Group-Level Graph Visualization Taxonomy

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The Problem

- Count the nodes
- Find the closest node to c

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

- Count the groups
- Find the neighbor groups of blue

Group-Level Graph Visualization Taxonomy

Graph And Map Algorithms (GAMA) Group – University of Arizona
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

**Group-Level Graph Visualization Taxonomy**
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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-link tasks**
  - Count inner edges in a group.
  - Find sparsely connected groups.
  - Find densely interconnected groups.
  - Find non-connected *neighbors*.

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

- **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
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
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