Data-Intensive Systems

Bachelor project proposals 2022

Cigdem Aslay, Ira Assent, **Panagiotis Karras**, Davide Mottin

Our research group

Our interests

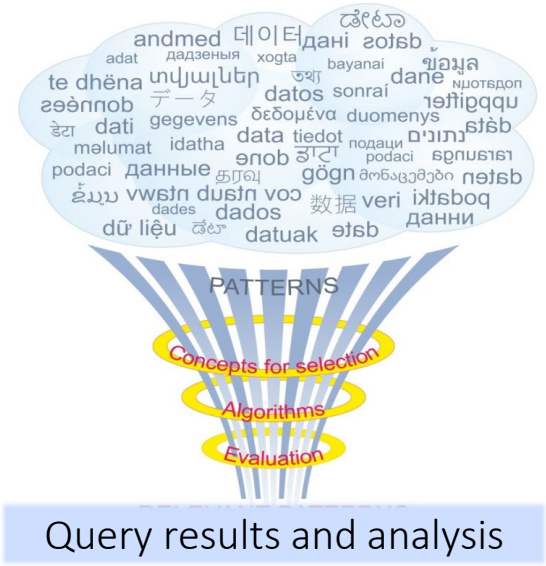
- Data management, data analysis, machine learning
- Efficiency and scalability
- Models and algorithms

Our methods

- Formalize real world problems
- Devise concepts and algorithmic solutions
- Evaluate empirically

Our tools and results

- Theoretical analysis and prototype implementations



Query results and analysis

Projects in a Nutshell

Approximating Betweennes Centrality on Large Graphs

Creating and Personalizing Large Knowledge Graphs

SAGA: Scalable Algorithms for Graph Alignment

BeCom: Benchmark for community detection

Graph analysis

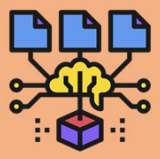
Efficient and Scalable Influence Maximization in Online Social Networks

Evolutionary games and spatial upstream reciprocity

Structural social balance under controversy

Similarity Search with Dynamic Time Warping

Interaction Models



Studying the fairness of ML models

ReliK: Reliable Knowledge Graph Embeddings

AI aspects

Graph analysis

Algorithms for Approximating Betweenness Centrality on Large Graphs

How can we fast detect ”broker” people in a social network?

BeCom: Benchmark for community detection

How can we easily evaluate whether two users belong to the same community?

Creating and Personalizing Large Knowledge Graphs

How do we create and maintain high-quality knowledge graphs for medical doctors?

SAGA: Scalable Algorithms for Graph Alignment

Can we find the same users in two very large social networks?

Interaction models

Efficient and Scalable Influence Maximization in Online Social Networks

How do I compute fast the set of most influencial users in a social network?

Evolutionary games and spatial upstream reciprocity

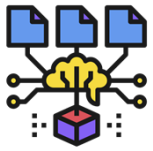
Why do we spend time, effort, and resources in cooperating with others?

Structural social balance under controversy

Can there be stability if controversial arguments are discussed?

Similarity Search with Dynamic Time Warping

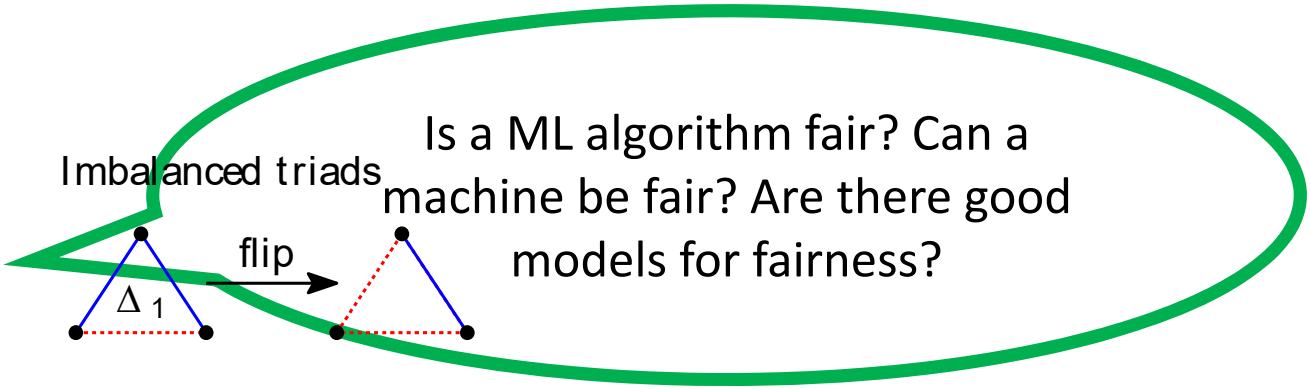
How can we efficiently search time series under complex distance models?

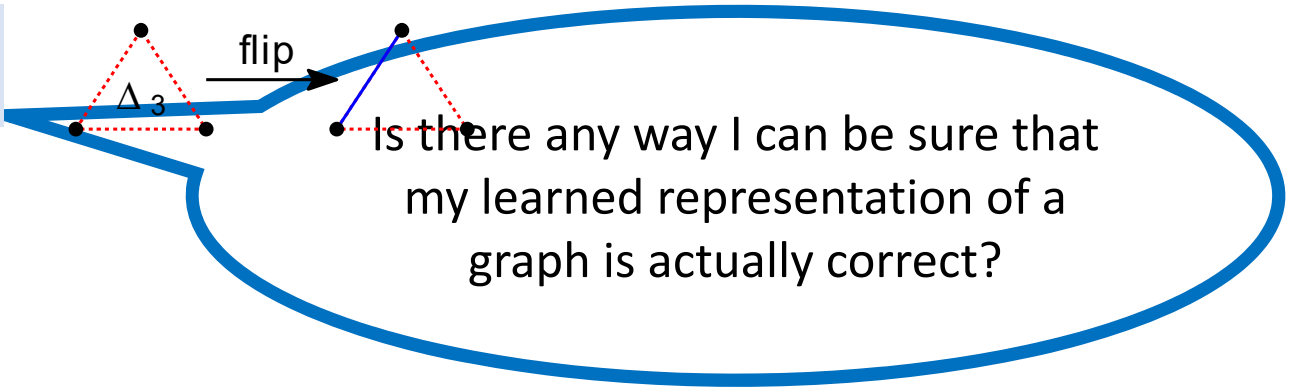


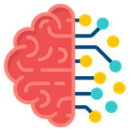
AI aspects

Studying the fairness of ML models

ReliK: Reliable Knowledge Graph Embeddings

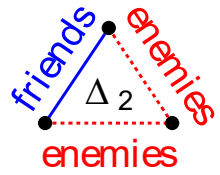




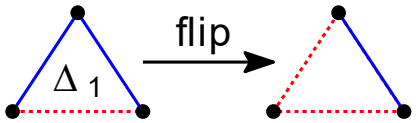


Structural Balance on Social Networks

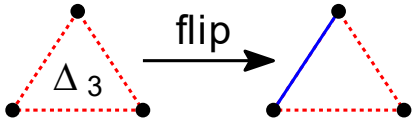
Balanced triads



Imbalanced triads

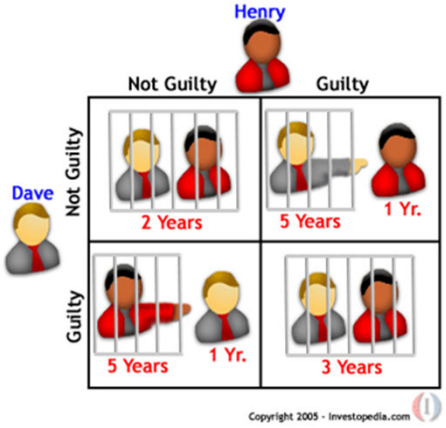


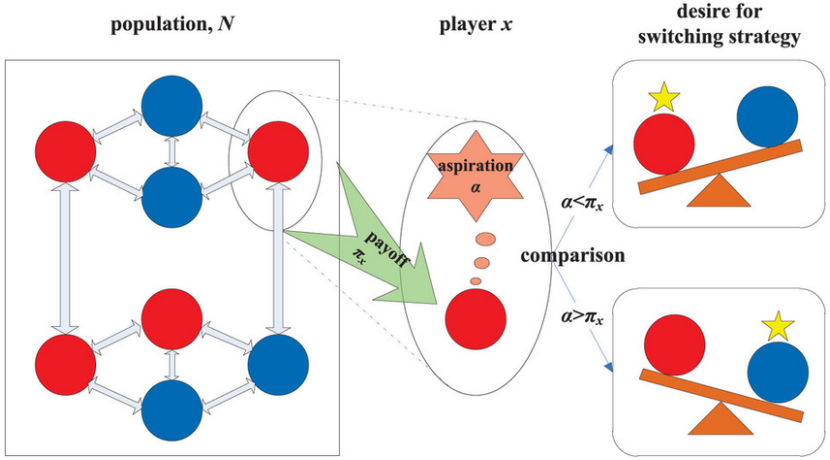
"The friend of my enemy is my enemy"



"The enemy of my enemy is my friend"

Evolution of Cooperation on Graphs





- Implement and study the stochastic process
- How long until balance is reached?
- How does the distribution of friendships look at the end?
- Which graphs promote cooperation?