

# Graph Playgrounds

## 3D Exploration of Graph Layers via Vertex Cloning

James Abello  
abello@dimacs.rutgers.edu

Fred Hohman  
fredhohman@gatech.edu

Polo Chau  
polo@gatech.edu

RUTGERS  
THE STATE UNIVERSITY  
OF NEW JERSEY

Georgia  
Tech

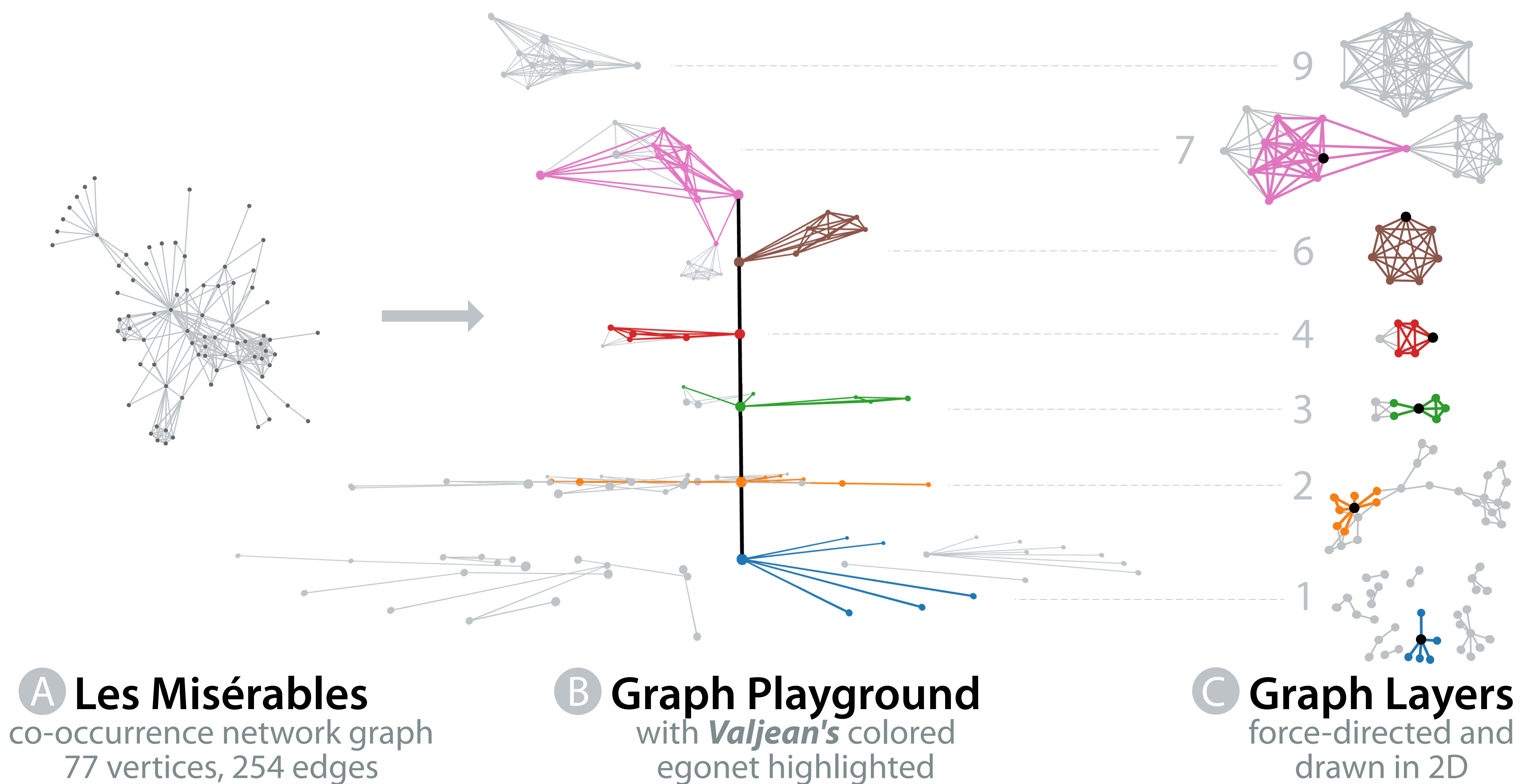
### Summary

We use edge decompositions as a central graph theoretical mechanism for 3D navigation, exploration, and large data sensemaking of network graphs.

We call these **Graph Playgrounds**.

#### Fixed-point edge decomposition algorithms:

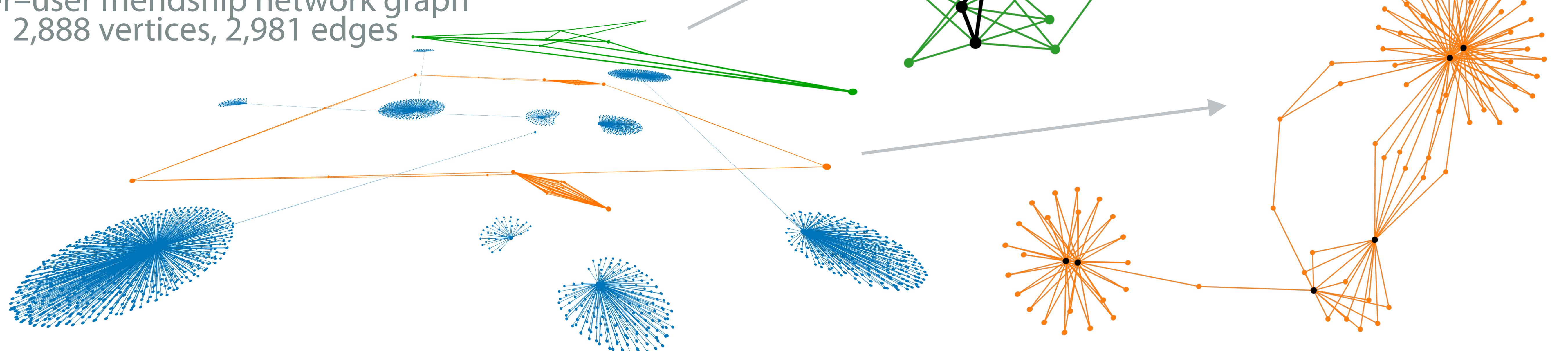
- discover subgraph patterns structurally similar or dissimilar to regular subgraphs
- quantify the variety of "roles" a vertex can play in the overall network topology (*vertex cloning*)
- iterative and scalable (*linear in number of edges per layer*)



### Graph Layer Structure

We split graphs into fixed points of degree peeling (*graph layers*), simultaneously revealing structure in graph layers and aspects of vertex diversity.

**Facebook (NIPS)**  
User-user friendship network graph  
2,888 vertices, 2,981 edges



### Ongoing Work

Scale Graph Playground visualizations to millions of nodes. Investigate how 3D views could enhance and complement existing 2D graph analytic visualization systems.

### System

Graph Playgrounds are rendered in the web browser using WebGL for real-time interactivity.

This work was supported by NSF grants IIS-1563816, IIS-1563971 and TWC-1526254.

3D Exploration of Graph Layers via Vertex Cloning

James Abello\*, Fred Hohman\*, Duen Horng Chau

Poster, IEEE Visual Analytics Science and Technology (VAST). Oct 1-6, 2017. Phoenix, USA.

\*Authors contributed equally