NATIONAL INSTITUTE OF TECHNOLOGY SILCHAR

Cachar, Assam

B.Tech. VIth Sem

Subject Code: CS-321

Subject Name: Social Network Analysis Lab

Submitted By:

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Branch : CSE – B

AIM: TO GENERATE DISJOINT COMMUNITIES WITH LOUVAIN METHOD AND VISUALIZE THE GENERATED COMMUNITIES USING NETWORKX LIBRARY OR GEPHI. (ALTERNATIVELY, CAN ALSO USE ANY OF THE FOLLOWING TOOLS: MATPLOTLIB, PLOTLY, GGPLOT, SEABORN, BOKEH).

THEORY:

1. **Louvain Method:** It is a heuristic method based on modularity optimization. This algorithm comprises of two steps. On the first step it assigns every node to be in its own community and then for each node it tries to find the maximum positive modularity gain by moving each node to all of its neighbour communities. If no positive gain is achieved the node remains in its original community**.**

   GRAPHS: Zachary's Karate Club, American College Football and Dolphin Social Network.

CODE:

```
import community as community_louvain
import matplotlib.cm as cm
import matplotlib.pyplot as plt
import networkx as nx

import io
import zipfile

GG_Karate = nx.karate_club_graph () # Karate Club
partitionKarate = community_louvain.best_partition (GG_Karate)
posKarate = nx.spring_layout (GG_Karate)
plt.figure (figsize = (15, 15))
cmap = cm.get_cmap ('viridis', max (partitionKarate.values ()) + 1)
nx.draw_networkx_nodes (GG_Karate, posKarate, partitionKarate.keys (),
node_size = 40, cmap = cmap, node_color = list (partitionKarate.values
()))
nx.draw_networkx_edges (GG_Karate, posKarate, alpha = 0.5)
plt.show ()

zfFootball = zipfile.ZipFile ("football.zip")
txtFootball = zfFootball.read ("football.txt").decode ()
gmlFootball = zfFootball.read ("football.gml").decode ()
gmlFootball = gmlFootball.split ("\n") [1:]

GG_Football = nx.parse_gml (gmlFootball) # Football Club
partitionFootball = community_louvain.best_partition (GG_Football)
posFootball = nx.spring_layout (GG_Football)
plt.figure (figsize = (15, 15))
cmap = cm.get_cmap ('viridis', max (partitionFootball.values ()) + 1)
```

```
nx.draw_networkx_nodes (GG_Football, posFootball,
partitionFootball.keys (), node_size = 40, cmap = cmap, node_color =
list (partitionFootball.values ()))
nx.draw_networkx_edges (GG_Football, posFootball, alpha = 0.5)
plt.show ()

zfDolphin = zipfile.ZipFile ("dolphins.zip")
txtDolphin = zfDolphin.read ("dolphins.txt").decode ()
gmlDolphin = zfDolphin.read ("dolphins.gml").decode ()
gmlDolphin = gmlDolphin.split ("\n") [1:]

GG_Dolphin = nx.parse_gml (gmlDolphin) # Dolphin Graph
partitionDolphin = community_louvain.best_partition (GG_Dolphin)
posDolphin = nx.spring_layout (GG_Dolphin)
plt.figure (figsize = (15, 15))
cmap = cm.get_cmap ('viridis', max (partitionDolphin.values ()) + 1)
nx.draw_networkx_nodes (GG_Dolphin, posDolphin, partitionDolphin.keys
(), node_size = 40, cmap = cmap, node_color = list
(partitionDolphin.values ()))
nx.draw_networkx_edges (GG_Dolphin, posDolphin, alpha = 0.5)
plt.show ()
```

 # DOWNLOAD AMERICAN FOOTBALL CLUB AND DOLPHIN SOCIAL NETWORK DATASET ZIP FILE FROM THE FOLLOWING SITE:
http://www-personal.umich.edu/~mejn/netdata/

OUTPUT AND OBSERVATIONS (NETWORKX LIBRARY):