

A blurred background image of a business meeting. Several people in professional attire are gathered around a table. One person in the center is holding a smartphone, while another to their right holds a tablet. A white coffee cup is visible on the table. The scene is brightly lit, likely from a window in the background.

# **DATA-INFORMED GROUP FORMATION TO IMPROVE COLLABORATION**

# COURSE CONTEXT & DESIGN PROBLEM

|                               |  |
|-------------------------------|--|
| <b>Context</b>                | Graduate-level Seminar for Engineering Teaching Assistants(Hybrid)   |
| <b>Design Problem</b>         | Informal groups led to uneven participation, with some students dominating.  |
| <b>Instructional Solution</b> | Implemented a data-driven group formation strategy using the Louvain community detection algorithm to support balanced, productive groups. |
| <b>Key Impact</b>             | Participation became more evenly distributed. Discussions showed stronger reciprocity and less reliance on a single dominant voice.        |



### **1 Collected early interaction data**

Initial seminar discussions and activities to see who responded to whom, and how often

Built an interaction network



### **2 Applied Louvain community detection**

Identified natural clusters in the interaction network

Avoided isolating quieter students at the edges

Balanced more central and less central participants across groups



### **3 Formed stable discussion/project groups**

Used cluster results to assign groups for ongoing seminar tasks

Ensured each group had a mix of voices and experience levels

Reduced the risk of one person “carrying” the group



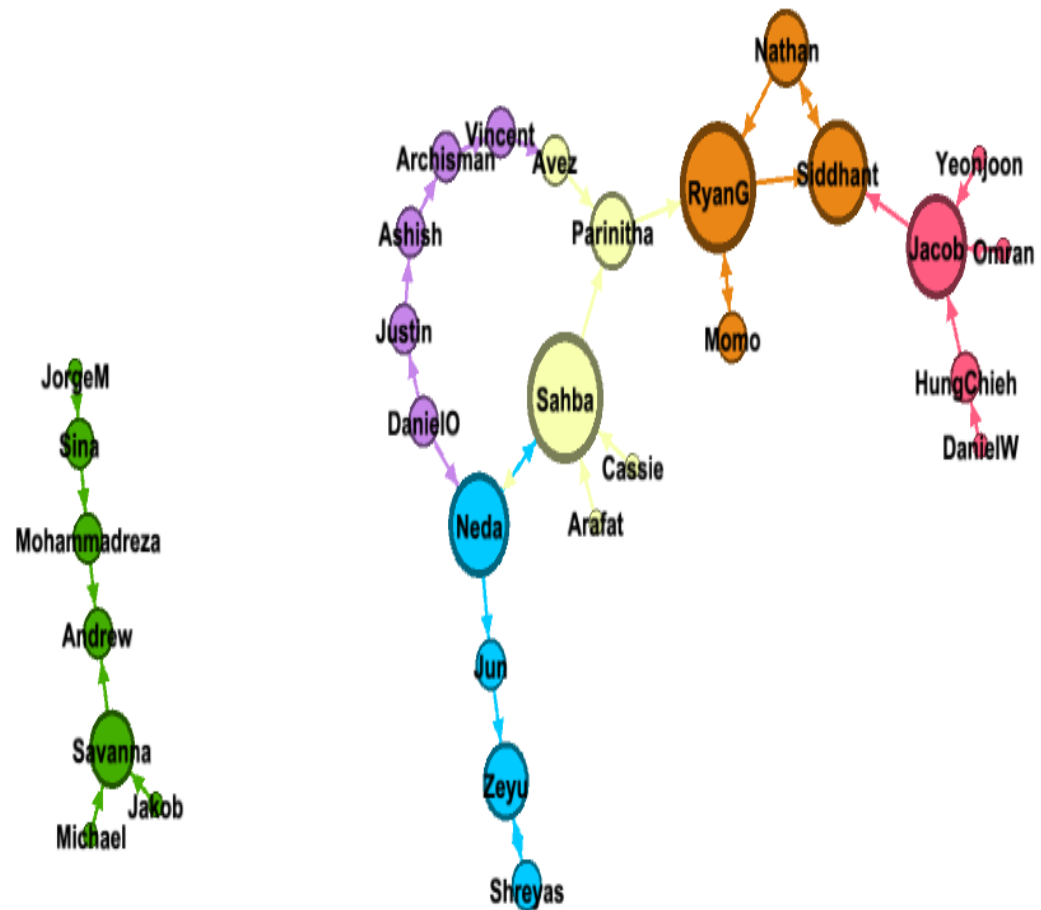
### **4 Integrated into course flow**

Announced final group assignments early in the semester

Groups stayed together for discussions, peer feedback, and mini-projects

Monitored collaboration patterns over time

## IMPLEMENTATION IN THE COURSE



# IMPACTS & REFINEMENTS

## Observed Outcomes

- Group assignment lists informed by network data
- Before/after network views of group structure
- Brief instructor notes on how to use data-informed grouping in future offerings
- Participation became more evenly distributed across group members.
- Discussions showed stronger reciprocity, reducing reliance on a single dominant voice.
- Group work on teaching cases and activities was smoother and more sustained.
- Groups felt fair and purpose-driven rather than arbitrary.
- Less time was spent addressing group issues and reassignments.

## Design Reflection & Iteration

- Combine network-based grouping with brief preference data (e.g., teaching interests, prior experience).
- Add a short orientation explaining why structured groups matter for their development as future instructors.
- Provide simple visual feedback to TAs about how their group is participating over time.
- Provided a **repeatable, data-informed grouping method** for future cohorts.