

Complex Networks: Quiz #10

Due on Jan 20th, 2019

RUOPENG XU
18M38179

Problem 1

Make a program for comparing the partitioning of karate club network. (You can use the following built-in functions of networkX.)

- kernighan_lin_bisection
- greedy_modularity_communities

Answer 1

```
import networkx as nx
import matplotlib.pyplot as plt
import numpy as np
import numpy.linalg as LA
from networkx.algorithms.community import greedy_modularity_communities
from networkx.algorithms.community import kernighan_lin_bisection

G = nx.karate_club_graph()
color_map = ['yellow'] * (nx.number_of_nodes(G) - 1)
color_map.append('red')

colors = ['red', 'blue', 'green', 'purple', 'brown', 'yellow']
pos = nx.spring_layout(G)

#####kernighan_lin_bisection
# a tuple with two parts
lst_b = kernighan_lin_bisection(G)
color_map_b = ['black'] * nx.number_of_nodes(G)

# fill in this part
# first_part, secend_part = lst_b
# print(first_part)
# print(secend_part)

color_count = 0
for i in lst_b:
    print("the {} part is ".format(color_count + 1), i)
    for j in i:
        color_map_b[j] = colors[color_count]
        color_count += 1

# draw the first graph
nx.draw_networkx_edges(G, pos)
nx.draw_networkx_nodes(G, pos, node_color=color_map_b)
nx.draw_networkx_labels(G, pos)
plt.axis('off')
plt.show()

#####greedy_modularity_communities
lst_c = list(greedy_modularity_communities(G))
color_map_c = ['black'] * nx.number_of_nodes(G)
# fill in this part

color_count = 0
for i in lst_c:
    print("the {} part is ".format(color_count + 1), i)
    for j in i:
```

```

    color_map_c[j] = colors[color_count]
    color_count += 1

nx.draw_networkx_edges(G, pos)
nx.draw_networkx_nodes(G, pos, node_color=color_map_c)
nx.draw_networkx_labels(G, pos)
plt.axis('off')
plt.show()

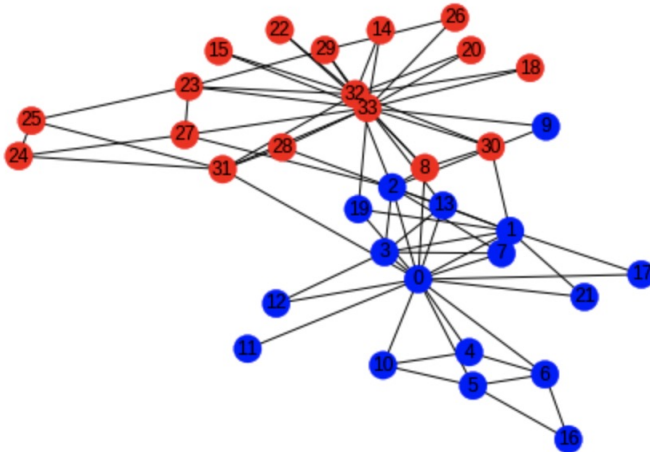
```

The result is:

```

the 1 part is {8, 14, 15, 18, 20, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33}
the 2 part is {0, 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 16, 17, 19, 21}

```



```

the 1 part is frozenset({32, 33, 8, 14, 15, 18, 20, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31}
                        )
the 2 part is frozenset({1, 2, 3, 7, 9, 12, 13, 17, 21})
the 3 part is frozenset({0, 4, 5, 6, 10, 11, 16, 19})

```

