Community Detection

Saptarshi Pyne

Assistant Professor
Department of Computer Science and Engineering
Indian Institute of Technology Jodhpur, Rajasthan, India 342030

Community organization in real networks

- Hierarchical

- Modular
    - Modularity maximization algorithms
    - Limitations of modularity

- Overlapping communities
    - Detection algorithms, e.g., the Cfinder algorithm (https://www.cfinder.org/)
    - Time complexities and benchmarks
        - The Louvain algorithm (Advanced Topic 9.C)

Community organization in real networks (contd.)

- Characterizing communities: Discovering the principles that govern community organization
  - Evolution of communities (potential events)
    - Birth
    - Growth, Merger
    - Contraction, Split
    - Death

Limitations of the existing community detection algorithms

- Forces each vertex to be a part of one or more communities. Must all vertices belong to communities?

References

- D **Barabasi**: Albert-László Barabási (2016), *Network Science*, Cambridge University Press. Freely available under the Creative Commons license: [website](#).
  - Chapter 9 'Communities': Please study all the sections except the sections titled 'Advanced Topic …'. However, for the Louvain algorithm, please study the section 'Advanced Topic 9.C: Fast Algorithms for Community Detection'.

Thank you