Ανάλυση Κοινωνικών Δικτύων (Social Network Analysis)

2η Εργαστηριακή Άσκηση

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Study of Artificial – Real Topologies

- Computation of Ego-centrality
  - Another analysis metric to consider

- Acquisition of real topologies from datasets
- Study and comparison of real topologies with artificial counterparts

- Community detection

Ego-network & Ego-centrality

- ***Ego networks***: consist of a single actor (ego) together with the actors they are connected to (alters) and all the links among those alters
- Computation of ego-centrality (one actor)
  - Adjacency matric A (of ego network)
  - **A^2[1-A]**, **1** is matrix of all 1's
  - # of geodesics of length 2 joining i to j
  - Sum of the reciprocal of the entries

    gives ego betweenness of the actor
  - Has to be halved if it is a graph
  - Repeat for rest of actors

$$\mathbf{A} = \begin{bmatrix} 0 & 1 & 1 & 1 & 1 \\ 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\mathbf{A}^2[1-\mathbf{A}] = \begin{bmatrix} * & * & * & * & * \\ * & * & * & 2 & 1 \\ * & * & * & * & 1 \\ * & * & * & * & 1 \\ * & * & * & * & * \end{bmatrix}$$

- The calculation of all the ego betweenness scores for a whole network would be one order of magnitude faster than calculating the real betweenness scores

Initialization

- Run Pathadd.m in folder ComDetTBV090
- Run in folder Algorithms all other functions

Initialization

- importgml.m
- Directed graph -> undirected

	Τοπολογία	Αρχείο
ΠΡΑΓΜΑΤΙΚΩΝ ΔΕΔΟΜΕΝΩΝ	American College football	football.gml
	Les Miserables	lesmis.gml
	Dolphin social network	dolphins.gml

Familiarize with the methods, check input & output

- Functions for community detection
- Compare algorithms based on modularity
- Print communities, for nodes in the same community use different colors
- Output of each algorithm, make it in the form

of a vector showing for each node its community

especially for Girvan-Newman (edge-betweenness)

Cell matrices

Μέθοδος Εντοπισμού Κοινοτήτων	Αρχείο ComDetTBv090\Algorithms
Spectral Clustering	GCSpectralClust2.m
Newman-Girvan	GGGirvanNewman.m
Modularity Maximization	GCModulMax1.m