

Group-Level Graph Visualization Taxonomy

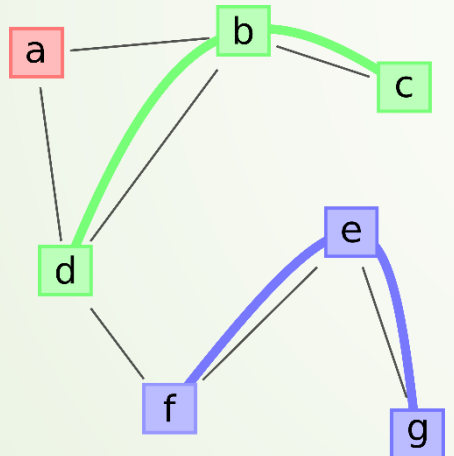
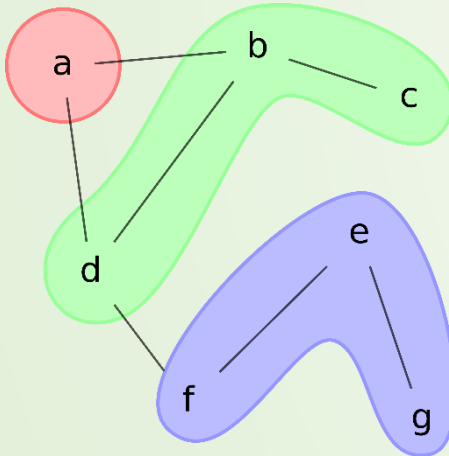
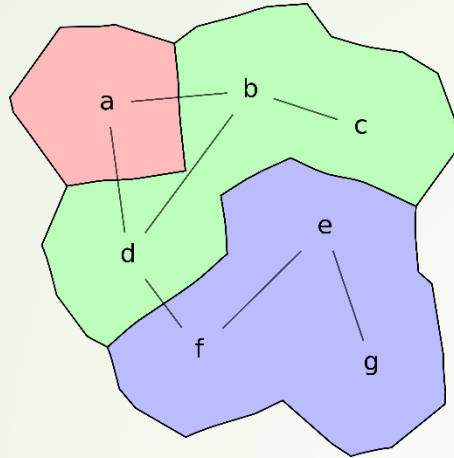
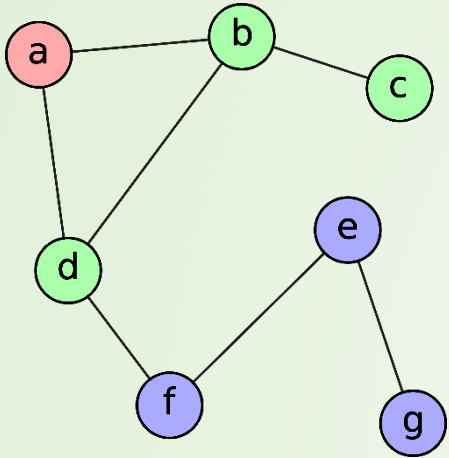
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The Problem



Node-based tasks

- Count the nodes
- Find the closest node to *c*

Edge-based tasks

- Is there a path between *b* and *e*?
- Find cycles

Group-based tasks

- Count the groups
- Find the neighbor groups of *blue*



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Previous Work

Typology of Visualization Task [Brehmer *et al.*, 2013]

- Organize visualization task taxonomies
- Identifies a main problem:
 - *Lack of global view*
- Propose a task characterization:
 - *Why*
 - *What*
 - *How*
- Blends with model-oriented taxonomies

Taxonomy Graph Task [Lee *et al.*, 2006]

- Based on taxonomy of visual analytics tasks [Amar *et al.*, 2005]
 - *Retrieve value*
 - *Filter...*
- Organize the tasks into
 - *Topology-based*
 - *Attribute-based*
 - *Browsing*
 - *Overview*



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Categories

- Group-only tasks

- Count the groups.
- Find groups of given color.
- Find group with larger area.
- Find *neighbors* of a group.

- Group-node tasks

- Count the nodes in a group.
- Find the group with larger number of nodes.
- Find the group of node x .

- Group-link tasks

- Count inner edges in a group.
- Find sparsely connected groups.
- Find densely interconnected groups.
- Find non-connected *neighbors*.

- Group-network tasks

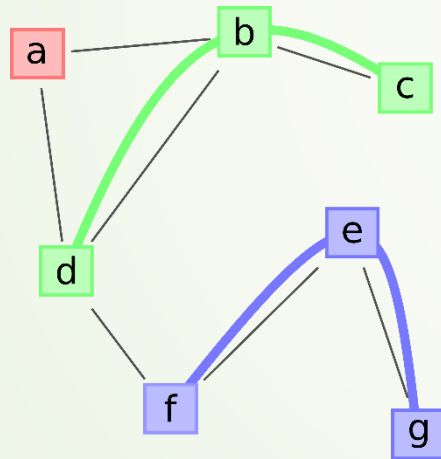
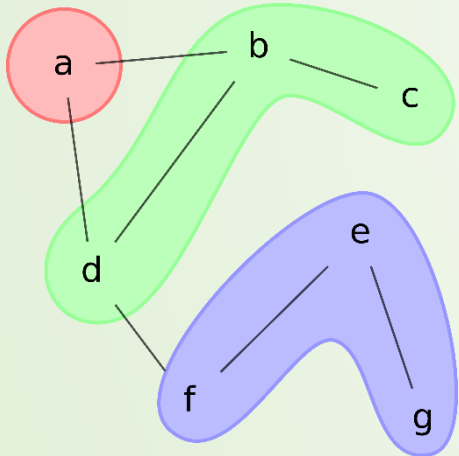
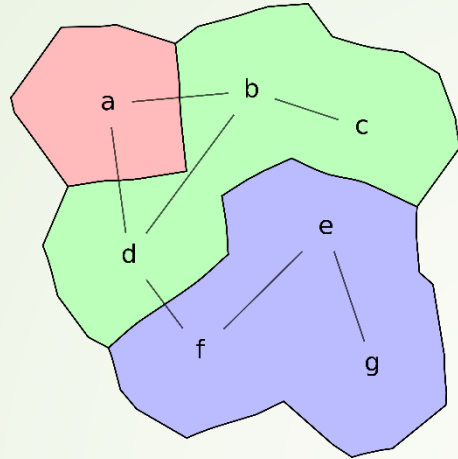
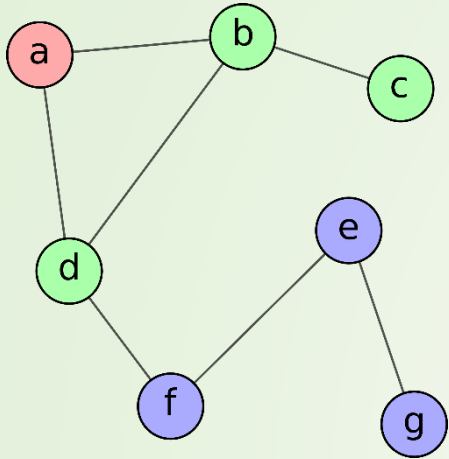
- Find groups with k -cliques.
- Is shortest path between nodes x and y entirely inside a group?
- Find min number of groups on a path from x to y .



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Additional Definitions



- **Group neighboring**
 - Abstract concept of proximity
 - To be defined on specific visualization
- **Group reachability**
 - Accessible by moving through neighbor countries
- **Group area/perimeter**
 - Not intuitively defined for all visualization
 - Important to be considered

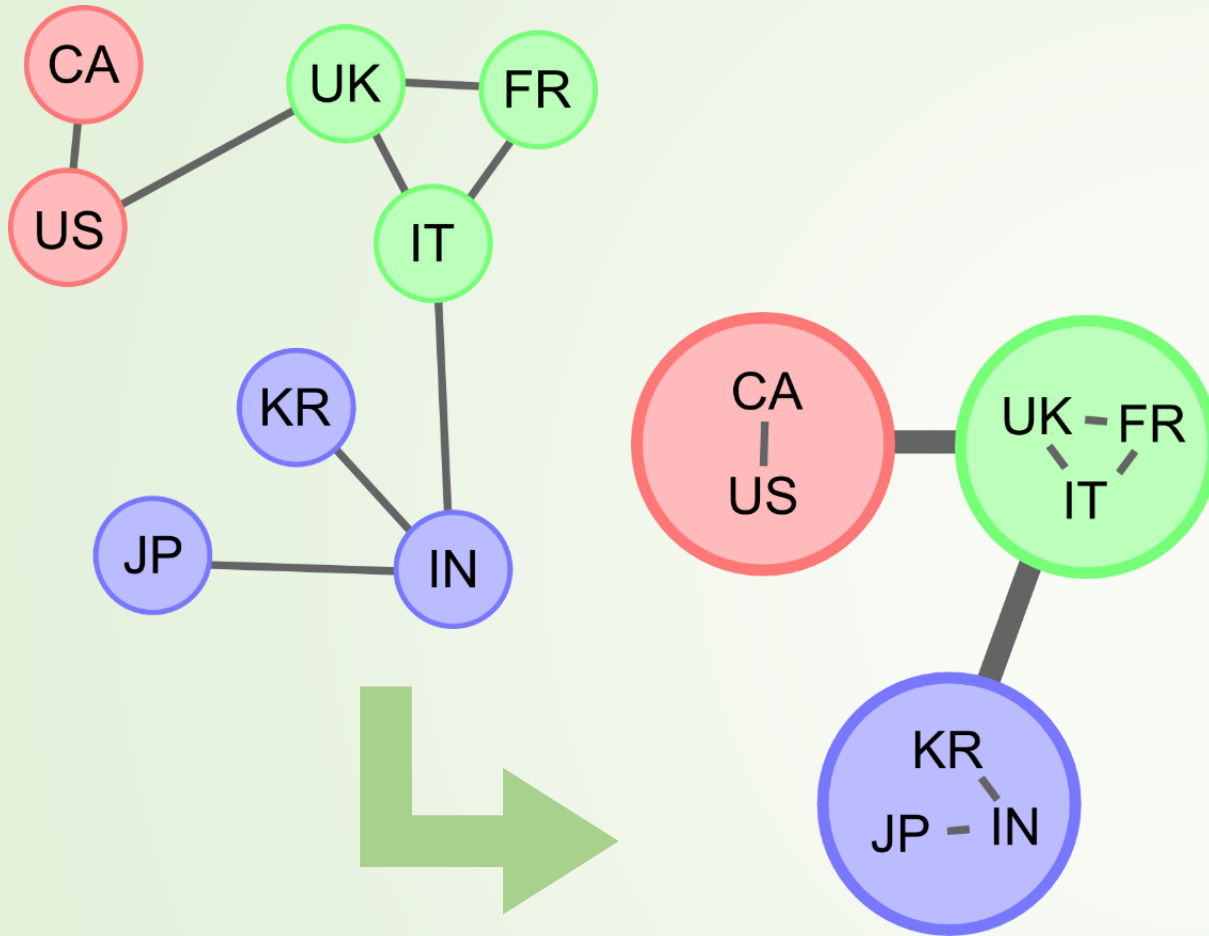


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Group Tasks as Extension of Graph Tasks



- **Group insights from graph tasks**
 - Metagraph construction allows graph tasks on groups
 - Tasks can be more or less meaningful
- **Metagraph construction**
 - Based on topology
 - Based on neighboring
 - Based on attributes



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Conclusions and Future Work

- **Conclusions**

- We characterized group-level graph tasks by proving
 - Examples of graph tasks
 - A task classification

- **Benefits**

- Provide directions for
 - Future evaluations
 - Visualization system design

- **Limitations**

- Clustering is a node partition
- Graph is undirected
- Graph is simple

- **Future Work**

- Consider hierarchical clustering
- Consider overlaps
- Extend and re-organize the tasks
- Propose alternative categories



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