

Homework 11

MO412 - Network Science

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Jun 2021

(Communities) Consider the undirected netM network coded using the Gephi CSV format for adjacency lists, with whitespace as separator, in the netM.csv file accompanying this homework. Your goal will be to detect communities in this network.

- (a) Load the network into Gephi and try to layout it using the Force Atlas algorithm with repulsion strength 10000 and all other parameters with their default values. Do you see communities appearing? How many? 5 communities

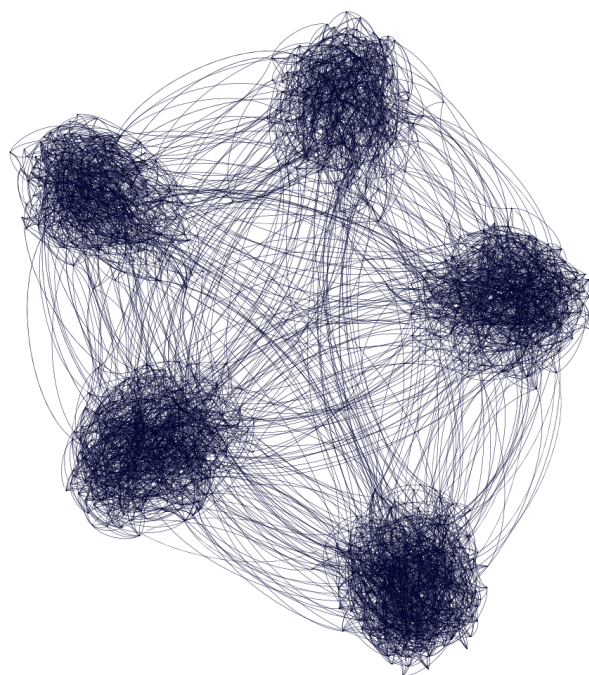


Figure 1: Gephi visualization

- (b) Use the `async_fluidc` algorithm from `networkx`, or an analogous method in another package of your choice, to find communities in `netM`. Give the number of communities determined in item (1a) as parameter `k`. Build files with the names of the nodes in each community and hand them in with your solution.

Code

```
G = nx.read_graphml("net.graphml")
communities = async_fluidc(G,5)

i = 0
for community in communities:
    f = open("community"+str(i)+".txt", "w+")
    group = ""
    for node in community:
        group+=node+"\n"
    f.write(group)
    f.close()
    i+=1
```

- (c) Use the `async_lpa_communities` algorithm from `networkx` or a similar method in other languages to find communities in `netM`. Are they the same as in item (1b)? If not, construct files with the names of the nodes in each community and hand them in with your solution.

Code

```
communitiesNetworkx = async_lpa_communities(G)

cGephi = []
for community in communities:
    a = [int(i) for i in community]
    a.sort(key=int)
    a = np.array(a)
    cGephi.append(a)

for community in communitiesNetworkx:
    a = [int(i) for i in community]
    a.sort(key=int)
    a = np.array(a)
    for j in range(5):
        if(cGephi[j][0] == a[0]):
            resp = np.array_equal(cGephi[j], a)
            print("Community " + str(j) + ": " + str(resp))
```

Result: Yes, they are the same.

```
Community 4: True  
Community 2: True  
Community 0: True  
Community 1: True  
Community 3: True
```

But after many tests, I realized that there are times that are not the same. They are few but they exist.

```
Community 1: False  
Community 2: True  
Community 0: False  
Community 4: False
```