



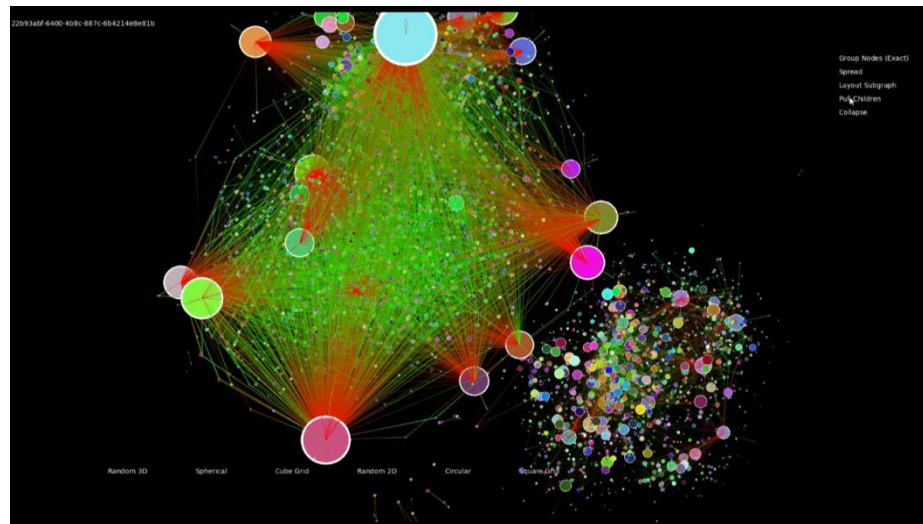
# ***Interactive Visual Exploration of Large Graphs with Enhanced Sampling and Summarization***

Christoph Borst, Mehmet Engin Tozal,  
Nicholas Lipari, Maryam Beisafar

University of Louisiana at Lafayette  
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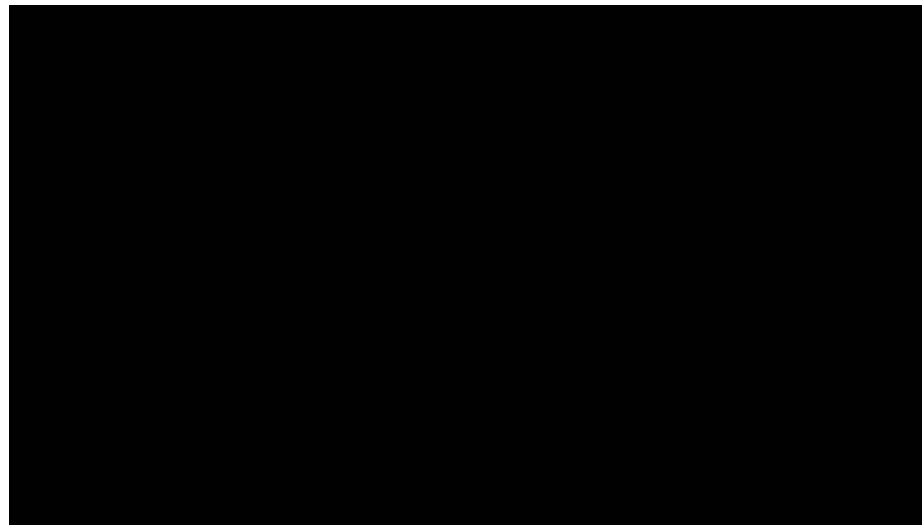
# Description

- Build on Year 4 project by extending sampling, summarization, and analysis processes, integrated into a coherent interactive visual analytics system.



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# Need & Relevance

- Real world graph datasets are large
  - Difficult to capture and analyze in their entirety
  - Challenging to visualize, especially at interactive rates
  - Cognitively demanding to gain deeper insight
- Need relevant visual analytic methods and tools:  
integrated approach incorporating multiple sampling, summarization, and analysis processes in a way that supports meaningful insight
- Need new knowledge about suitability of different methods for different graph types and properties



# Goals & Objectives

- Extend/enhance our sampling approaches
  - Unbiased crawling (research)
  - Simple Random Walk with re-weighting (SRW-rw)
  - Metropolis-Hastings Random Walk (MHRW)
- Explore additional measures to present more perspectives into data
  - Closeness, Eigenvector, Cross-Clique
- Integrate sampling, summarization, and other processes into an enhanced analytics interface

# Approach

- Develop characteristic-preserving graph crawling approaches
- Develop universal gravitation based graph summarization techniques
- Build on standard tools (iGraph) to increase re-usability and generalizability
- Provide visual interface to let users access various samples and request further analyses
  - Support new integrated methods and build on our CVDI framework
  - Support range of displays: laptop/tablet to large visualization systems
- Work with larger datasets to demonstrate and evaluate the approaches





# Uniqueness

- Extending igraph for sampling, summarization and visualization
- Investigating characteristic-preserving graph crawling approaches
- Investigating universal gravitation based graph summarization techniques
- Developing novel visualization and interaction methods, and overall visual analytics framework



# Impact

- Enable better data exploration
- Applications (e.g., collaboration graphs, disease patterns, resource monitoring, cybersecurity)
- Guidelines for applying these technique for analytics-guided decision making
- Enhanced visual analytics software framework and modules