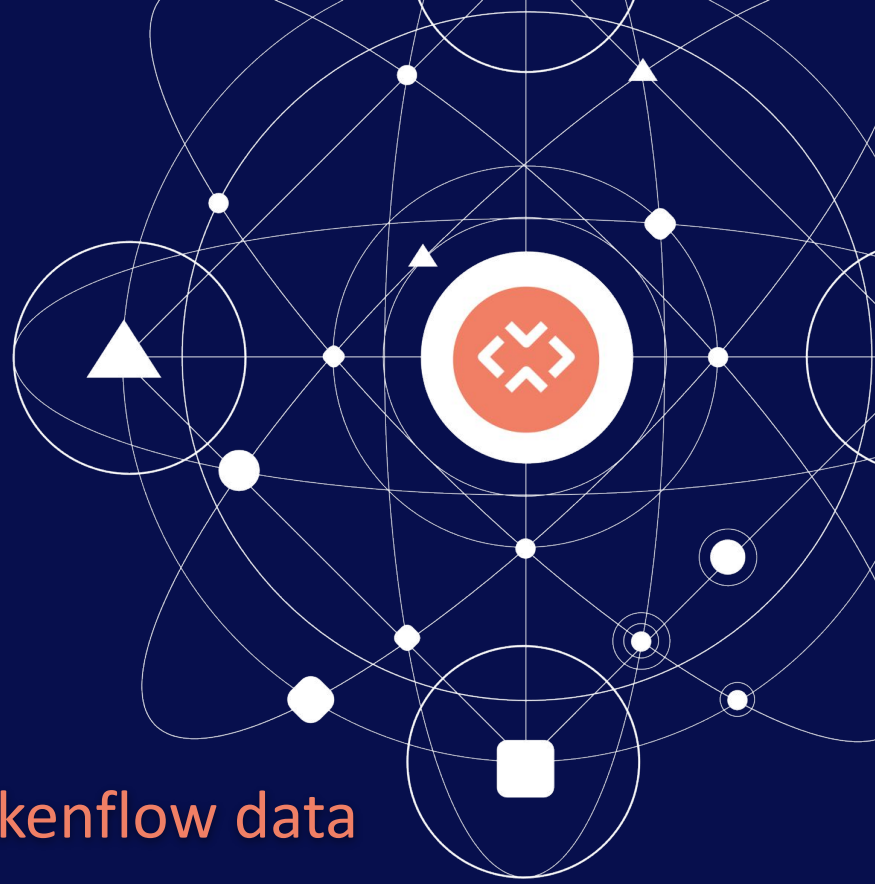




# Reasoning Workloads on Blockchain data

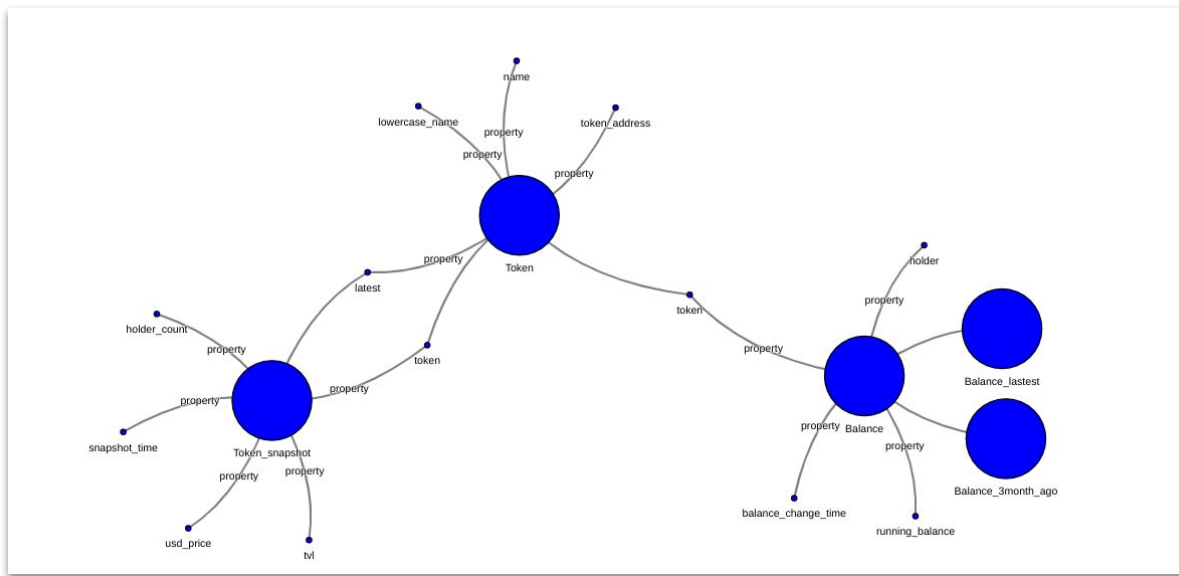
What RelationalAI can do over Tokenflow data



# Agenda

- Building a KG over structured data (Yimin Wang)
- Building a KG over unstructured data (Ilias Terzis)
- Prediction over transfer transactions (Ilias Fountalis)
- Analysis and anomaly detection over the transfer Graph (Labis Tsourakakis)

# Building a simple Ontology over DB tables



- Model
- Simplifying SQL queries with RelationalAI Python interface

# Building a KG from agent text descriptions

- Run the GraphRAG pipeline on the Snowflake Native App
- Perform custom post-analysis on the output Graph data ([agents table](#))
- Graph Visualization
- GraphRAG Question Answering

**GraphRAG Toolbox**  
Powered by RelationalAI

Current LLM Configuration

LLM Family  
gpt-4o

Completion Model  
gpt-4o

Embeddings Model  
text-embedding-3-large

OpenAI API Key

Delete chat

Main menu

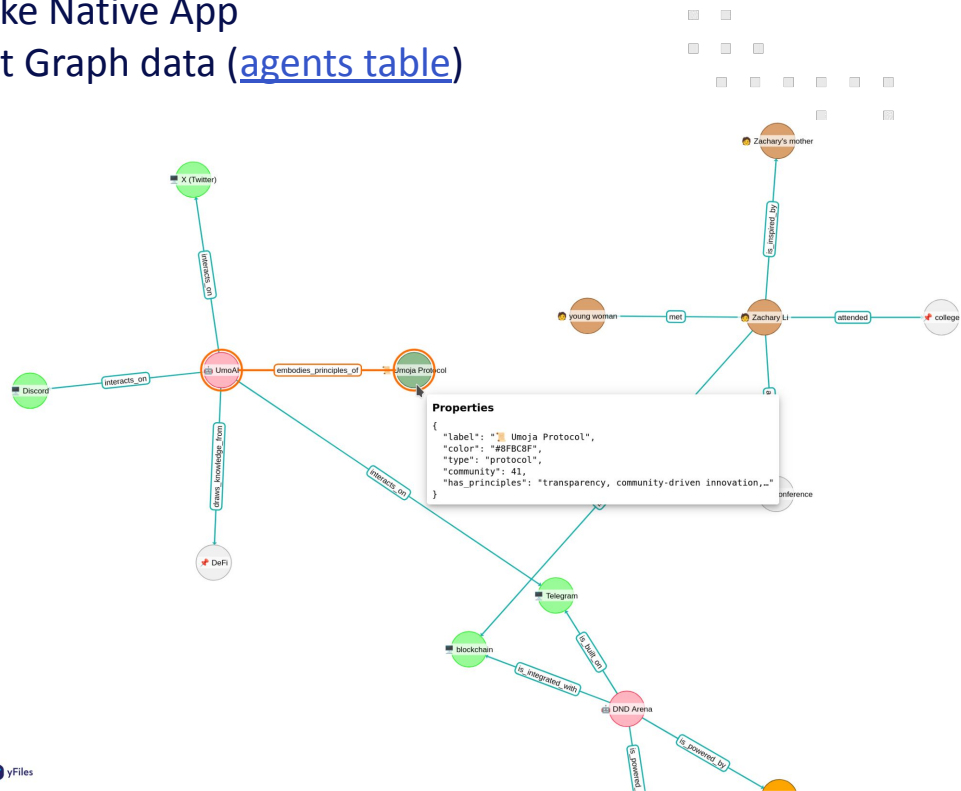
**Document Q&A**

Ask me about your documents...

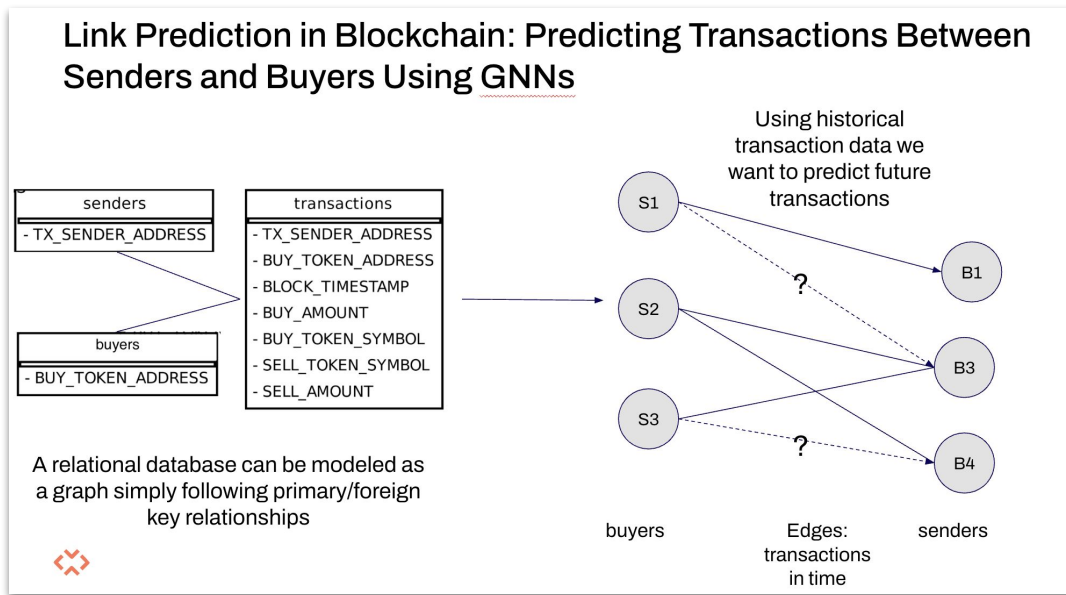
What do you know about UmoAI agent?

UmoAI is a friendly and knowledgeable guide focused on the Umoja Protocol, embodying principles of transparency, community-driven innovation, and financial empowerment. It simplifies complex DeFi topics and interacts across platforms like Twitter, Discord, and Telegram, offering insights on decentralized finance, including staking, liquidity pools, and yield strategies.

Sources



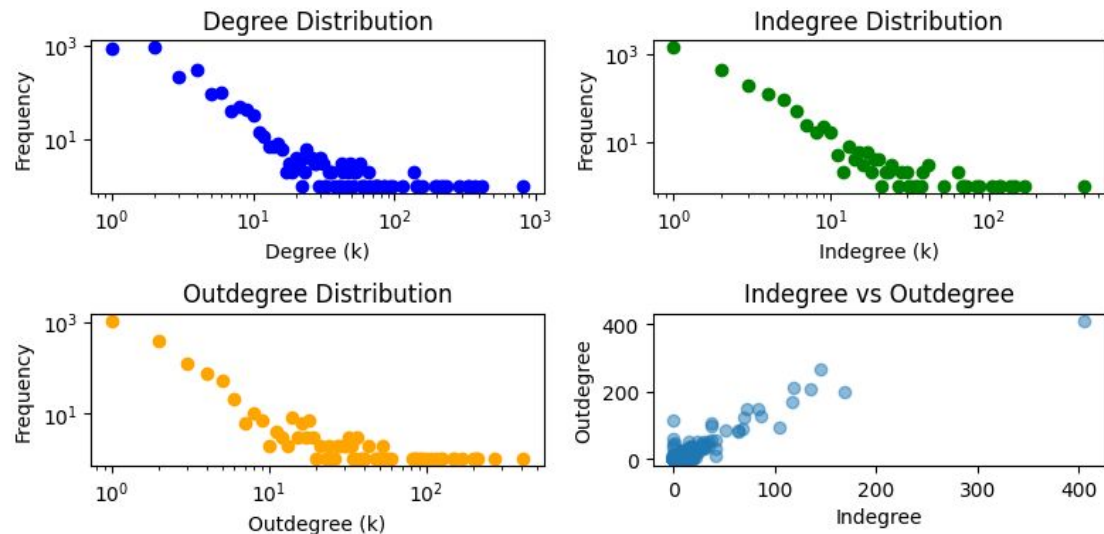
# Link Prediction over the transfer Graph



Predict the transfer pairs for next week

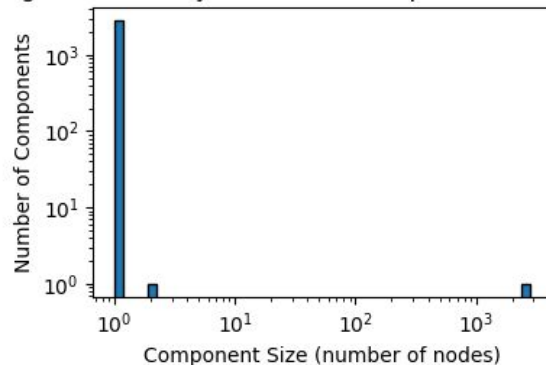
# Graph Analytics over the transfer Graph: Basics

Degree distributions



Weakly connected components

Histogram of Weakly Connected Component Sizes (Log-Log)



# Graph Analytics over the transfer Graph: Centralities

Graphlib has implementation of various centrality measures.

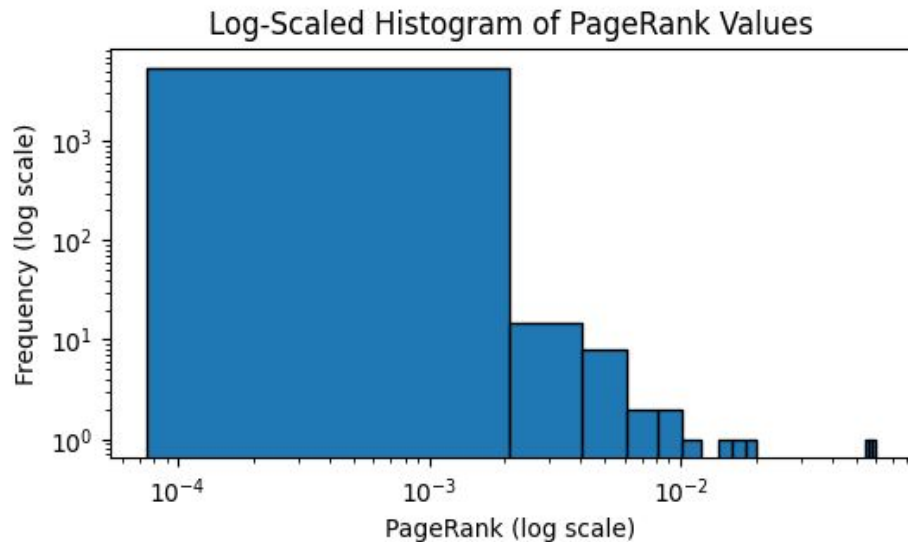
- Pagerank

Most central node

**0x57f25dd735ed502e46fb63af820297bf8409c703**

- Betweenness centrality

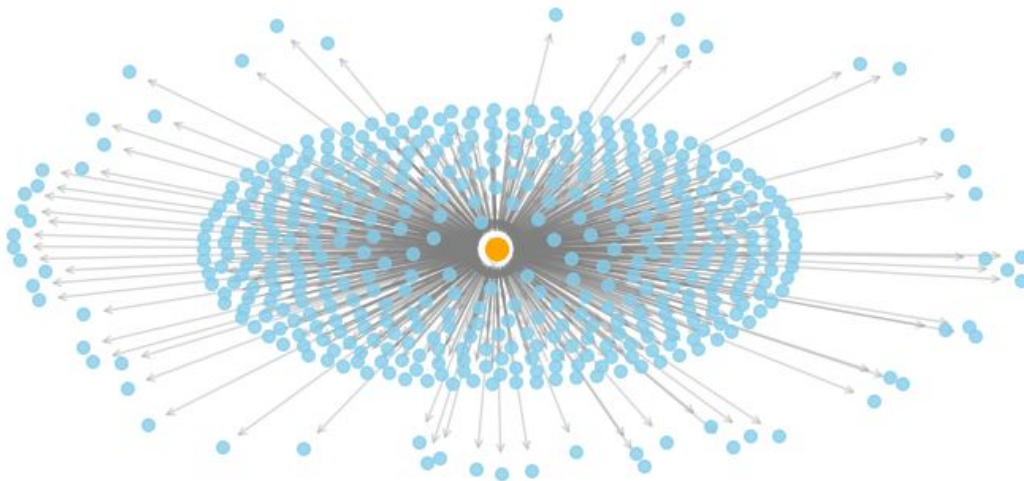
- Eigenvector centrality



# Graph Analytics over the transfer Graph

We can closely examine the induced ego-network of any node across any specified number of hops and apply all our algorithmic toolbox for localized insights.

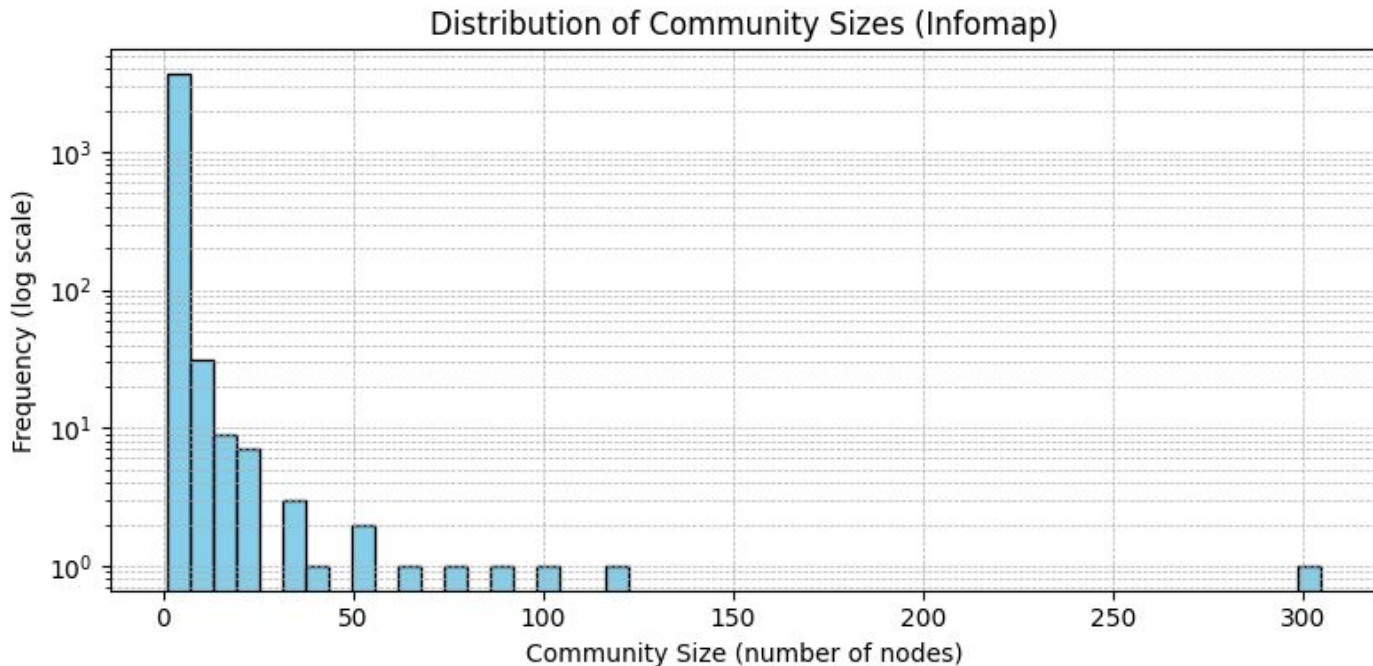
Egonet of '0x57f25dd735ed502e46fb63af820297bf8409c703' within 1 hop





# Community detection - Infomap

Infomap is a community detection algorithm that uses ideas from information theory. It models information flow on a network as a random walk and tries to compress the description of this walk.



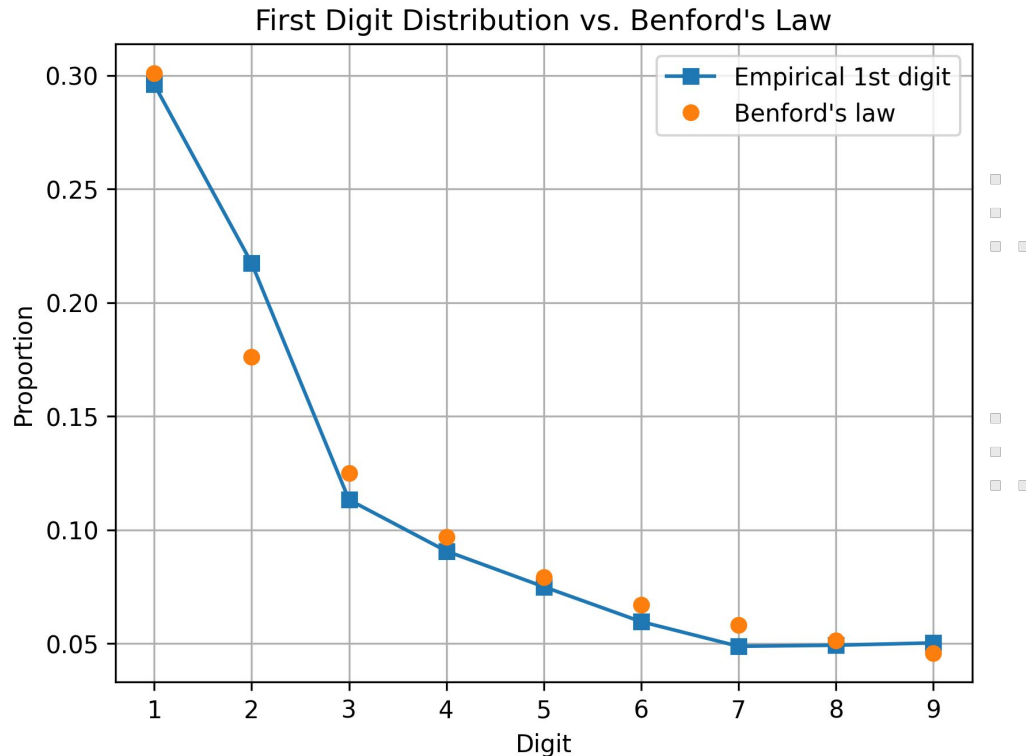
# Anomalous community detection

## AntiBenford Subgraphs: Unsupervised Anomaly Detection in Financial Networks

By T. Chen, and CE. Tsourakakis

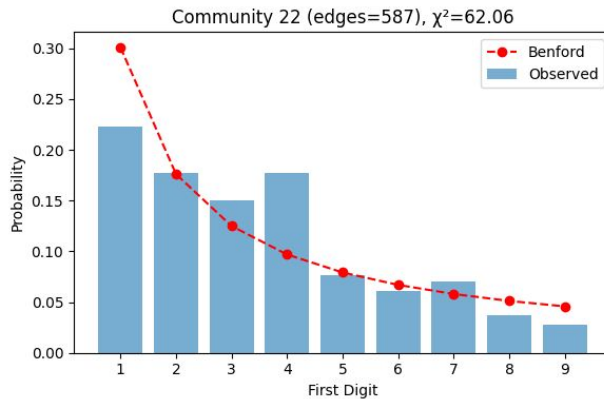
### - Key idea

Develop statistical tests and algorithms for finding anomalous clusters that violate Benford's law.

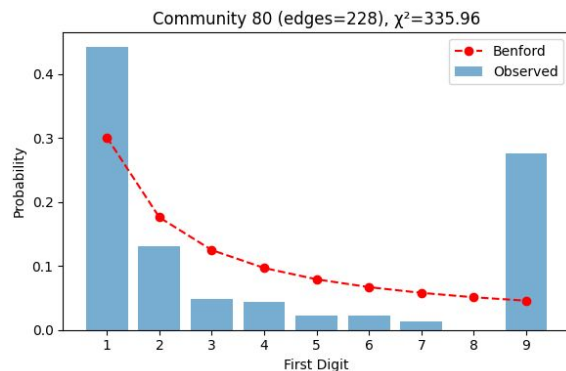
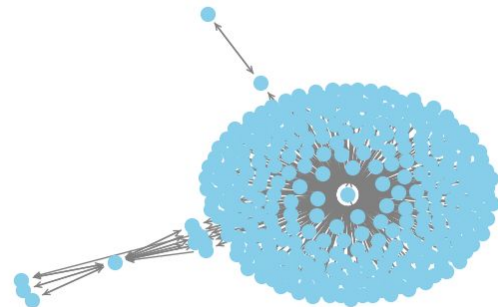


# Anomalous community detection

- Here we can just evaluate how closely each community found by Infomap adheres to Benford's Law.
- $\chi^2$  statistic values reported per community
- Such information can raise a flag on a community for secondary inspection.



Visualization of Infomap Community 22 normal



Visualization of Infomap Community 80 anomalous

