Complex Network

Quiz 5

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Code

```
import networkx as nx
import matplotlib.pyplot as plt
import numpy as np
import pprint
import math

def printout(network):
  for n,c in sorted(network.items()):
    print("%d %0.2f"%(n,c))
  print("The most central node:", max(dc, key=network.get))

G = nx.Graph()
G.add_nodes_from(range(1,10))
G.add_edges_from([(0,2),(1,2),(2,3),(2,4),\
                (3,5),(3,6),(4,6),(5,7),(6,7),(7,8),(8,9),(8,10)])
plt.figure(figsize=(5,5))
nx.draw_spring(G, node_size=400, node_color='red', with_labels = True,
   font_weight = 'bold')
#A = nx.adjacency_matrix(G).todense()
#A = np.array(A, dtype = np.float64)
# print("degree centrality:", list(nx.degree_centrality(G).values()))

# v = list(nx.degree_centrality(G).values())
# s = ("degree centrality:" + ','.join(['%.2f']*len(v))) % tuple(v)
# print("biggest:", np.argmax(v))

# Degree Centrality
dc = nx.degree_centrality(G)
printout(dc)

# Betweenness Centrality
bc = nx.betweenness_centrality(G)
printout(bc)

# Closeness Centrality
cc = nx.closeness_centrality(G)
printout(cc)

# Eigenvector Centrality
ec = nx.eigenvector_centrality(G)
printout(ec)

# Page Rank
pr = nx.pagerank(G)
printout(pr)

# Katz Centrality
kc = nx.katz_centrality(G)
printout(kc)
```

Results

Make a program of computing (i) and (ii) of the following centralities (1âĂŘ6). Show the code and its outputs.
(i) centrality values of all nodes in the right graph
(ii) the most central node

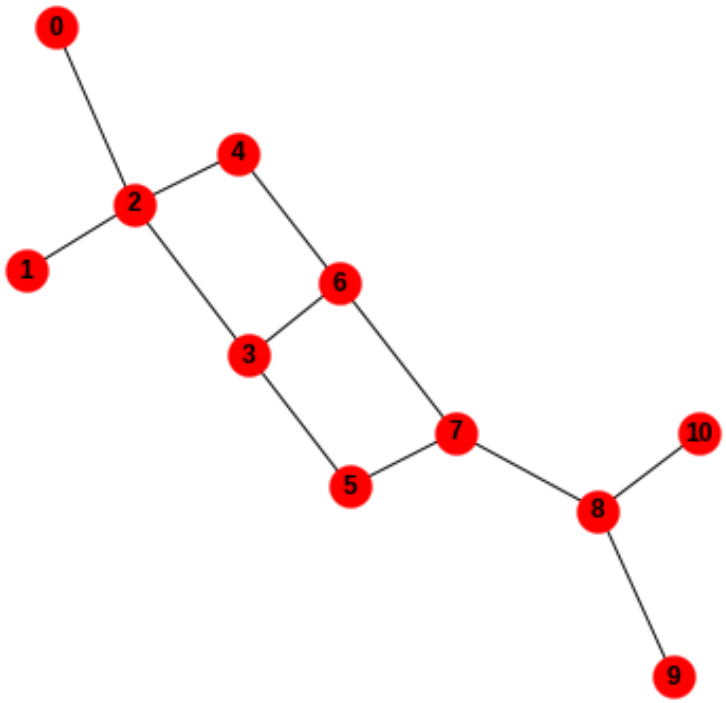

Figure 1: Graph

1. Degree centrality: The most central node: 2

Node	Centrality
0	0.10
1	0.10
2	0.40
3	0.30
4	0.20
5	0.20
6	0.30
7	0.30
8	0.30
9	0.10
10	0.10

2. **Betweenness centrality**: The most central node: 7

Node	Centrality
0	0.00
1	0.00
2	0.40
3	0.30
4	0.12
5	0.13
6	0.34
7	0.49
8	0.38
9	0.00
10	0.00

3. **Closeness centrality**: The most central node: 6

Node	Centrality
0	0.29
1	0.29
2	0.40
3	0.45
4	0.42
5	0.43
6	0.48
7	0.45
8	0.37
9	0.28
10	0.28

4. **Eigenvector centrality**: The most central node: 3

Node	Centrality
0	0.16
1	0.16
2	0.42
3	0.45
4	0.33
5	0.31
6	0.44
7	0.36
8	0.20
9	0.07
10	0.07

5. **PageRank**: The most central node: 2

Node	Centrality
0	0.05
1	0.05
2	0.16
3	0.11
4	0.08
5	0.08
6	0.11
7	0.12
8	0.14
9	0.05
10	0.05

6. **Katz centrality**: The most central node: 2

Node	Centrality
0	0.27
1	0.27
2	0.35
3	0.33
4	0.30
5	0.30
6	0.33
7	0.33
8	0.32
9	0.26
10	0.26