HOMEWORK 3

Problem 1: Network representation

Consider the network in Fig. 1. Find:

1. its edge list;

2. its adjacency matrix A.

3. The adjacency matrix of a complex network is usually a sparse matrix. A sparse matrix can be stored efficiently using special formats (e.g., the compressed sparse row (CSR) format), and calculations on a sparse matrix can be faster accordingly. Find the CSR format for A.

4. Now, change the links in Fig. 1 to be undirected instead. Write down the new edge list and adjacency matrix. What are the clustering coefficients of each node and the global clustering coefficient of the network?

5. Next, switch node 5 and node 6. How will the adjacency matrix and the edge list change? What kind of information about the network can you infer from the adjacency matrix but not from the edge list?
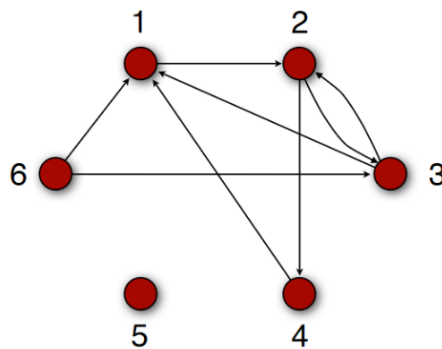

FIG. 1: (Color online) A small network.

-Sean.