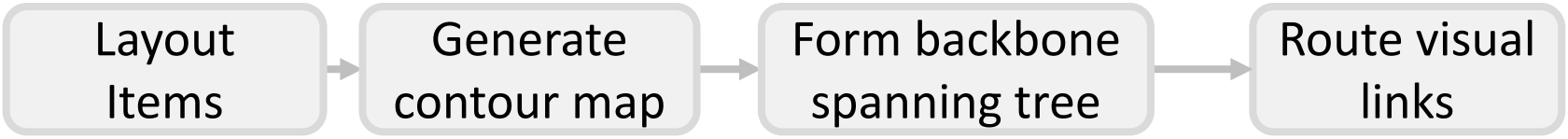
Layout Items → Generate contour map → Form backbone spanning tree → **Route visual links**


Layout Items
Generate contour map
Form backbone spanning tree
Route visual links



the original MST and
the simplified backbone

the visual links for three sets



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Infovis proceedings (95-02)

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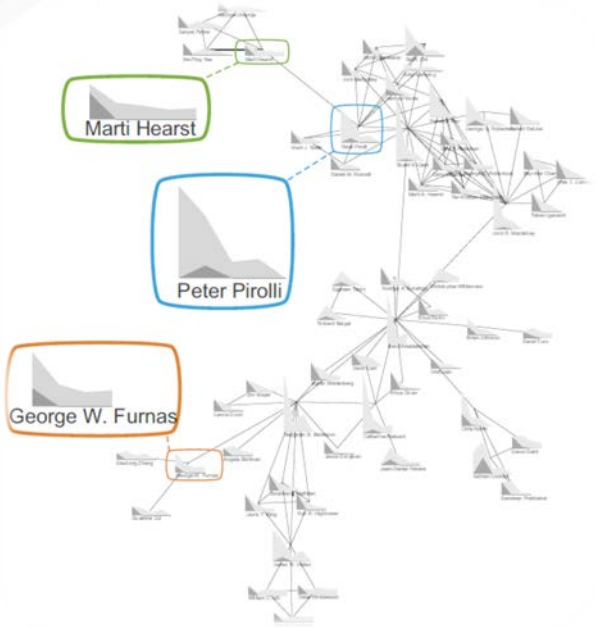
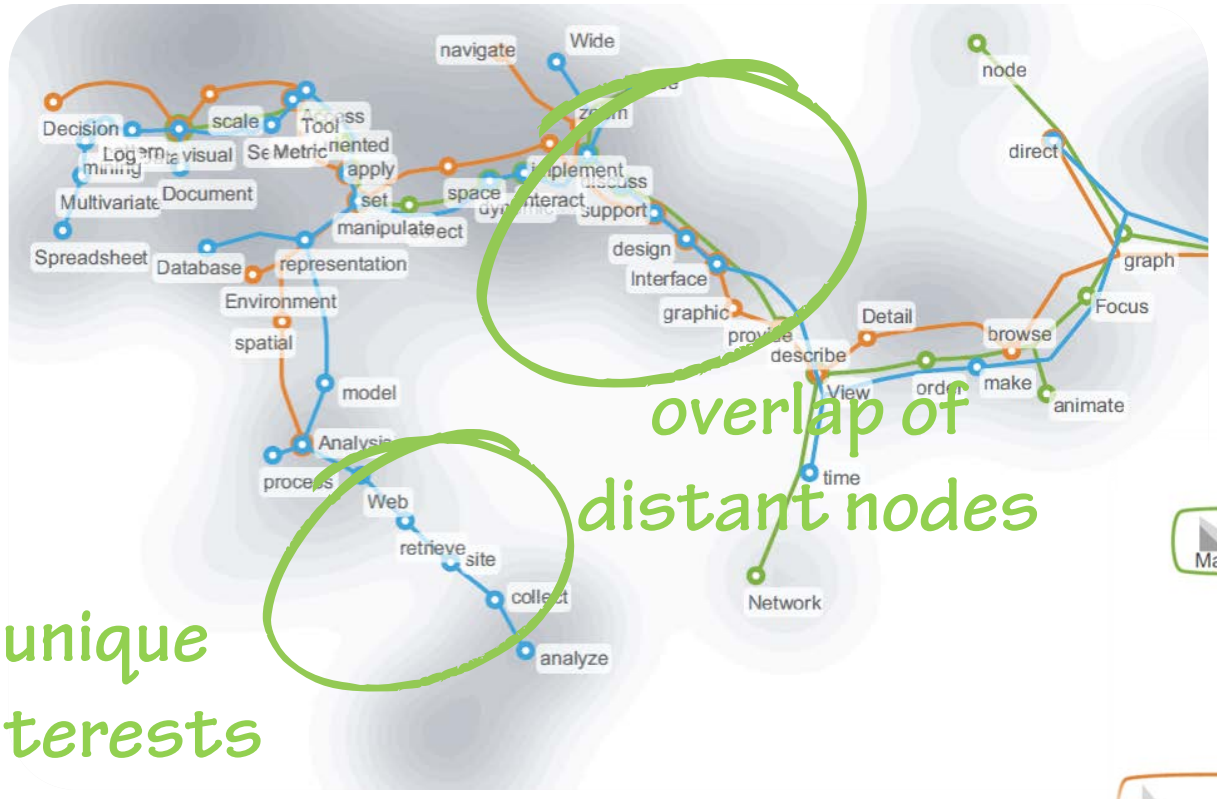


Bibliographic data



overlap of distant nodes

unique interests

Infovis proceedings (95-02)

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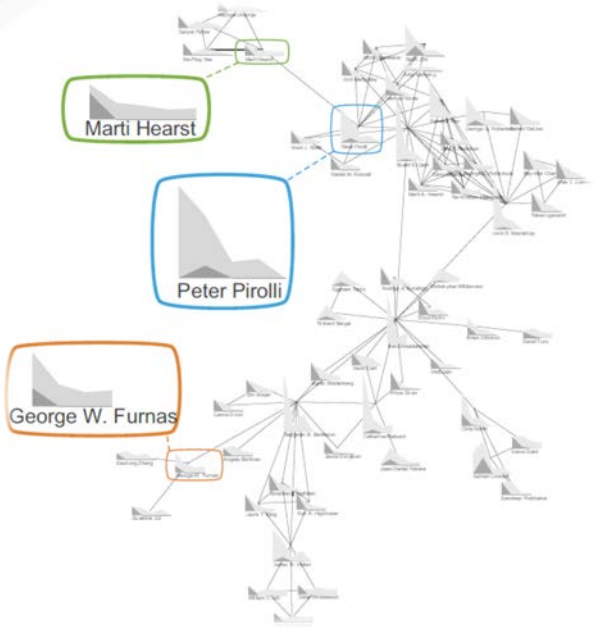

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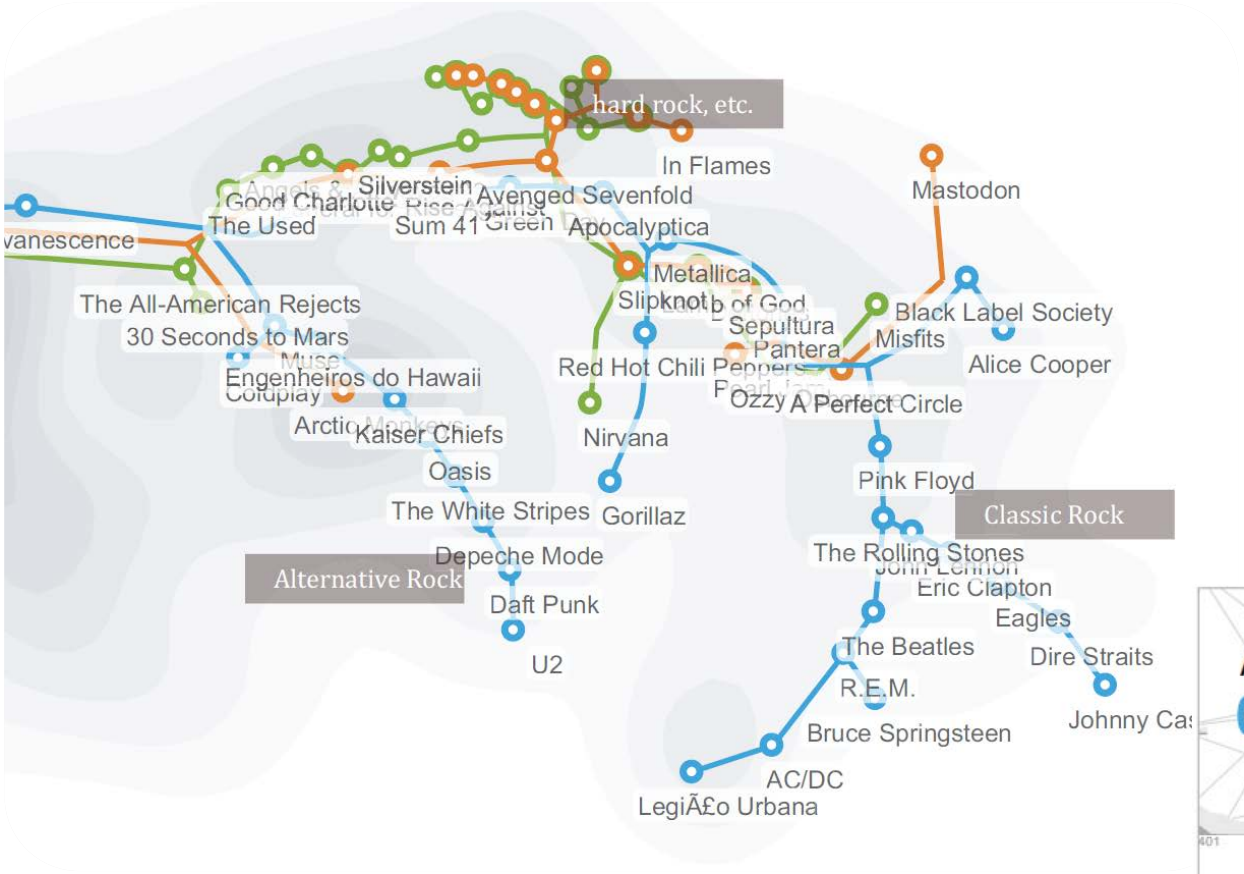
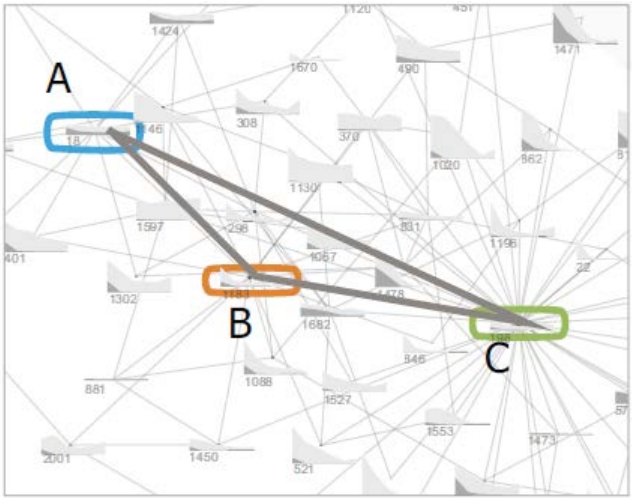


Last.fm

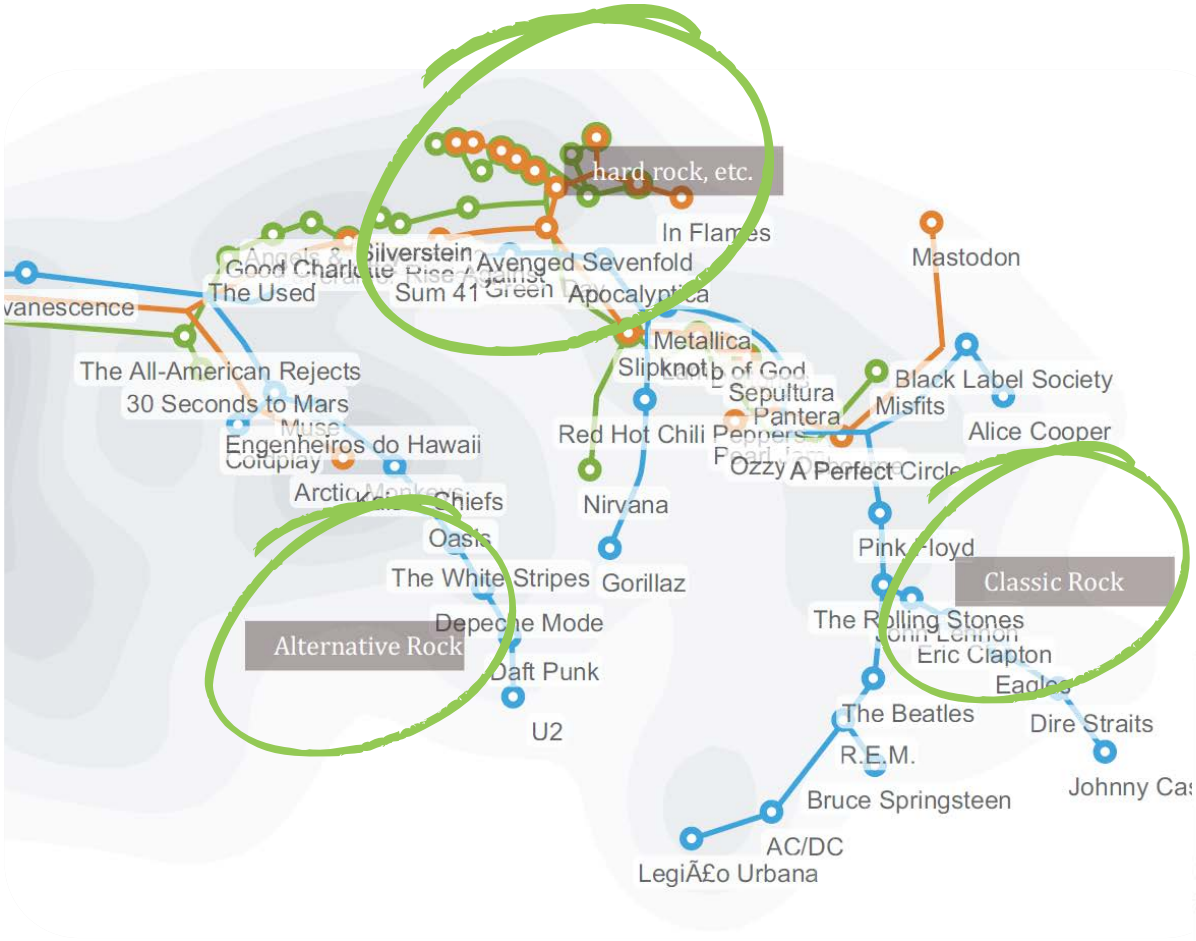
Artist similarity

User friendship

Listening history



Social site data



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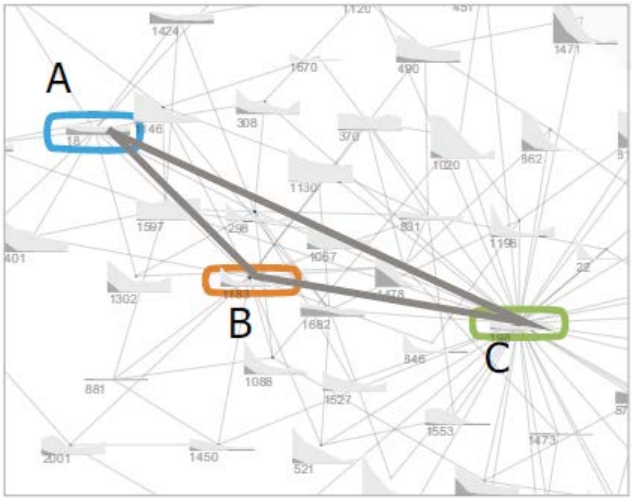

Social site data

Glyph design for homophily analysis

Set visualization over item clusters and layout algorithm

Case studies

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Scalability of glyph design

Use different graph layout, aggregate the nodes

Limitation & future works

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Use different graph layout, aggregate the nodes

Scalability of set visualization

Improve layout algorithm

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Evaluation

Compare with existing techniques (Line set, Kelp diagram)

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Compare with existing techniques (Line set, Kelp diagram)

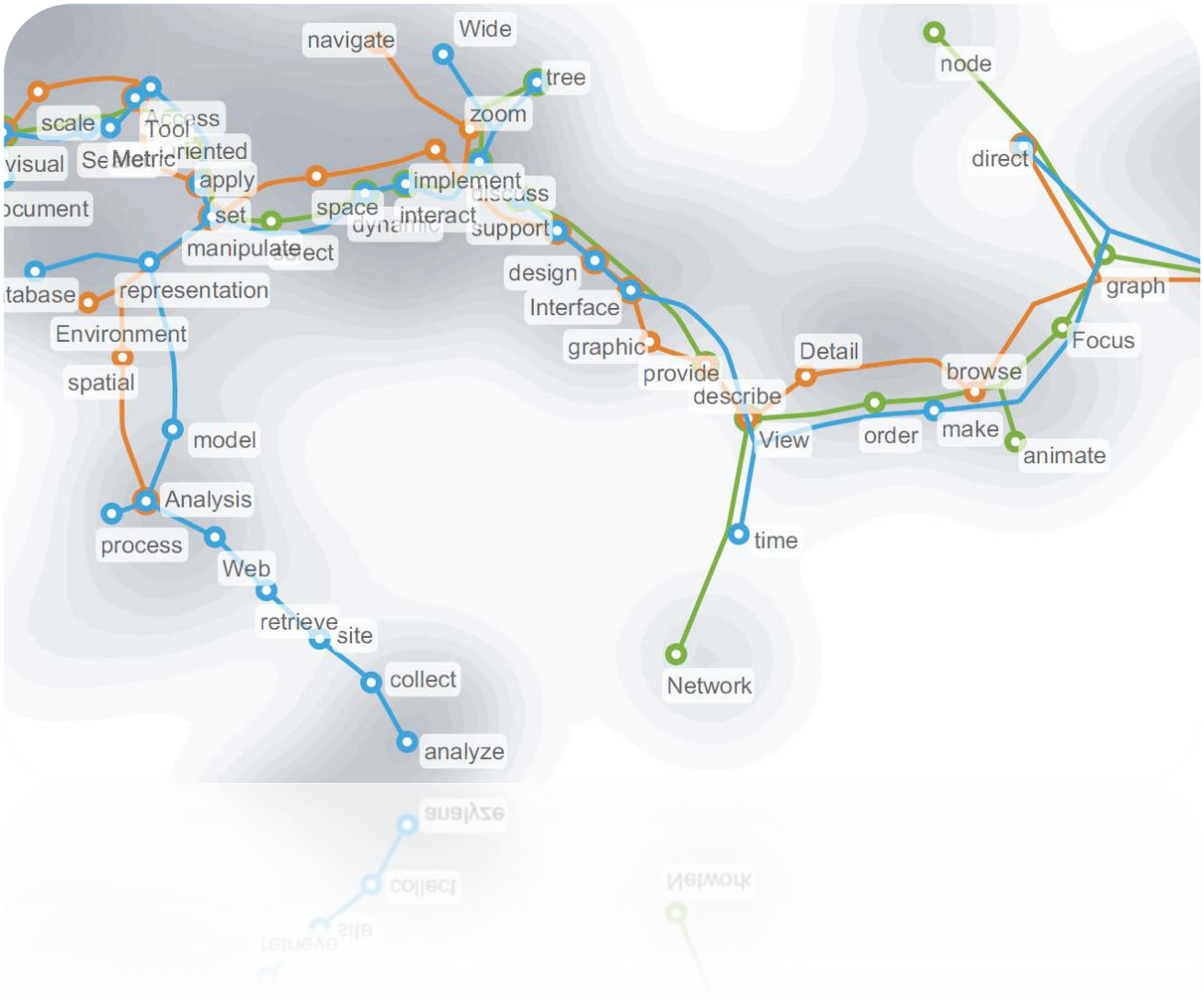
Application of set visualization technique

Draw sets on word cloud, tree map, etc.

Limitation & future works

Thanks!

panpan
pxu@ust.hk



Last.fm Data

Artist similarity collected through Last.fm web API

User information could also be accessed

Infovis 04 publication data

Keyword similarity: through topic modeling (LDA) and co-citation

Dataset collection & processing

Metro map drawing