Fall 2025 EECS 215 MR-Project

Data-mining and modeling-based Project

Groups that will be choosing this project will participate in a collaborative game sorting task.

Book an appointment using this link: https://calendar.app.google/ChdxHqgib2WY7jcf9

Data Provided After Completing Data Collection:

1. Sociograms
   - Session-level: Aggregated interaction strengths awcross entire collaboration
   - Temporal: 32-second windowed snapshots showing dynamic evolution
   - Three modalities: conversation (directed), proximity (undirected), joint attention (undirected)
   - Metrics available: reciprocity, density, eigenvector centrality,
2. Pairwise Features (per second)
   - speaking_entropy: Turn-taking unpredictability between dyad
   - dominance_ratio: Speaking time imbalance
   - material_diversity: Number of distinct virtual objects jointly attended
   - joint_att_count: Frequency of shared gaze fixations
   - dist_mean: Average physical distance between participants
   - prox_binary: Time spent within 1.5 feet
   - approach_rate: Speed of movement toward/away from each other
3. Task Performance
   - Completion time per group
   - Object interaction logs (which participant placed which image where with timestamps)

Objective:

Design data mining algorithms to understand collaborative group behavior and identify opportunities to enhance teamwork in mixed reality environments.

Project Options

Option 1: Intervention Timing Optimization

Learn optimal moments to intervene (e.g., redistribute attention, suggest regrouping).

Option 2: Causal Discovery in Collaboration

Identify causal relationships between individual behaviors and group outcomes.

Option 3: Propose Your Own

Any project related to group behavior analysis, prediction, or optimization. Must use provided data, and produce actionable insights for collaborative MR design. Your project should not be mere clustering!

Deliverables

- Algorithm implementation with documentation
- Evaluation on provided data with train/test methodology
- Analysis report: methodology, results, insights for improving MR collaboration

Technical Constraints

- You must use at least one of the data provided (i.e. your proposal will only use pairwise features) etc.
- Use classical ML/data mining (scikit-learn, NetworkX, statsmodels) or maybe LLM!
- Focus on interpretability and actionable insights