Community Detection in Graphs

Purpose

★ Holistic overview of community detection in graphs

- Structural measures and quality functions
- Categories of algorithms
- Challenges in community detection

Structural Measures

- Function of structural measures
- Examples:
  - Betweenness
  - Similarity
  - Distance
- Algorithm specific

Quality Functions - Modularity

- Determine partition efficacy
- Modularity – what is it?
- Has been improved over time
- Still contains some limitations

$$Q = \frac{1}{2m}\sum_{ij}(A_{ij} - P_{ij})\delta(C_i, C_j)$$

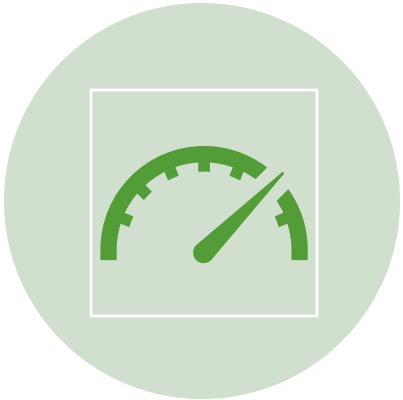
Categorizations of Algorithms

- Traditional
- Divisive/agglomerative
- Modularity-based
- Spectral
- Dynamic
- Statistical inference
- Specialty Methods

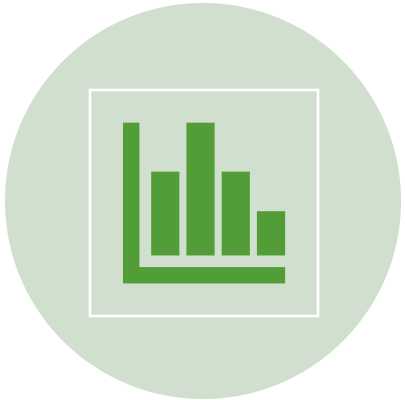
Comparison

- Inherently difficult to define best community
- Benchmarks
- Inherits modularity biases in unknown graphs
- Likely is no general best method

Other Challenges



GENERAL EFFICIENCY



INTERPRETATION OF RESULTS

IMPROVED METHODS FOR PROCESSING SPECIAL GRAPHS

References

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