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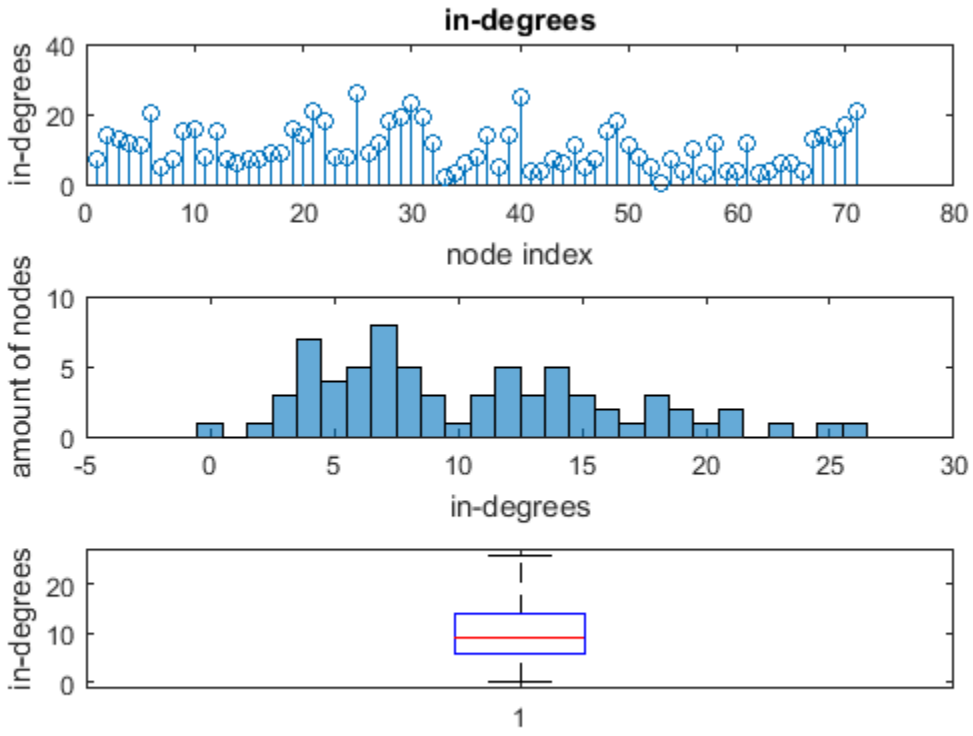
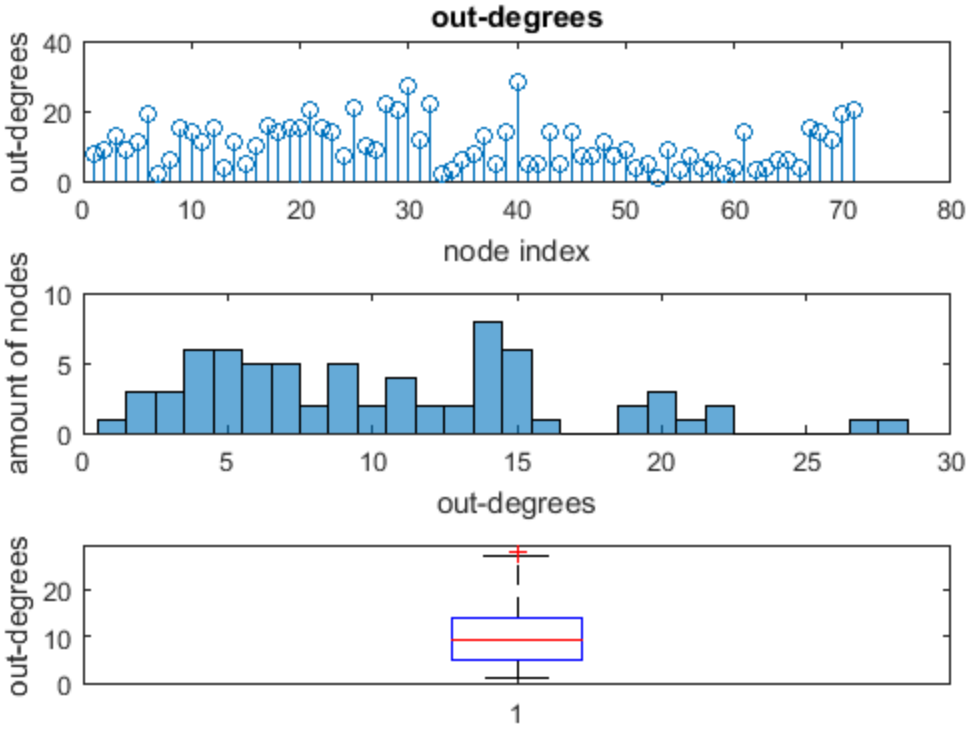
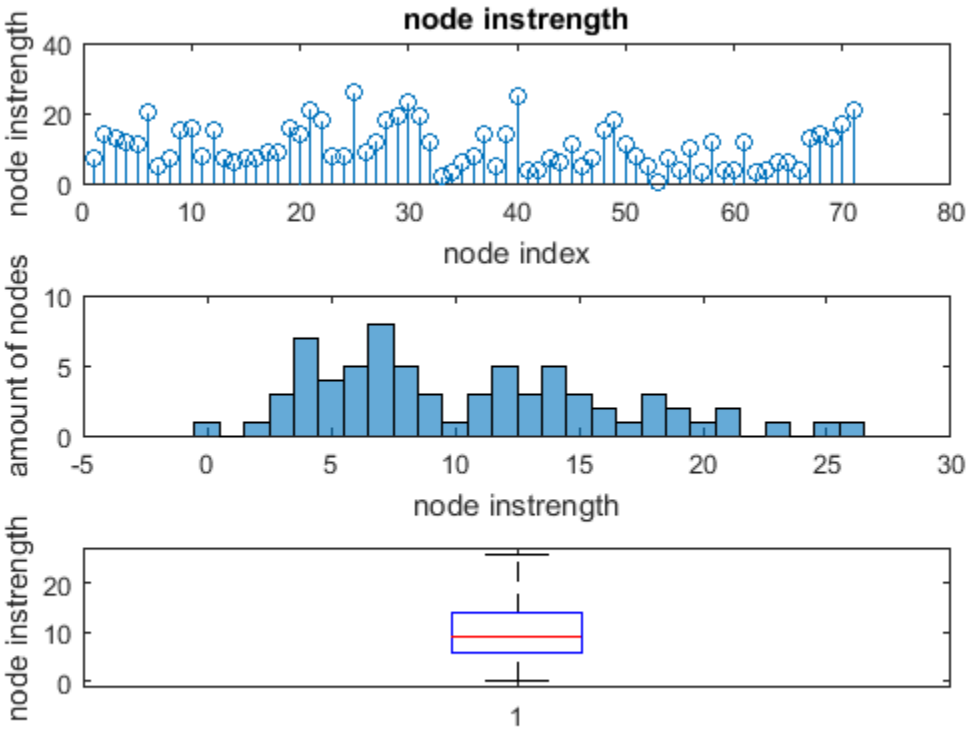
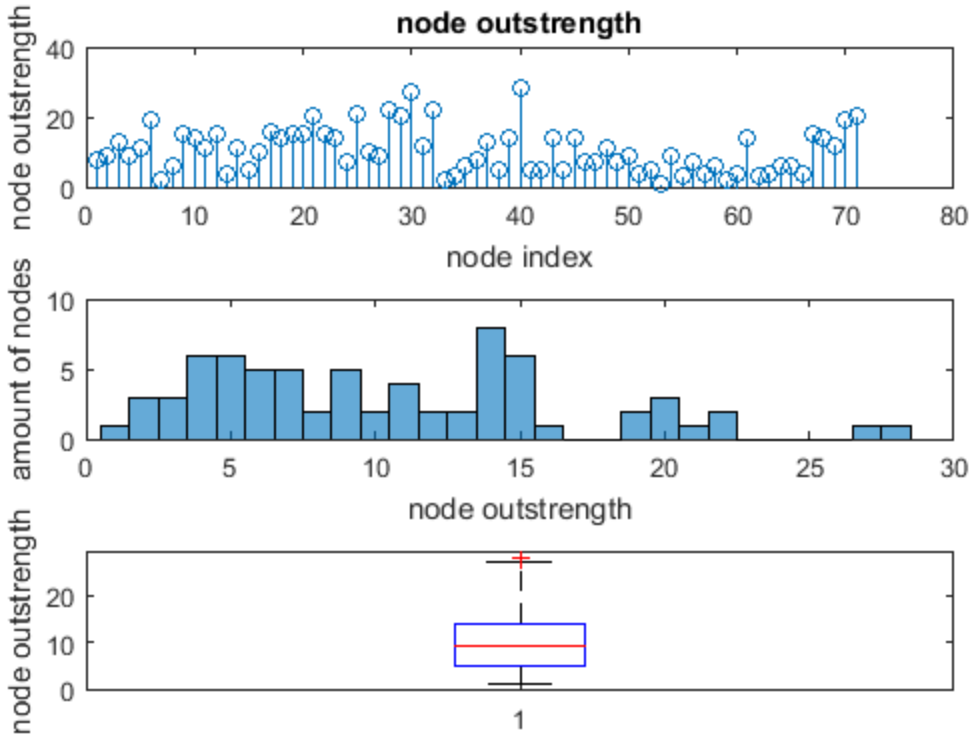
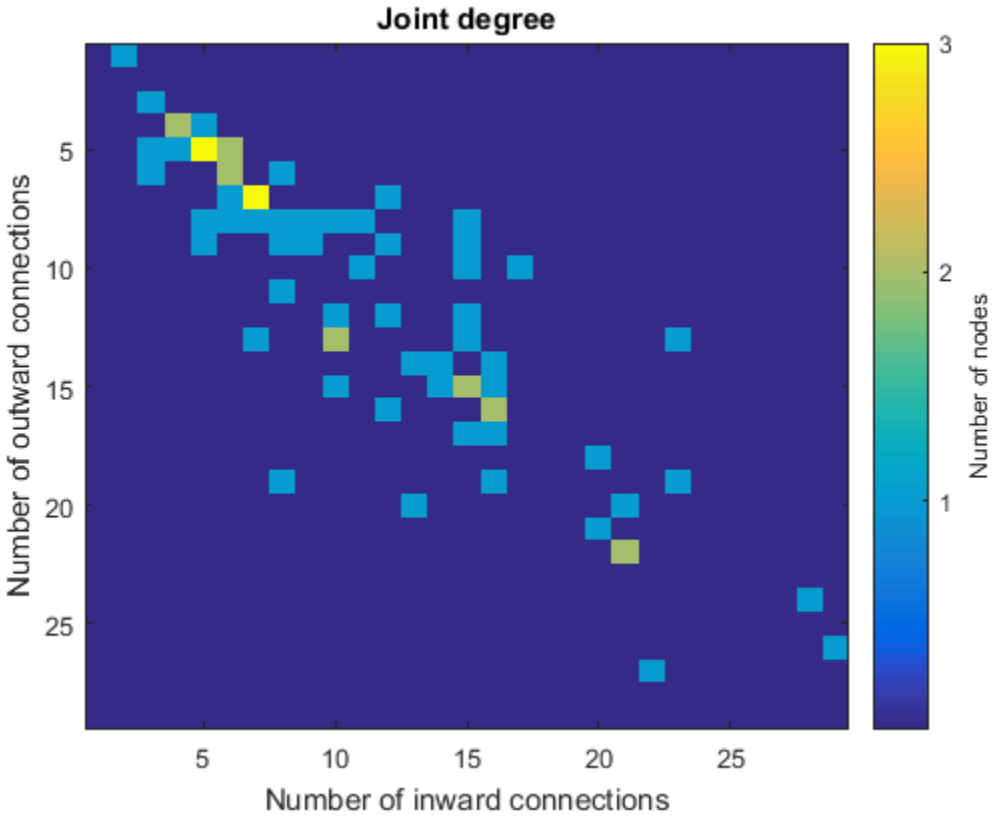
Degree and Similarity

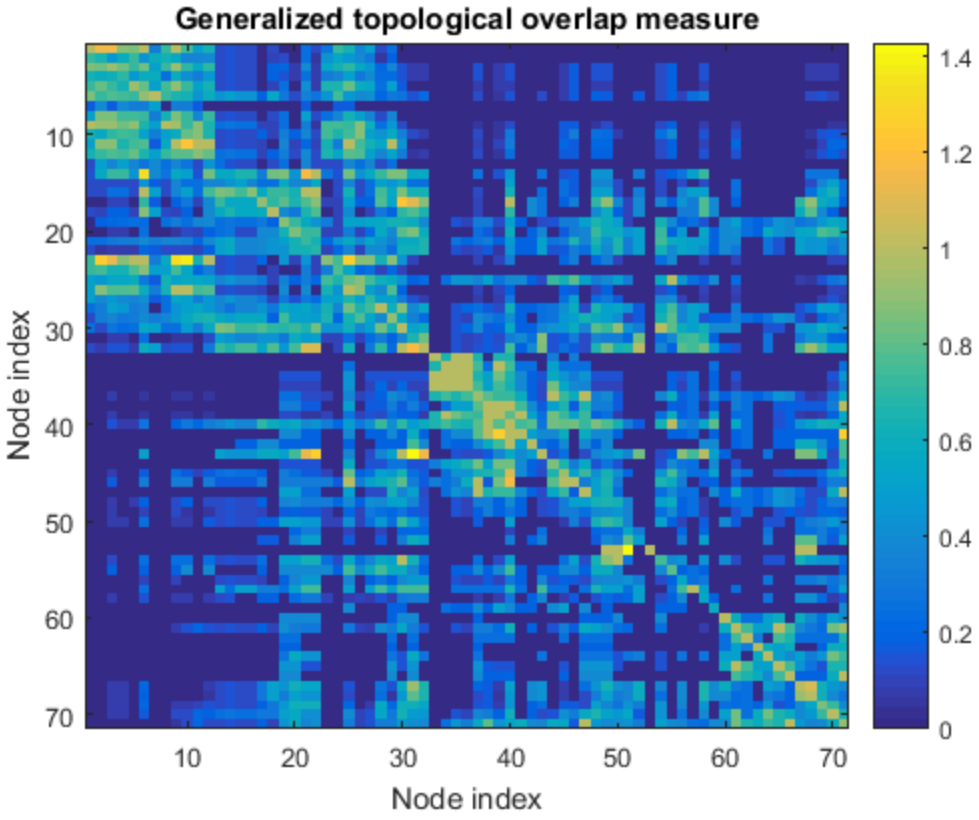


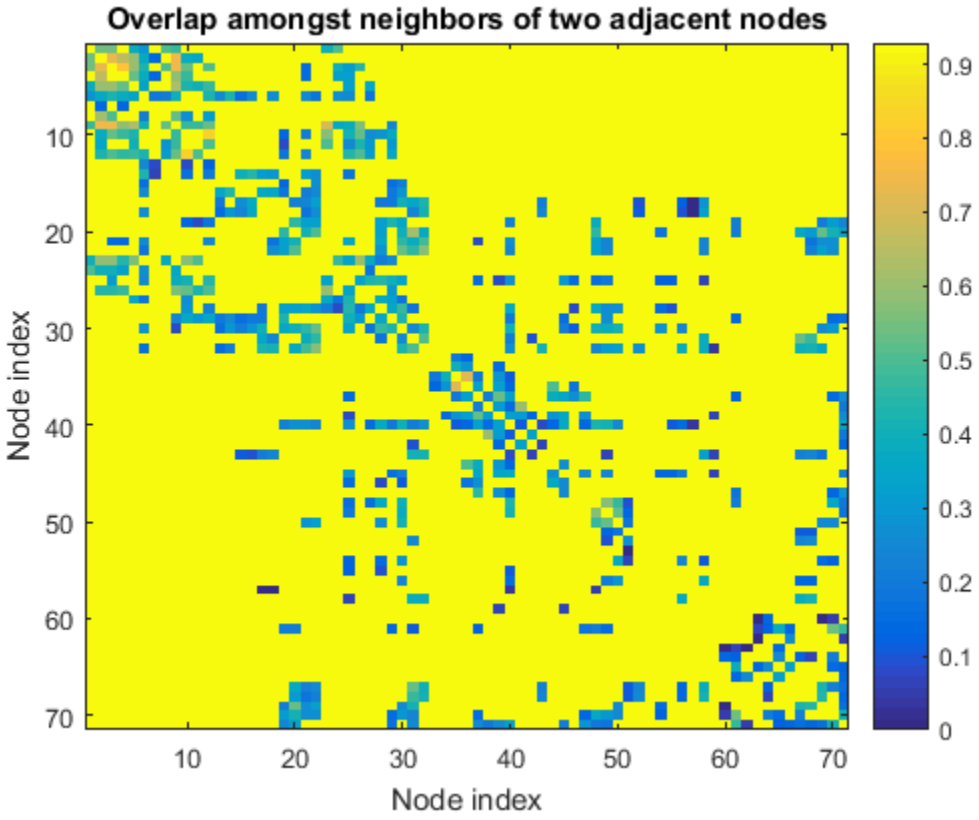

out-degrees
out-degrees
node index
amount of nodes
out-degrees
out-degrees

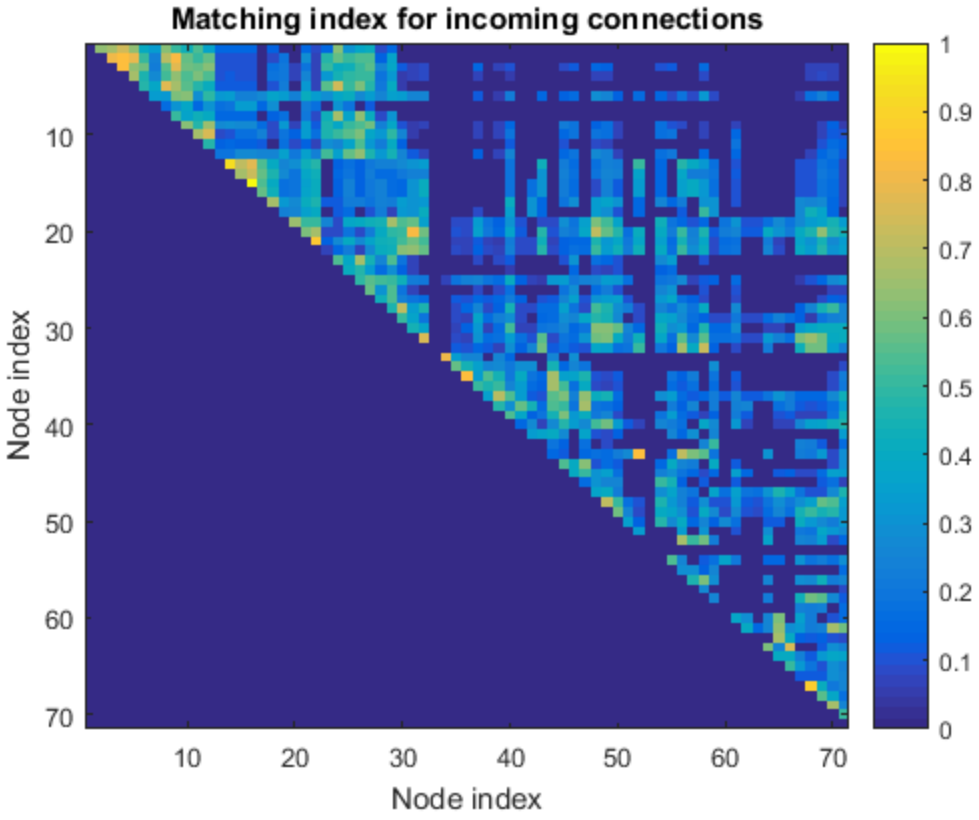

node instrength
node instrength
node index
amount of nodes
node instrength
node instrength

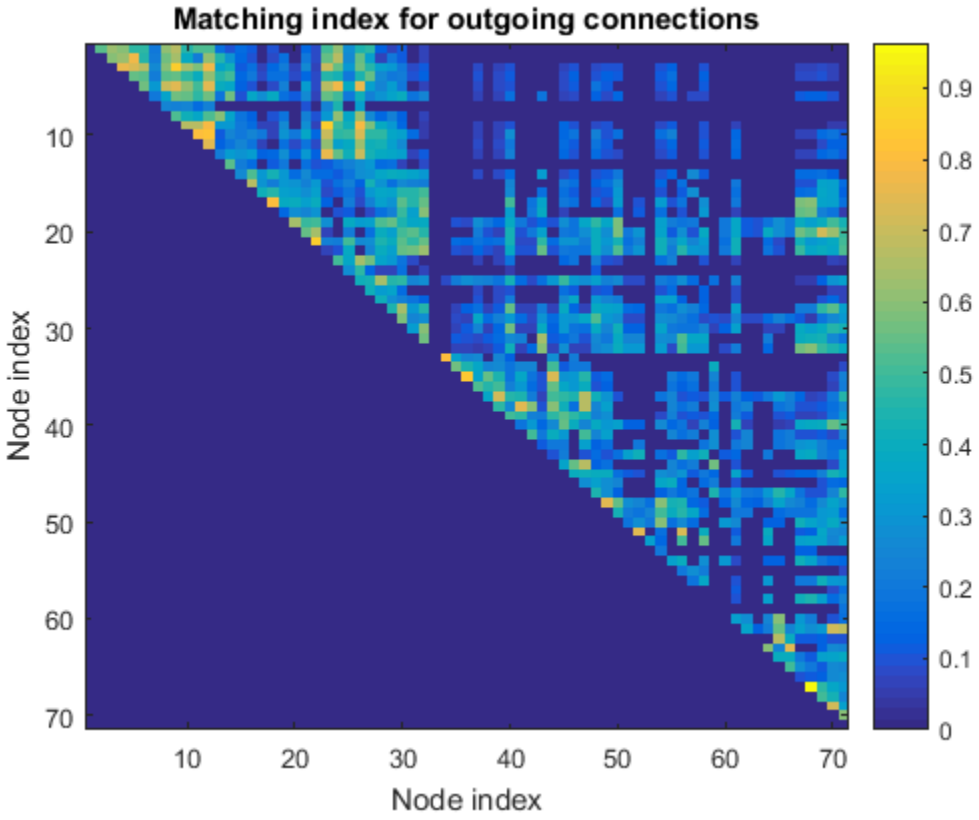

node outstrength
node outstrength
node index
amount of nodes
node outstrength
node outstrength
1

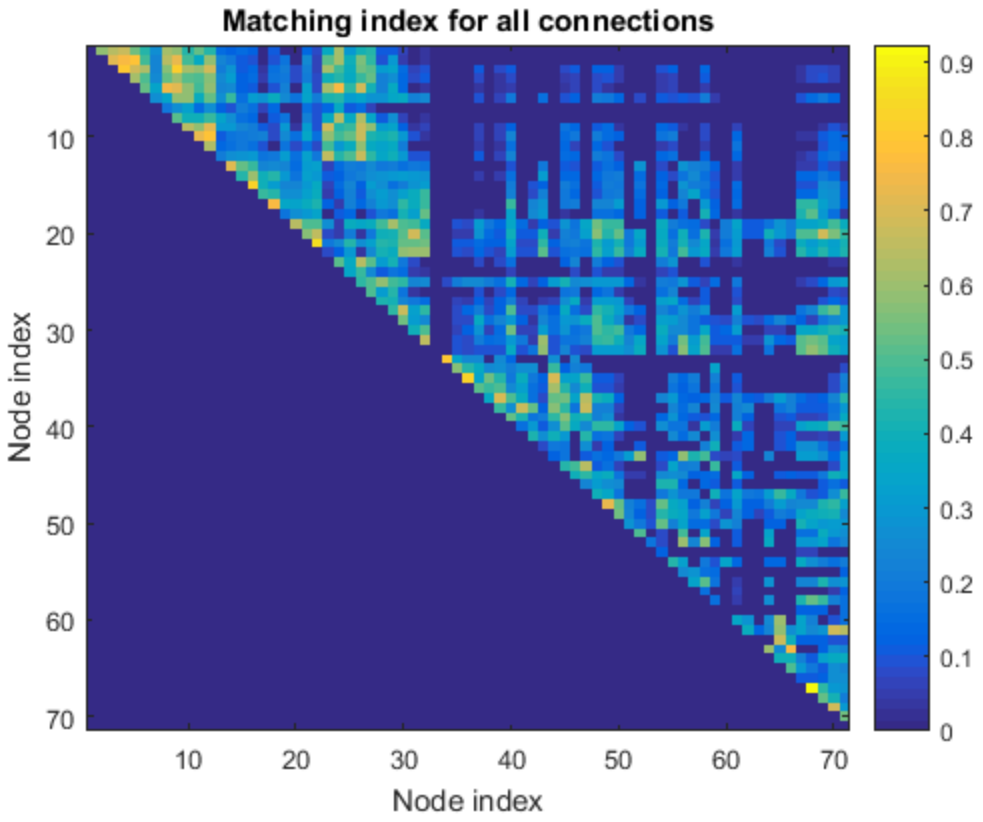

Joint degree
Number of outward connections
Number of inward connections
Number of nodes


Generalized topological overlap measure
Node index
Node index
10
20
30
40
50
60
70
1.4
1.2
1
0.8
0.6
0.4
0.2
0


Overlap amongst neighbors of two adjacent nodes
Node index
Node index
10
20
30
40
50
60
70
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0


Matching index for incoming connections
Node index
Node index
10
20
30
40
50
60
70
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0


Matching index for outgoing connections
Node index
Node index
10
20
30
40
50
60
70
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0

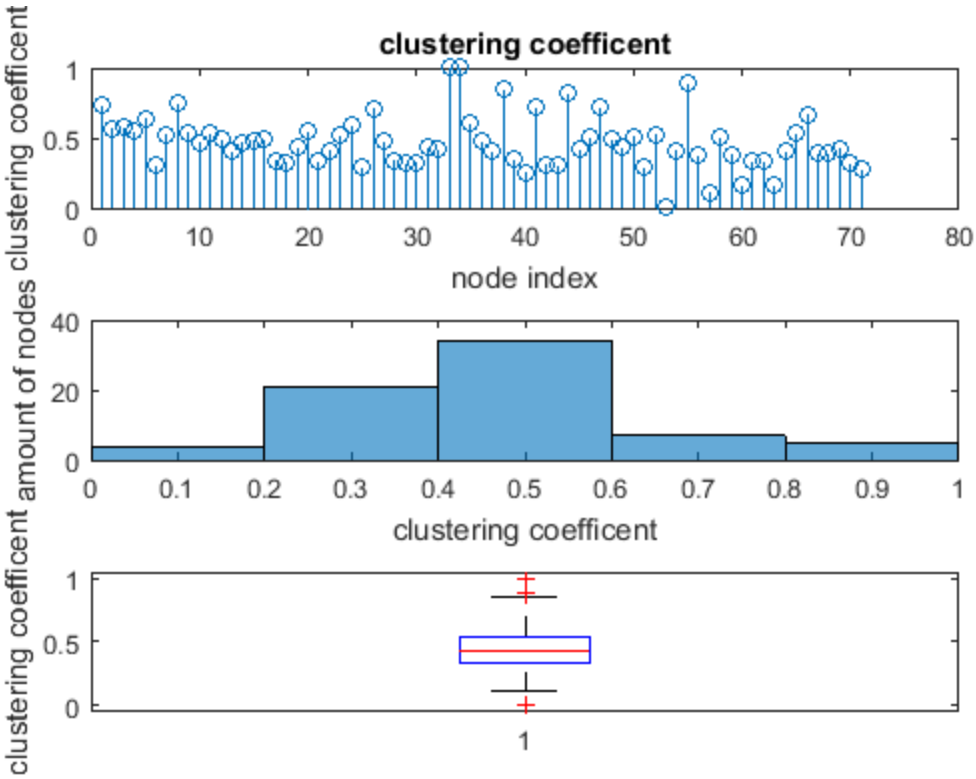


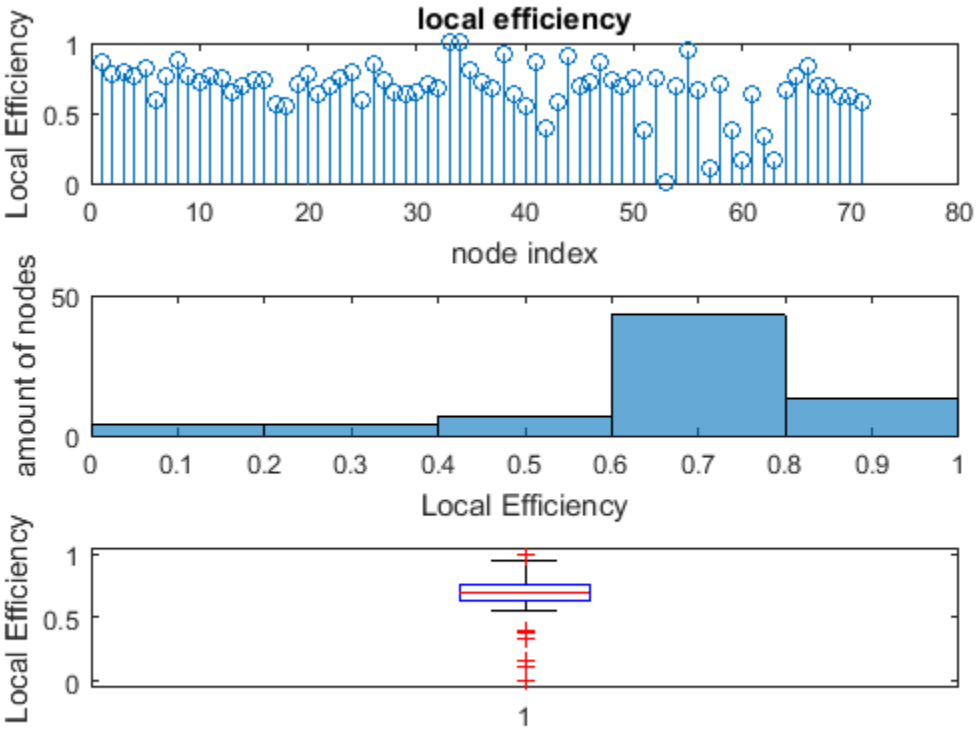
Density and Rentian Scaling:

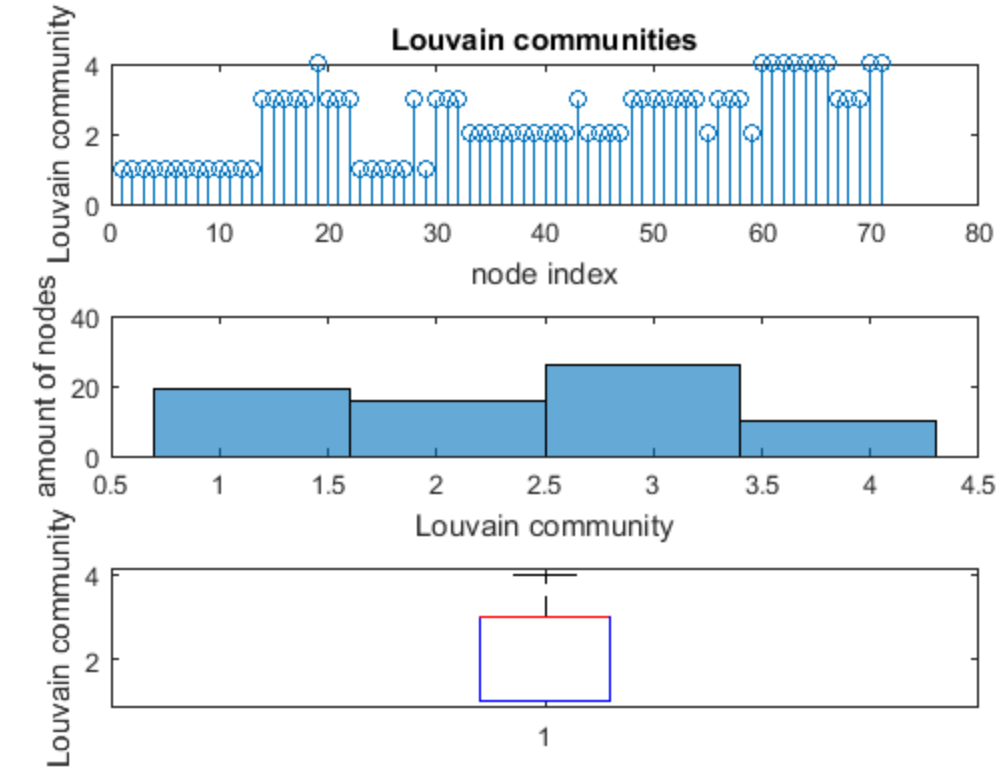
```
Density = 0.1501
Number of vertices = 71
Number of edges = 746
```

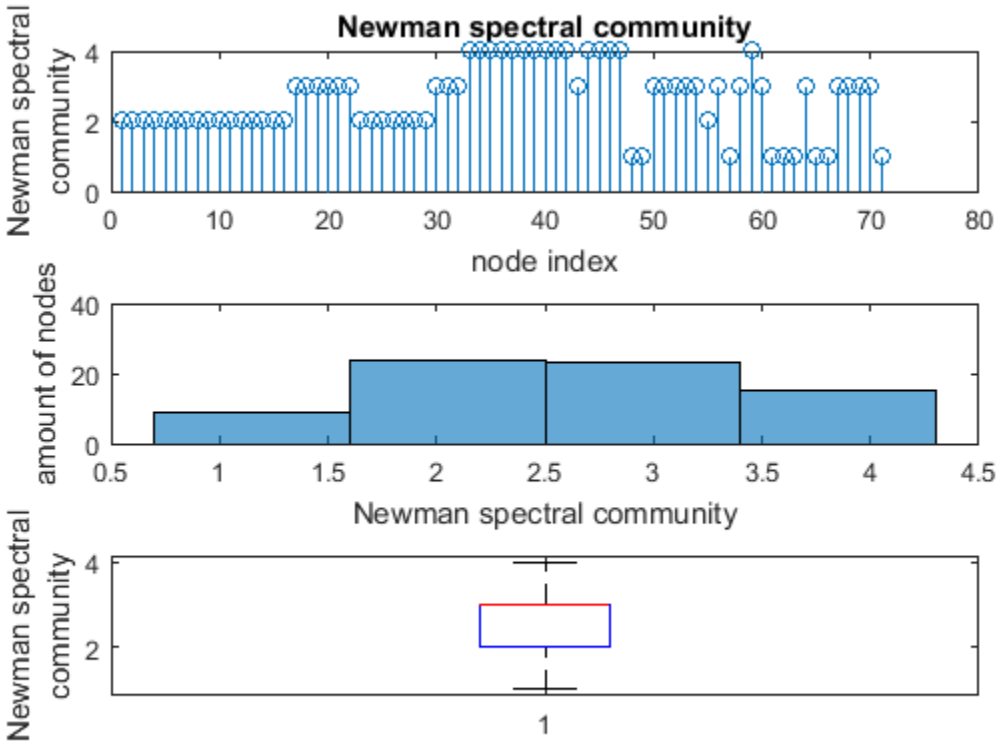
Clustering and Community Structure

```
Transitivity scalar = 0.39797
global efficiency = 0.49609
```


clustering coefficent
clustering coefficent
node index
amount of nodes
clustering coefficent
clustering coefficent


local efficiency
Local Efficiency
node index
amount of nodes
Local Efficiency
Local Efficiency

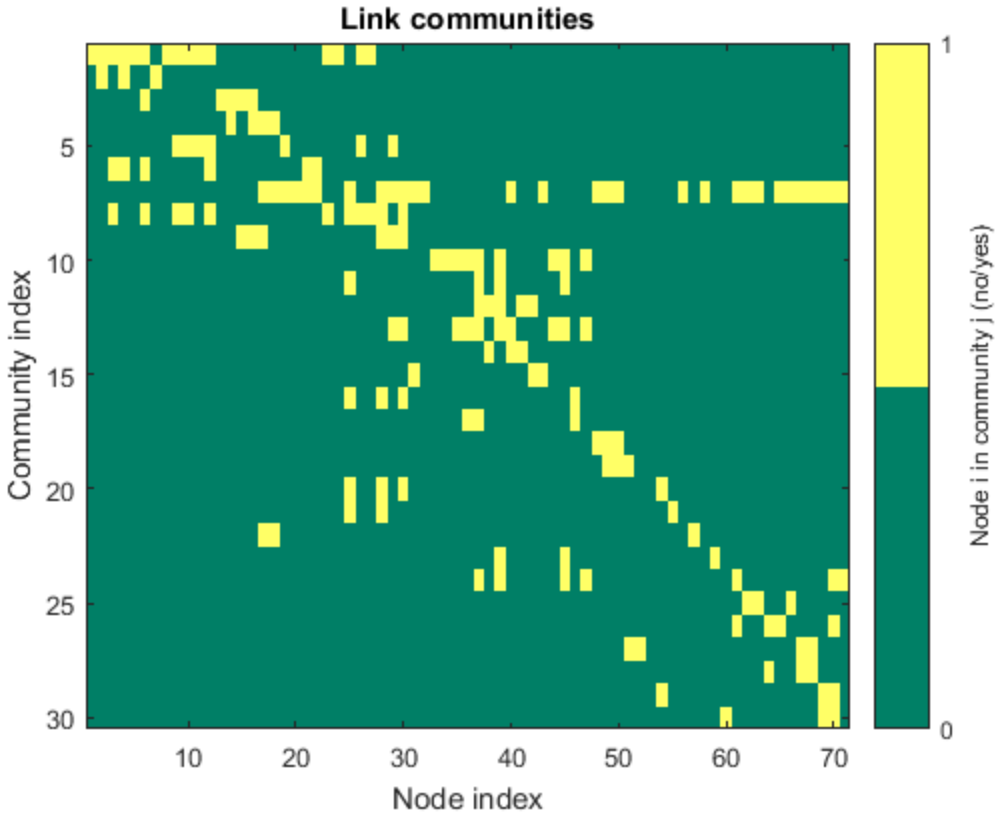

Louvain communities
Louvain community
node index
amount of nodes
Louvain community
Louvain community
1


Newman spectral community
Newman spectral community
node index
amount of nodes
Newman spectral community
Newman spectral community
1

```
hierarchy       1
hierarchy       2
hierarchy       3
hierarchy       4
hierarchy       5
hierarchy       6
hierarchy       7
hierarchy       8
hierarchy       9
hierarchy      10
hierarchy      11
hierarchy      12
hierarchy      13
hierarchy      14
hierarchy      15
hierarchy      16
hierarchy      17
hierarchy      18
hierarchy      19
hierarchy      20
hierarchy      21
hierarchy      22
hierarchy      23
hierarchy      24
hierarchy      25
hierarchy      26
hierarchy      27
hierarchy      28
hierarchy      29
hierarchy      30
hierarchy      31
hierarchy      32
hierarchy      33
hierarchy      34
hierarchy      35
hierarchy      36
hierarchy      37
hierarchy      38
hierarchy      39
hierarchy      40
hierarchy      41
hierarchy      42
hierarchy      43
hierarchy      44
hierarchy      45
hierarchy      46
hierarchy      47
hierarchy      48
hierarchy      49
hierarchy      50
hierarchy      51
hierarchy      52
hierarchy      53
hierarchy      54
```

```
hierarchy      55
hierarchy      56
hierarchy      57
hierarchy      58
hierarchy      59
hierarchy      60
hierarchy      61
hierarchy      62
hierarchy      63
hierarchy      64
hierarchy      65
hierarchy      66
hierarchy      67
hierarchy      68
hierarchy      69
hierarchy      70
hierarchy      71
hierarchy      72
hierarchy      73
hierarchy      74
hierarchy      75
hierarchy      76
hierarchy      77
hierarchy      78
hierarchy      79
hierarchy      80
hierarchy      81
hierarchy      82
hierarchy      83
hierarchy      84
hierarchy      85
hierarchy      86
hierarchy      87
hierarchy      88
hierarchy      89
hierarchy      90
hierarchy      91
hierarchy      92
hierarchy      93
hierarchy      94
hierarchy      95
hierarchy      96
hierarchy      97
hierarchy      98
hierarchy      99
hierarchy     100
hierarchy     101
hierarchy     102
hierarchy     103
hierarchy     104
hierarchy     105
hierarchy     106
hierarchy     107
hierarchy     108
```

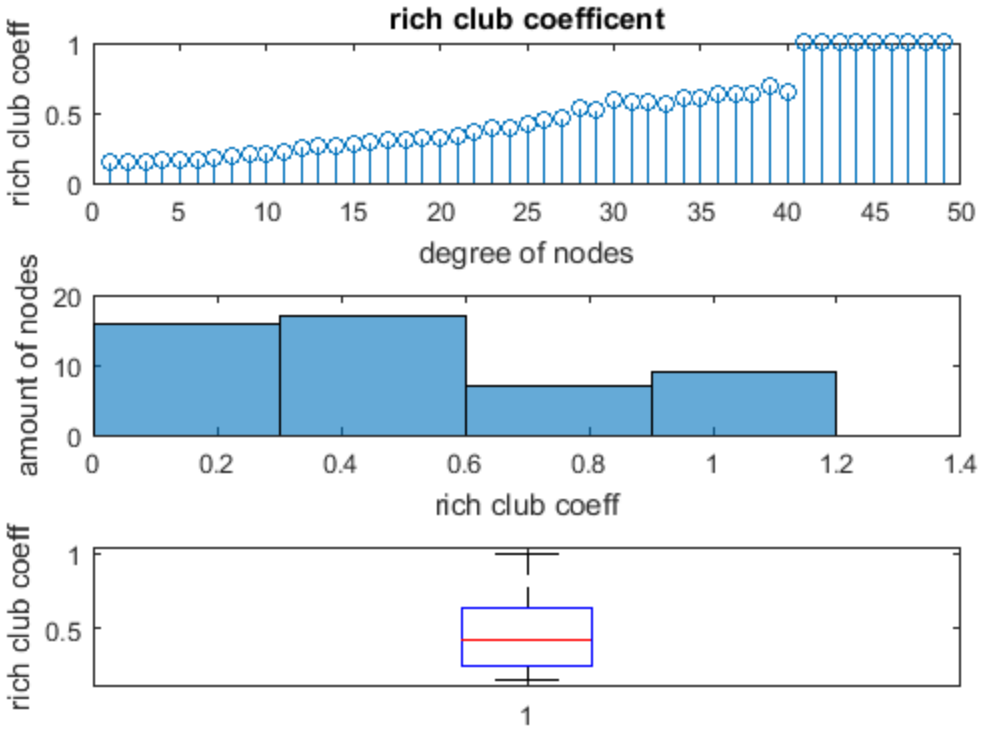
```
hierarchy     109
hierarchy     110
hierarchy     111
hierarchy     112
hierarchy     113
hierarchy     114
hierarchy     115
hierarchy     116
hierarchy     117
hierarchy     118
hierarchy     119
hierarchy     120
hierarchy     121
hierarchy     122
hierarchy     123
hierarchy     124
hierarchy     125
hierarchy     126
hierarchy     127
hierarchy     128
hierarchy     129
hierarchy     130
hierarchy     131
hierarchy     132
hierarchy     133
hierarchy     134
hierarchy     135
hierarchy     136
hierarchy     137
hierarchy     138
```

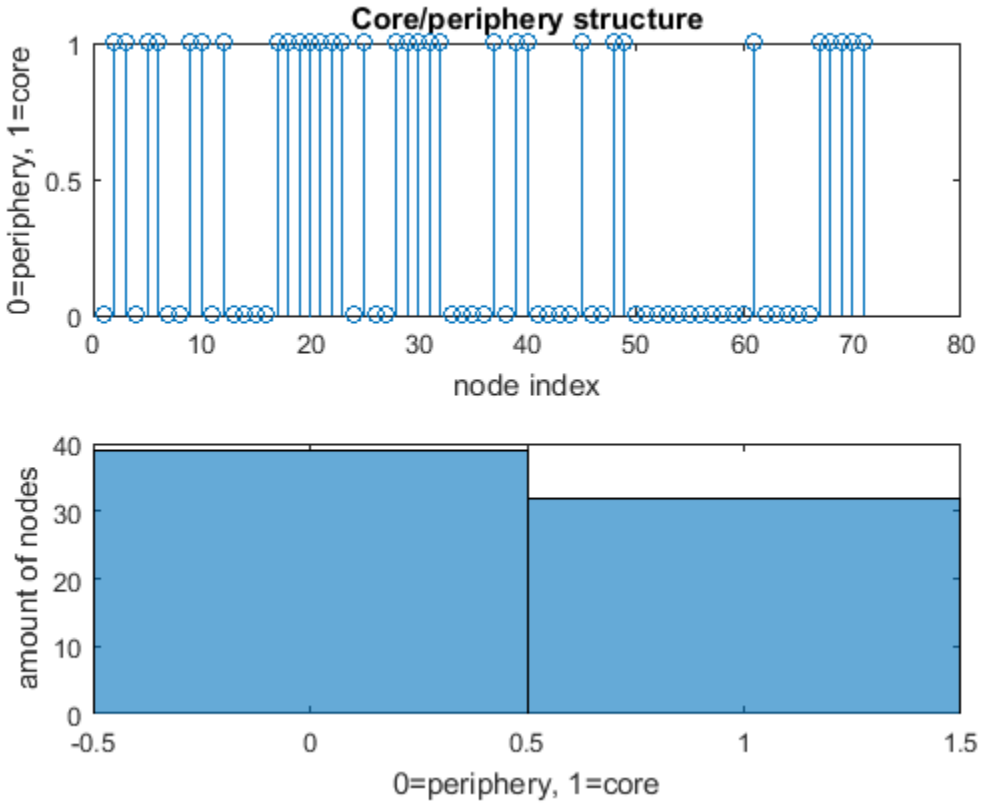


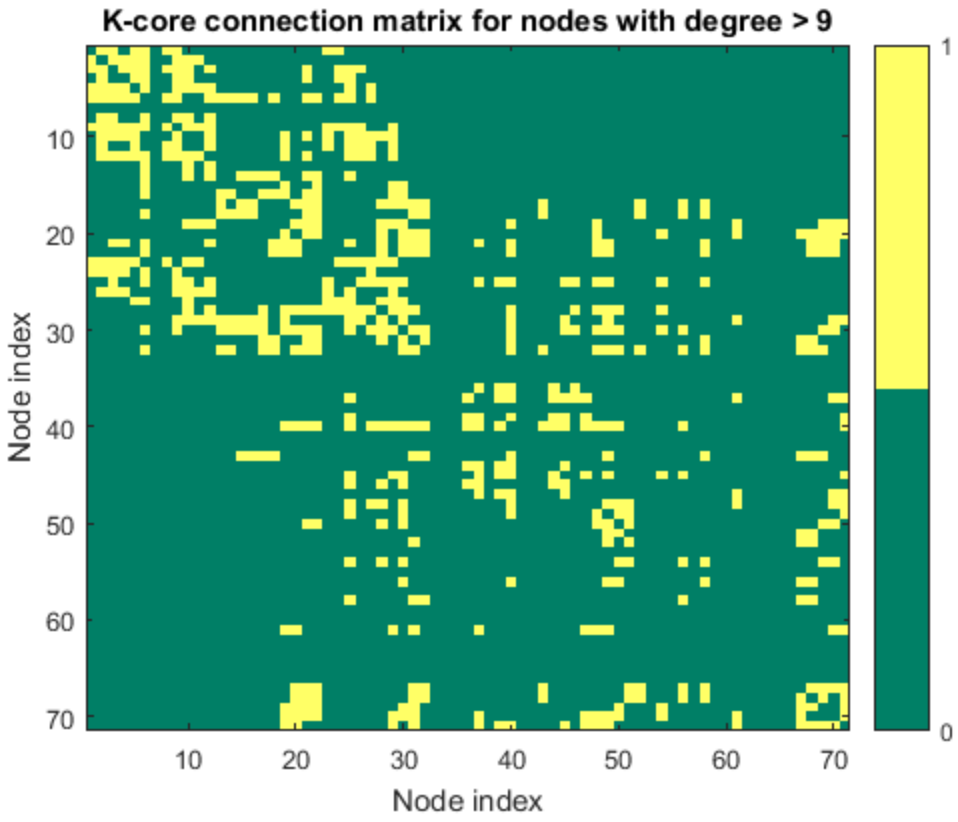
clique_communities.m (BU networks) Clique-percolation community-detection algorithm (detects overlapping communities).

Assortativity and Core Structure:

```
out-degree/in-degree correlation = -0.0065817
in-degree/out-degree correlation = 0.049021
out-degree/out-degree correlation = -0.0095452
in-degree/in-degree correlation = 0.056597
```

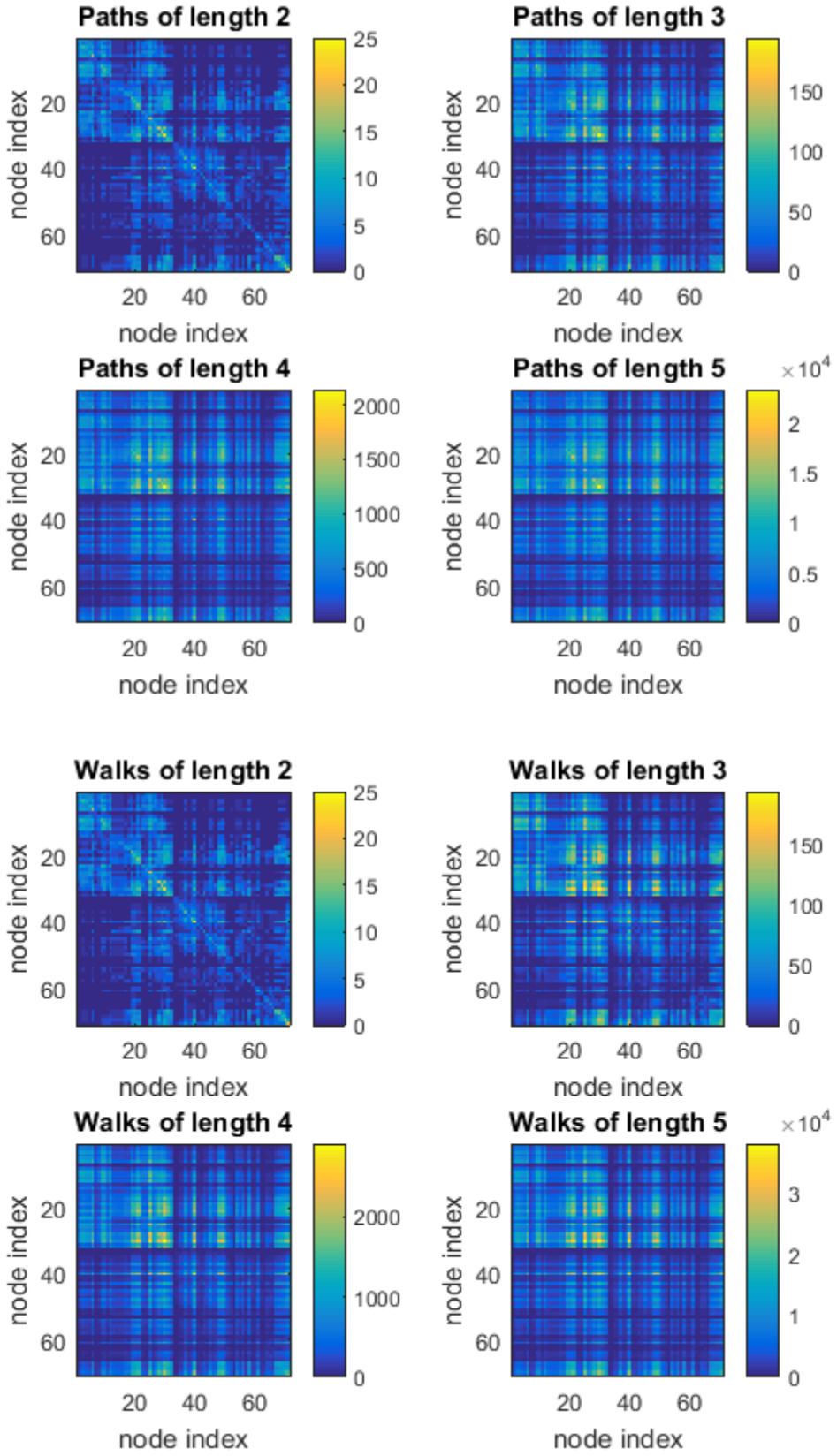

rich club coefficent
rich club coeff
degree of nodes
amount of nodes
rich club coeff
rich club coeff
1

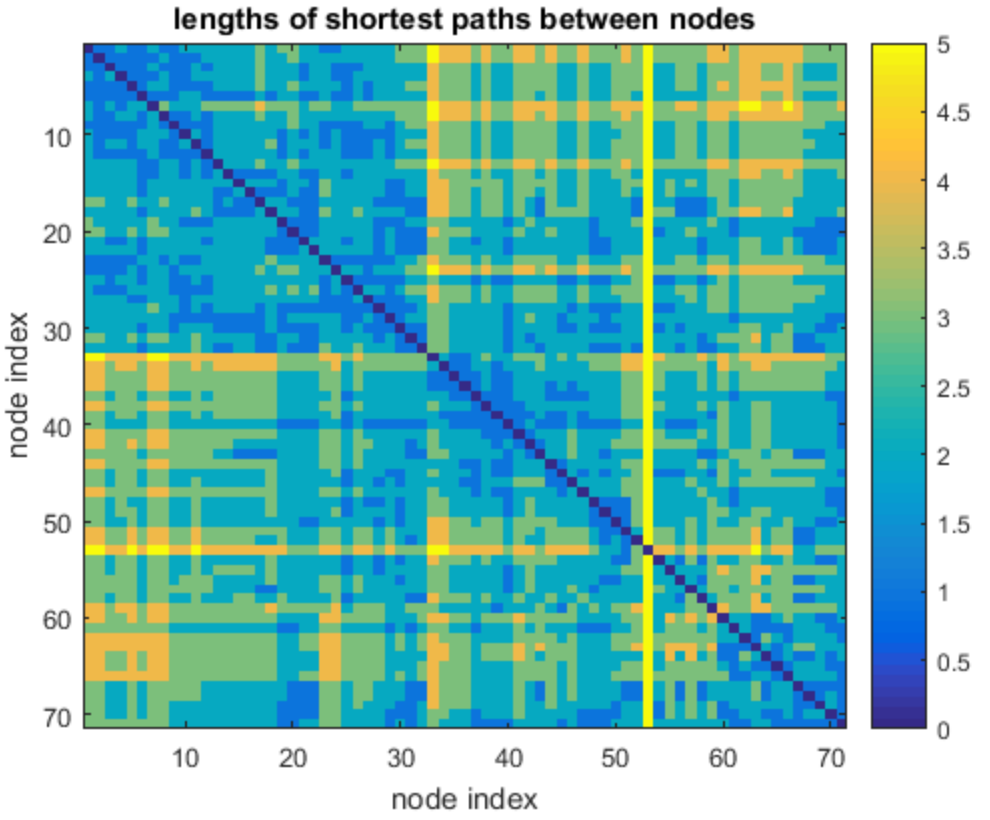

Core/periphery structure
0=periphery, 1=core
node index
amount of nodes
0=periphery, 1=core

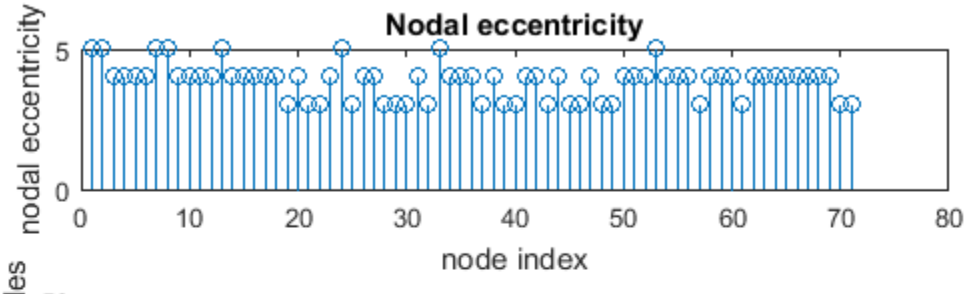


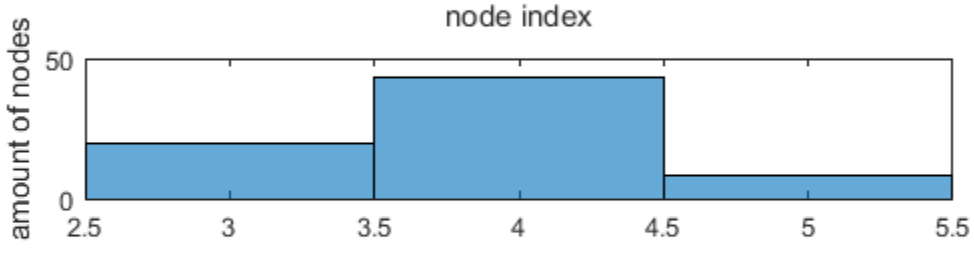
Paths and Distances

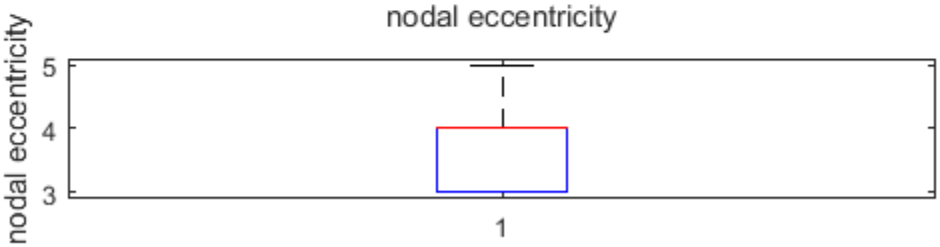
```
current pathlength (q) = 2   number of paths so far (up to q-1)= 746
current pathlength (q) = 3   number of paths so far (up to q-1)= 10823
current pathlength (q) = 4   number of paths so far (up to q-1)=
 131657
current pathlength (q) = 5   number of paths so far (up to q-1)=
 1574614
fraction of all paths that are cycles for path length 1: 0
fraction of all paths that are cycles for path length 2: 0.061129
fraction of all paths that are cycles for path length 3: 0.030563
fraction of all paths that are cycles for path length 4: 0.025575
fraction of all paths that are cycles for path length 5: 0.022521
probability that a non-cyclic path of length 0 can be extended to form
 a cycle of length 1: 0
probability that a non-cyclic path of length 1 can be extended to form
 a cycle of length 2: 0.82574
probability that a non-cyclic path of length 2 can be extended to form
 a cycle of length 3: 0.39034
probability that a non-cyclic path of length 3 can be extended to form
 a cycle of length 4: 0.31504
probability that a non-cyclic path of length 4 can be extended to form
 a cycle of length 5: 0.26711
```


Paths of length 2
Paths of length 3
Paths of length 4
Paths of length 5
Walks of length 2
Walks of length 3
Walks of length 4
Walks of length 5
node index
20
40
60
0
5
10
15
20
25
50
100
150
500
1000
1500
2000
0.5
1
1.5
2
3
×10^4


lengths of shortest paths between nodes
node index
node index
10
20
30
40
50
60
70
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5

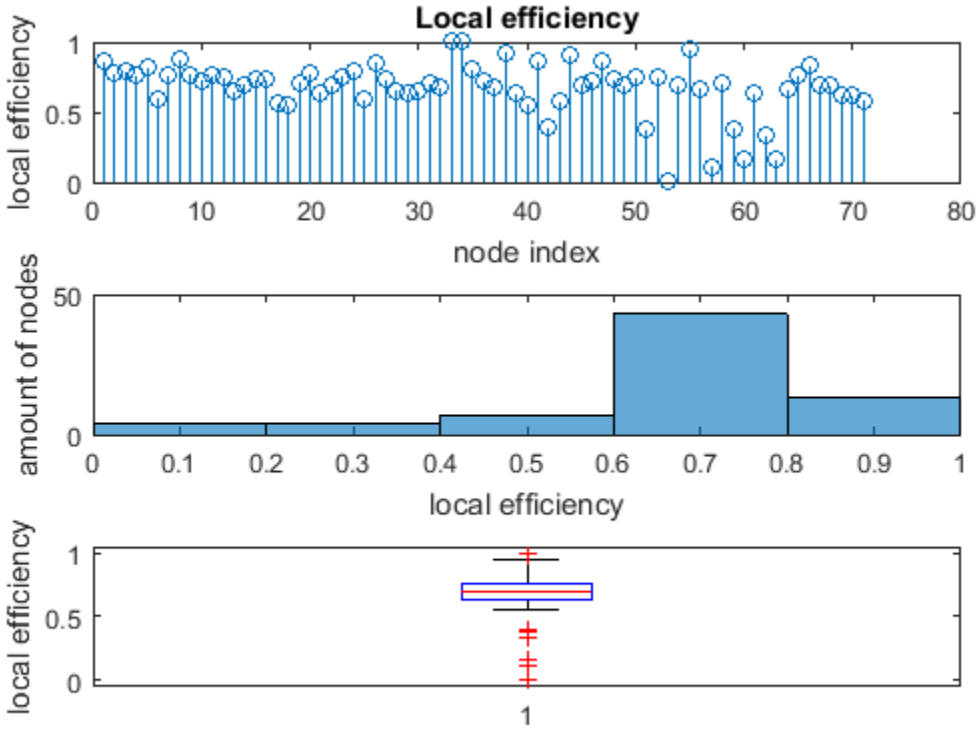

Nodal eccentricity
nodal eccentricity
node index
0
5
0
10
20
30
40
50
60
70
80

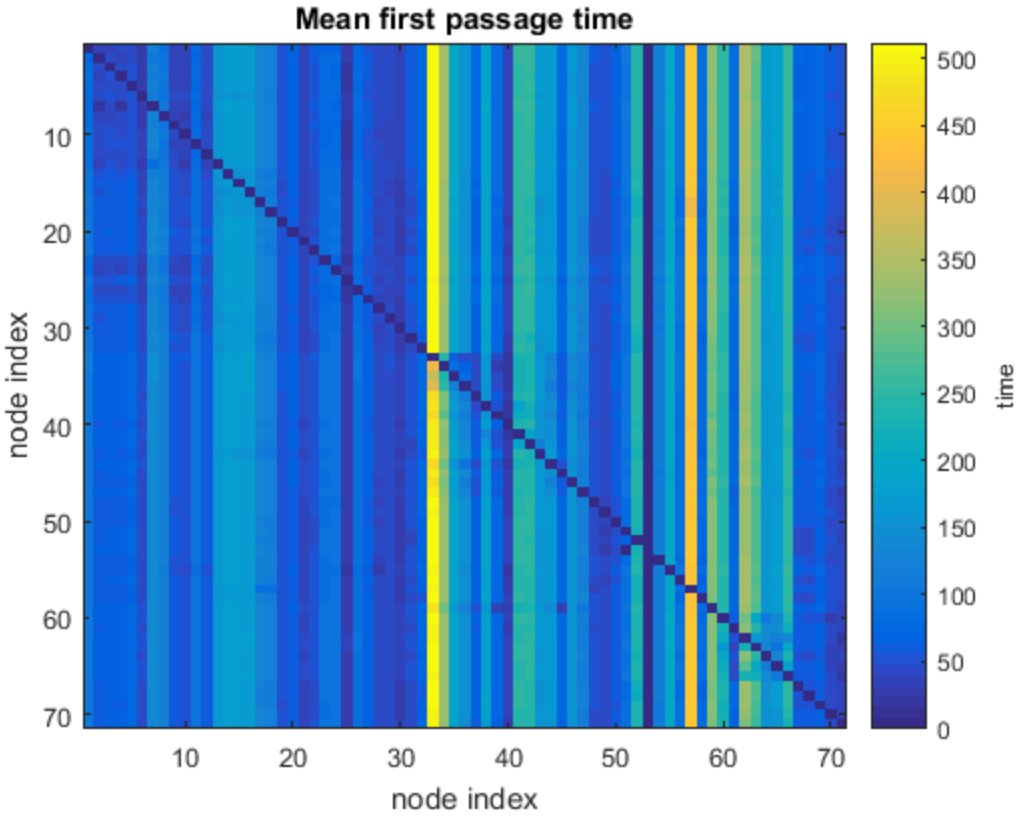

amount of nodes
nodal eccentricity
0
50
2.5
3
3.5
4
4.5
5
5.5

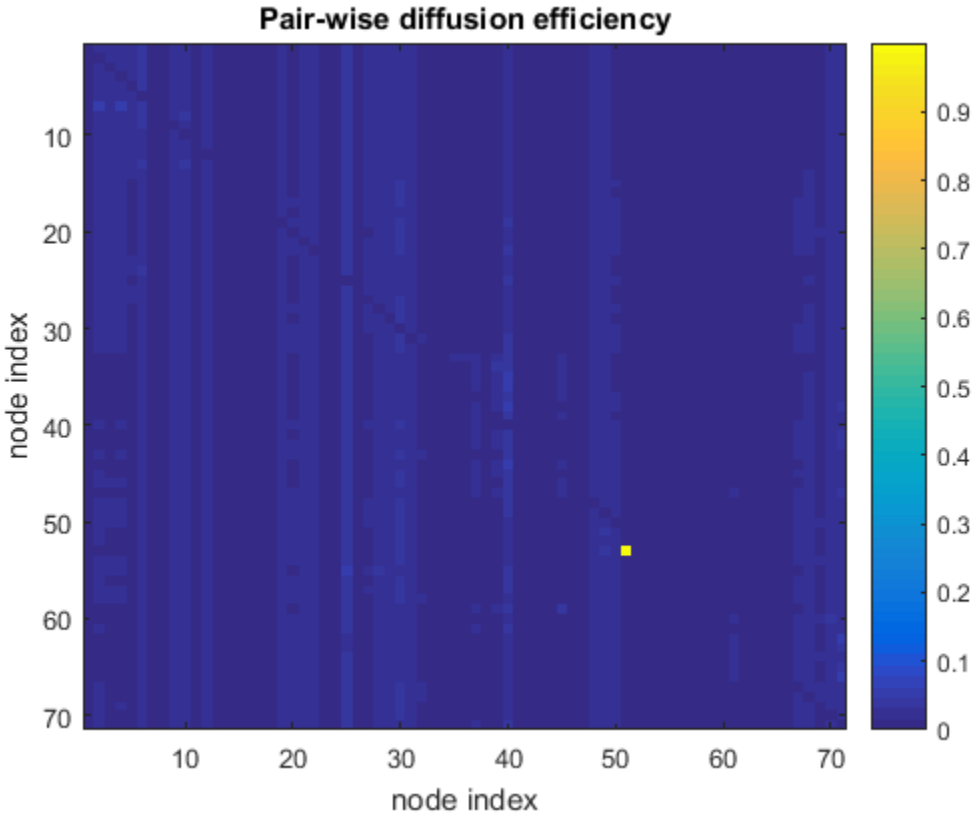

nodal eccentricity
3
4
5
1

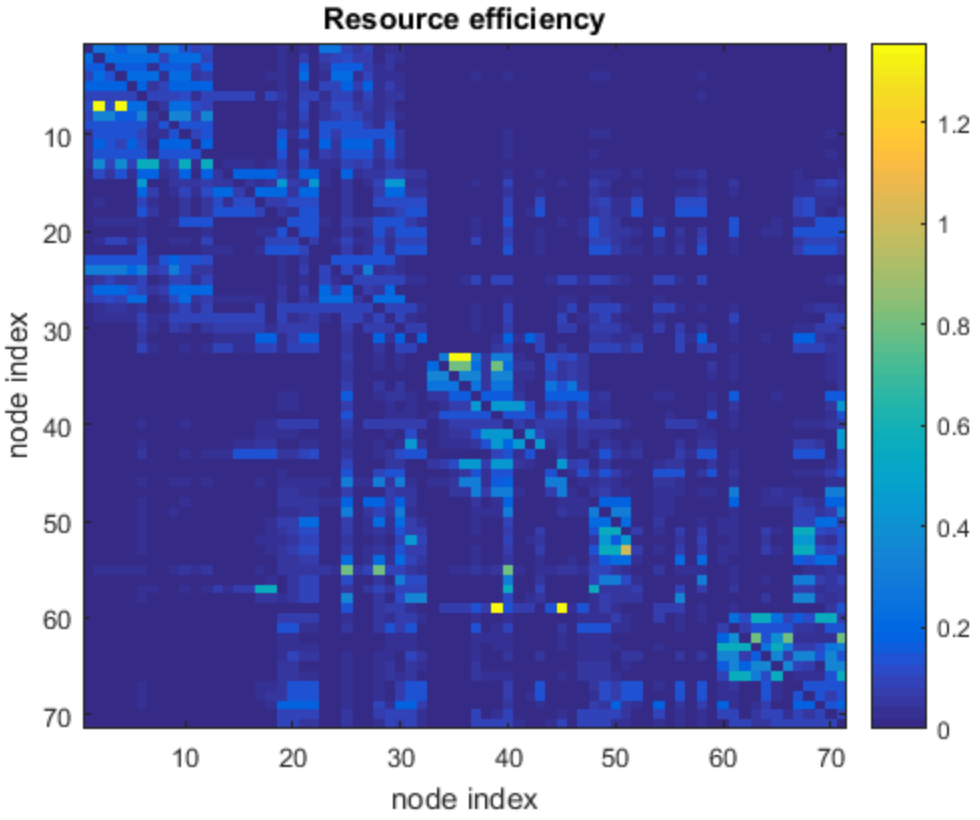
Efficiency and Diffusion

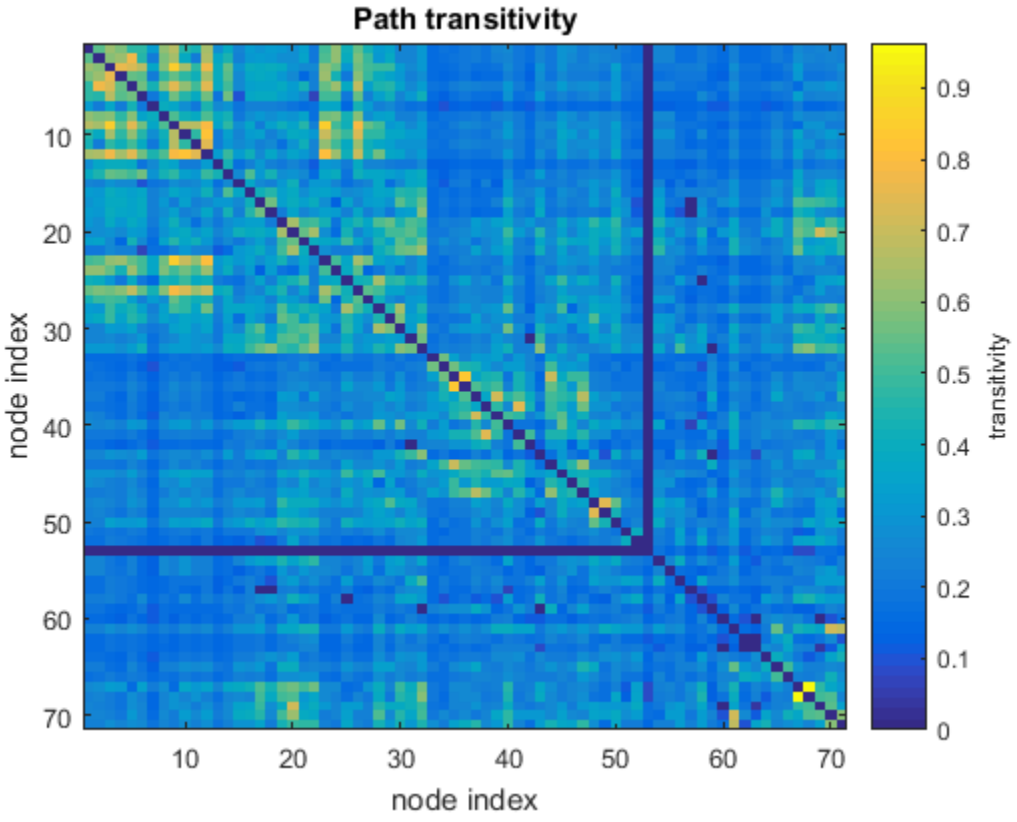
Global efficiency: 0.49609

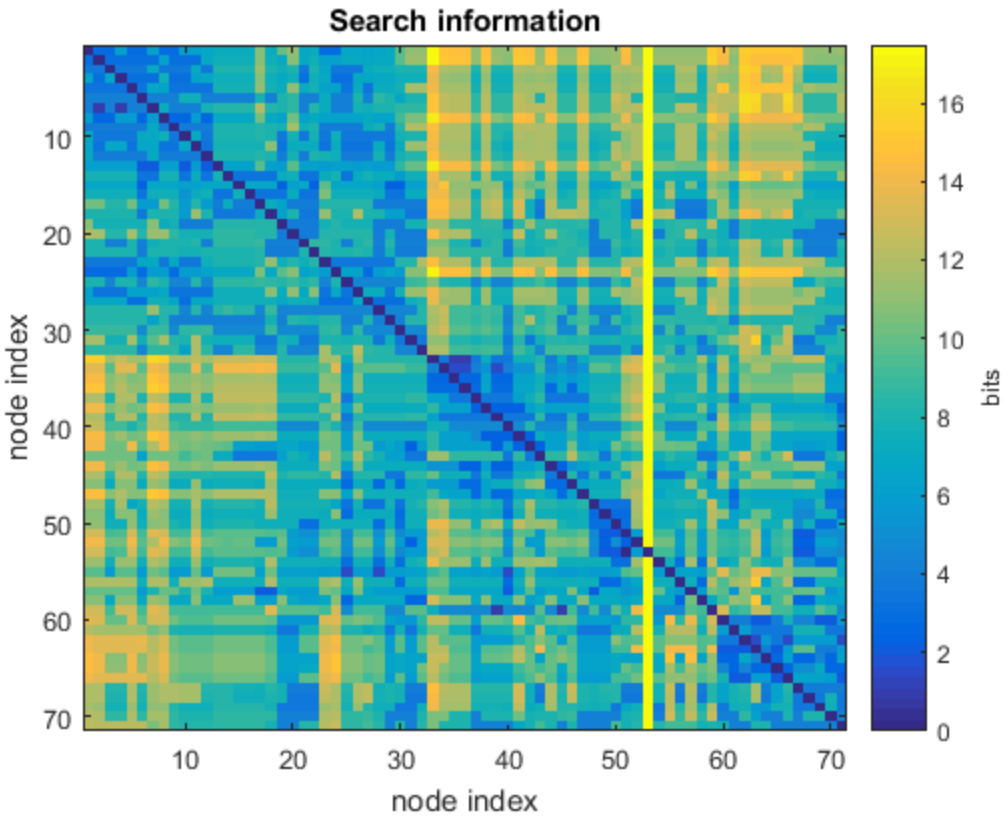



Mean first passage time
node index
node index
time
10
20
30
40
50
60
70
0
50
100
150
200
250
300
350
400
450
500

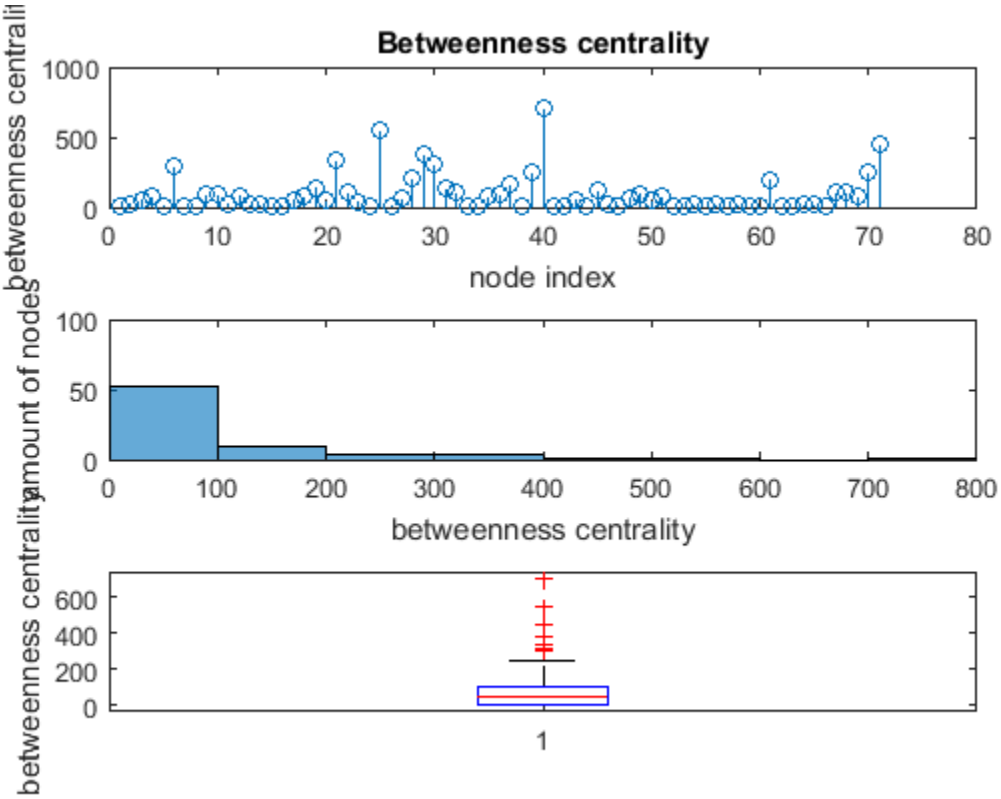

Pair-wise diffusion efficiency
node index
node index
10
20
30
40
50
60
70
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9

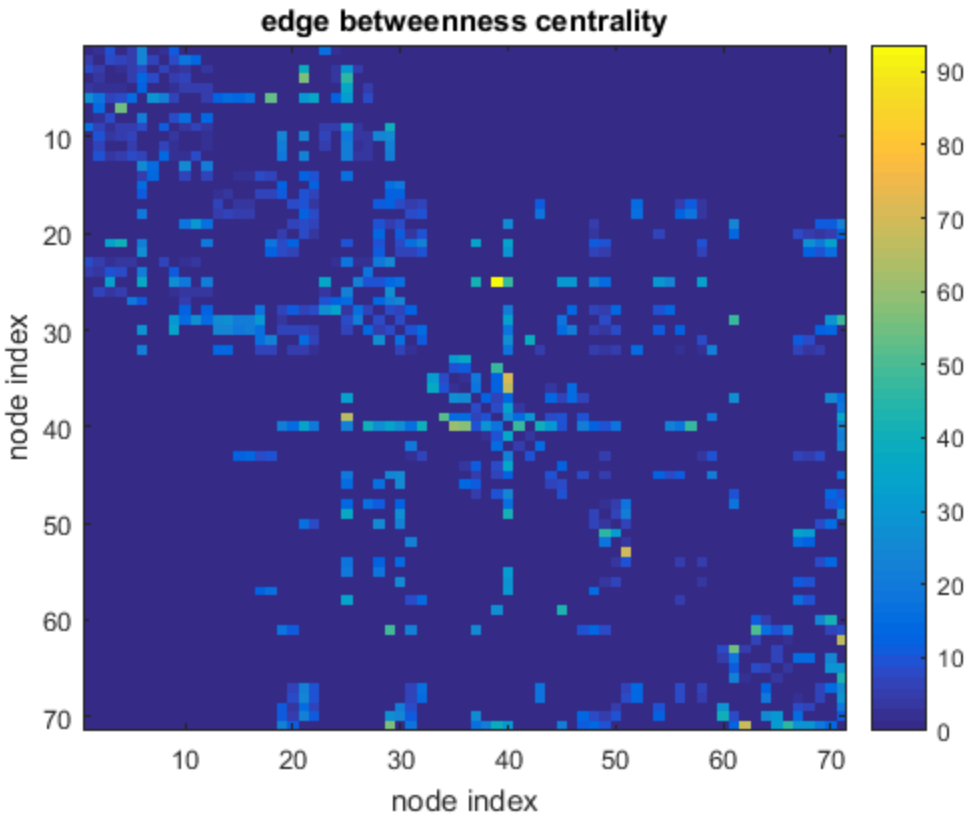

Resource efficiency
node index
node index
10
20
30
40
50
60
70
1.2
1
0.8
0.6
0.4
0.2
0


Path transitivity
node index
node index
transitivity
10
20
30
40
50
60
70
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0

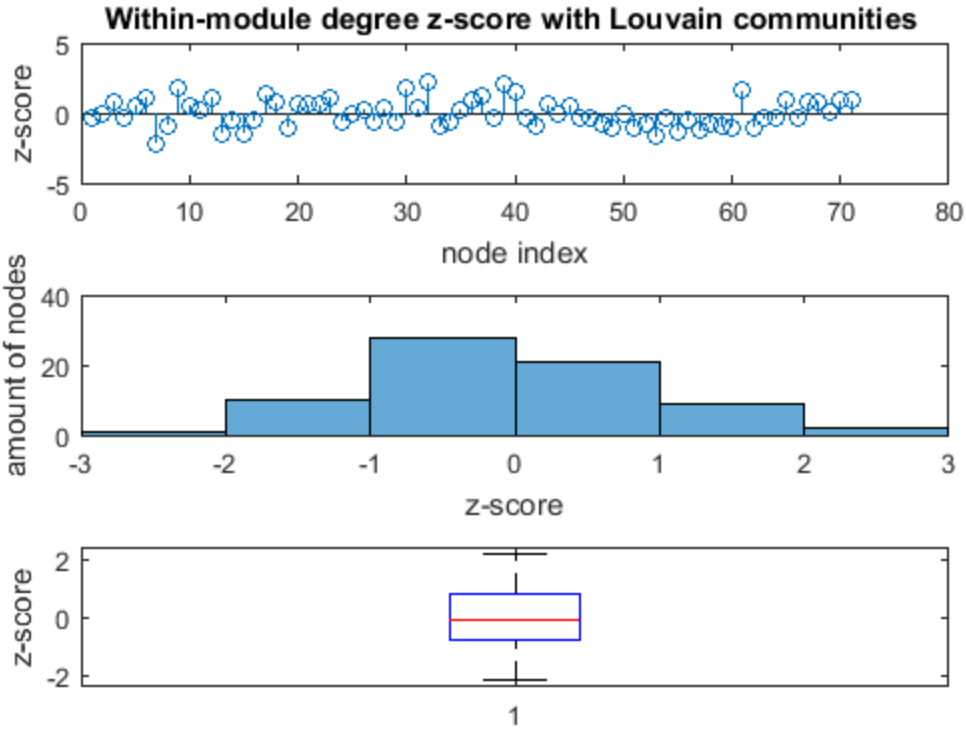

Search information
node index
node index
bits
10
20
30
40
50
60
70
0
2
4
6
8
10
12
14
16

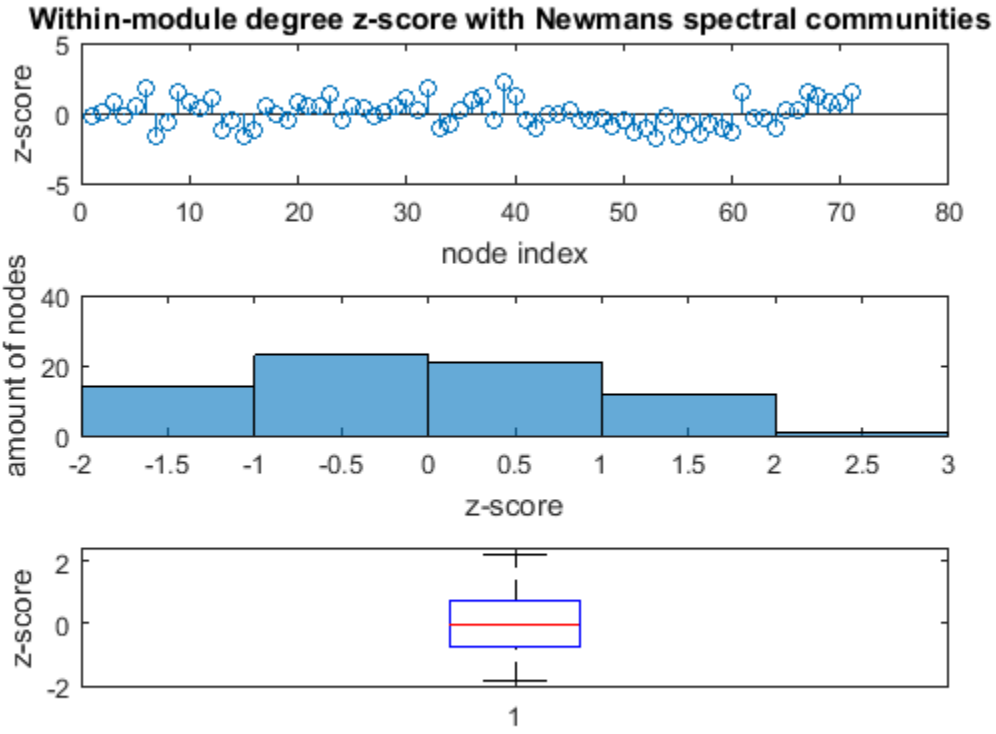
Centrality

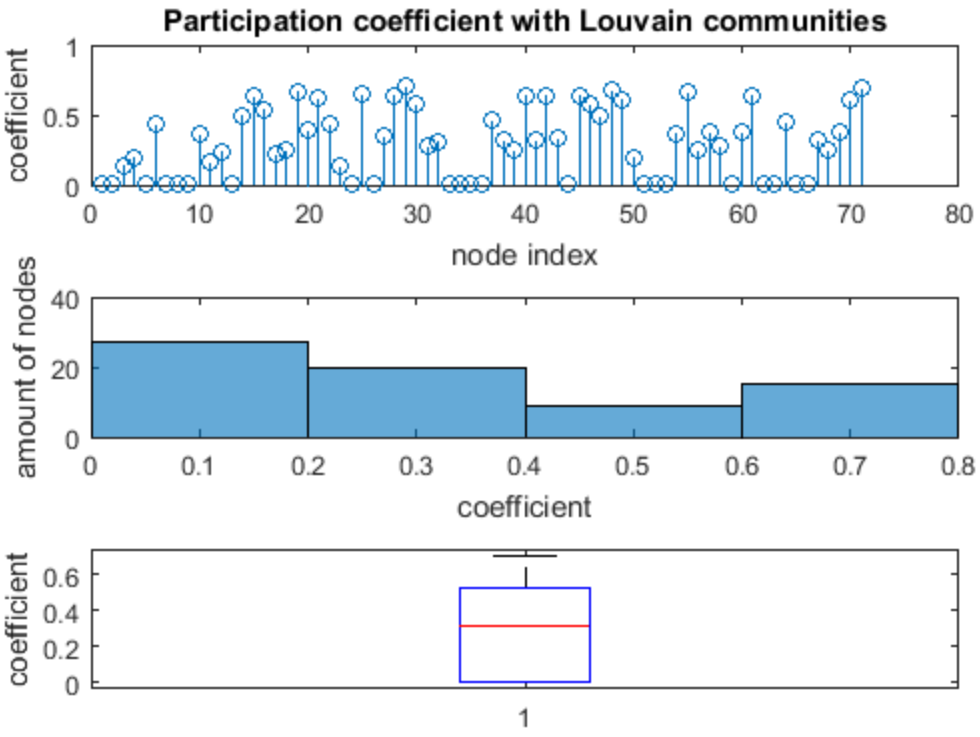

Betweenness centrality
betweenness centrali
1000
500
0
0
10
20
30
40
50
60
70
80
node index
amount of nodes
100
50
0
0
100
200
300
400
500
600
700
800
betweenness centrality
betweenness centrality
600
400
200
0
1

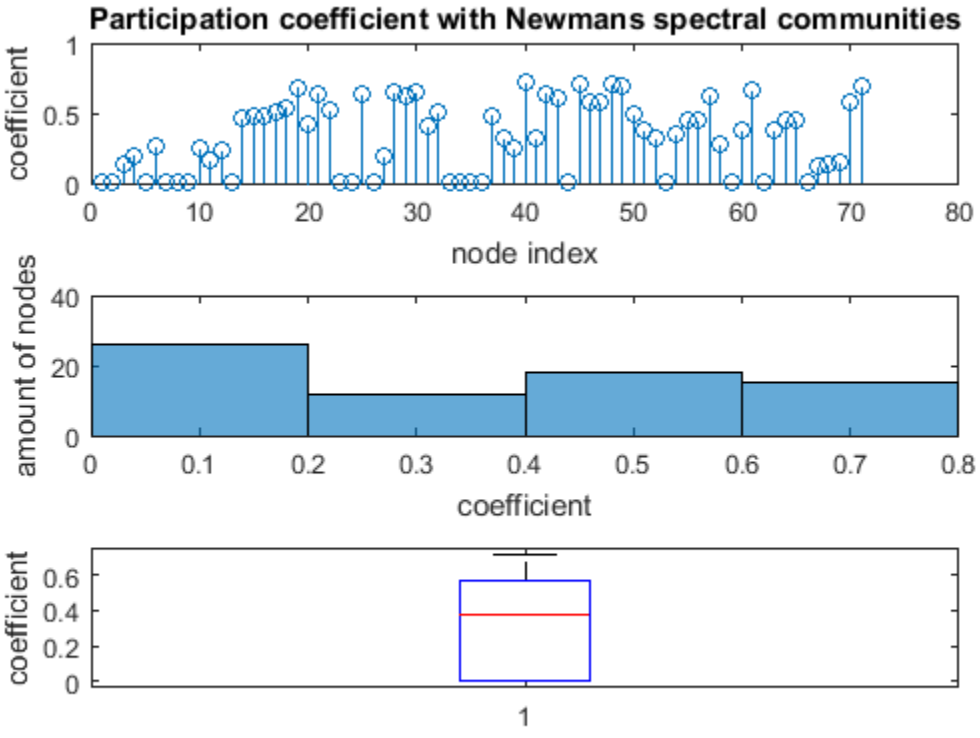


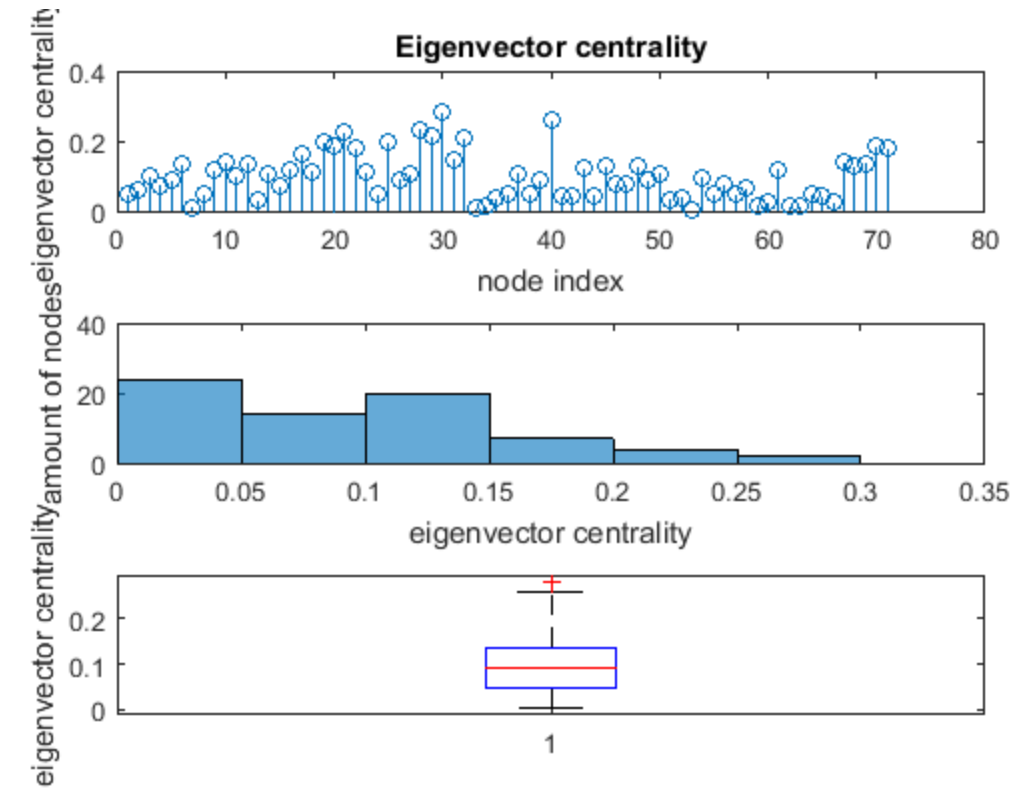
average range for entire graph: 2.0188
fraction of shortcuts in the graph: 0.020107

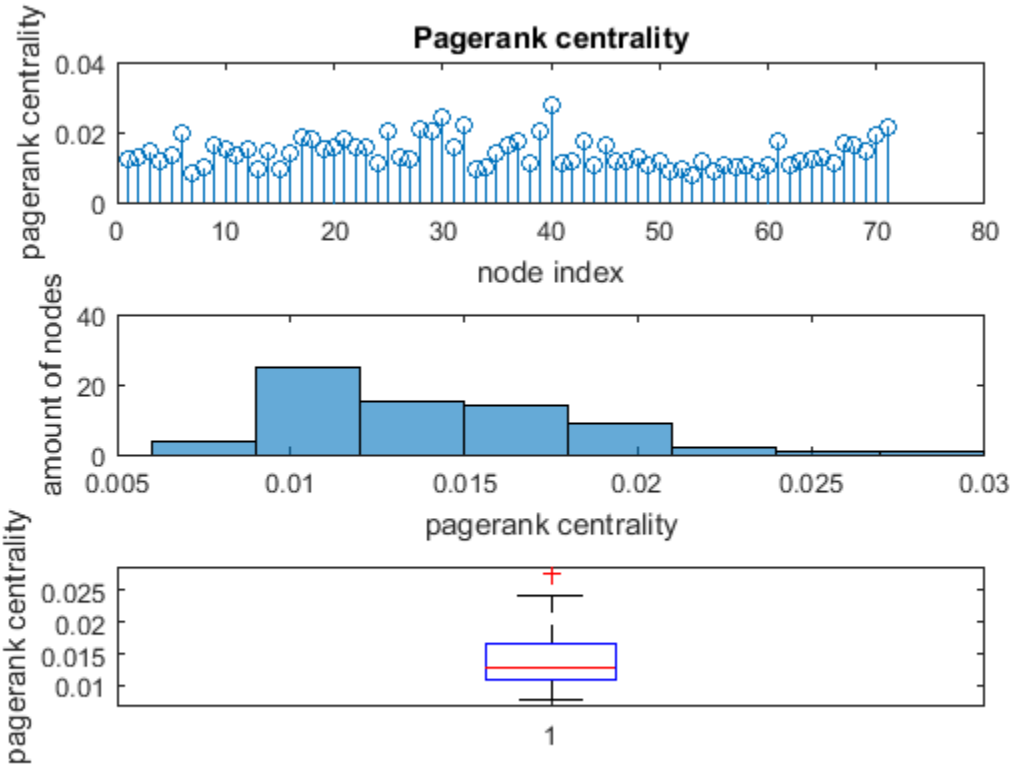

Within-module degree z-score with Louvain communities
z-score
node index
amount of nodes
z-score
z-score
1

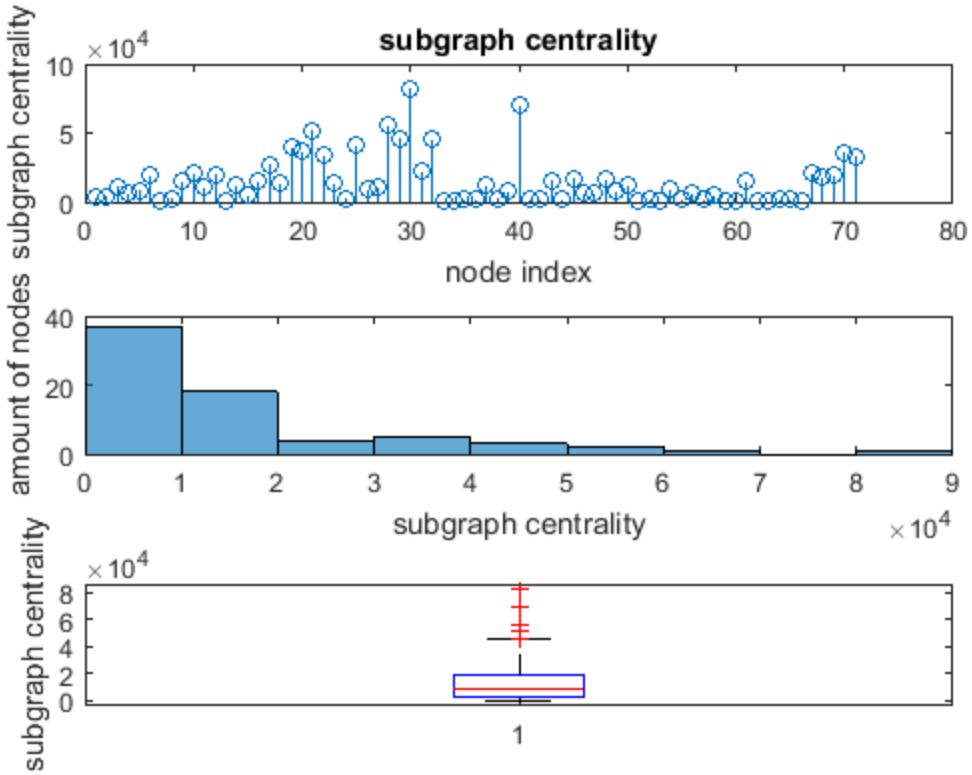

Within-module degree z-score with Newmans spectral communities
z-score
node index
amount of nodes
z-score
z-score
1

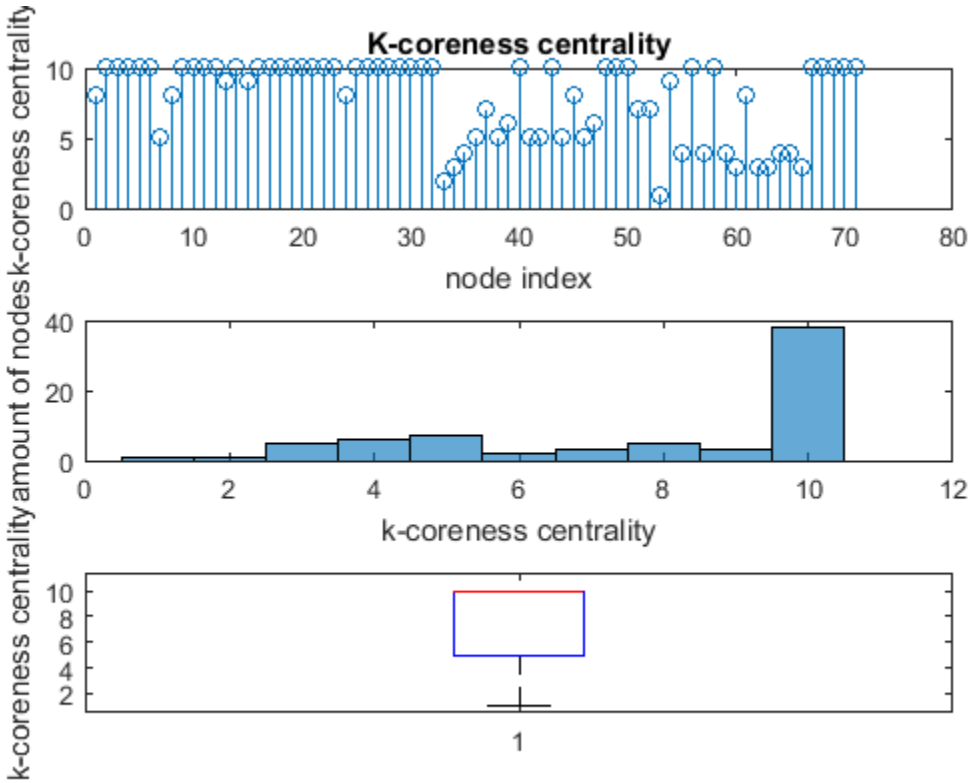

Participation coefficient with Louvain communities
coefficient
node index
amount of nodes
coefficient
coefficient
1

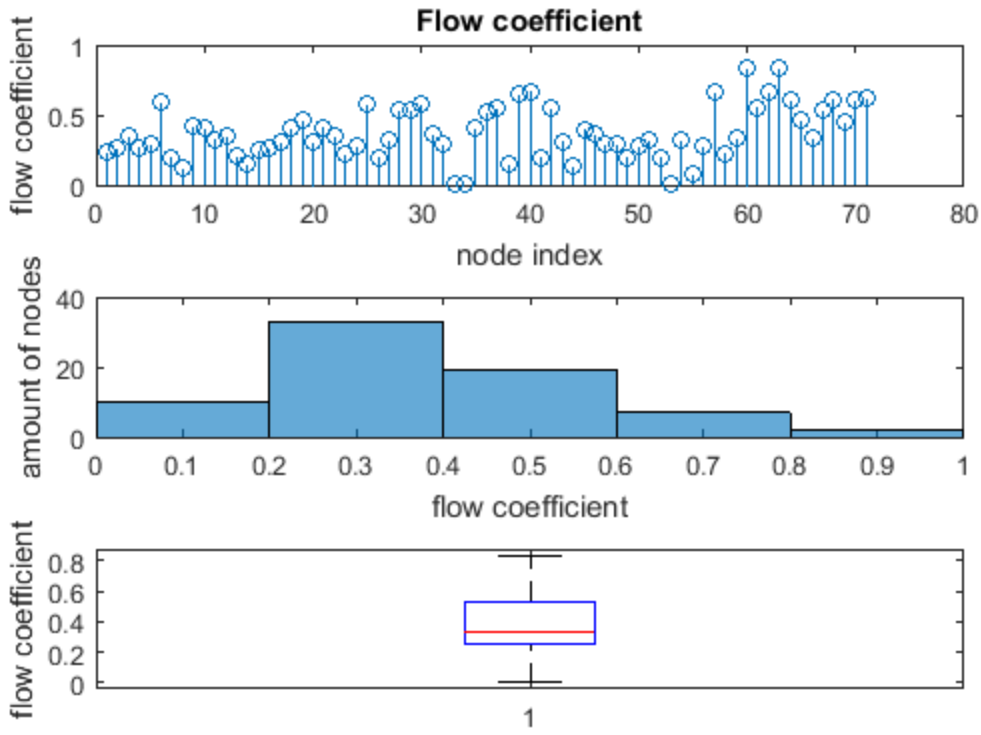

Participation coefficient with Newmans spectral communities
coefficient
node index
amount of nodes
coefficient
coefficient
1

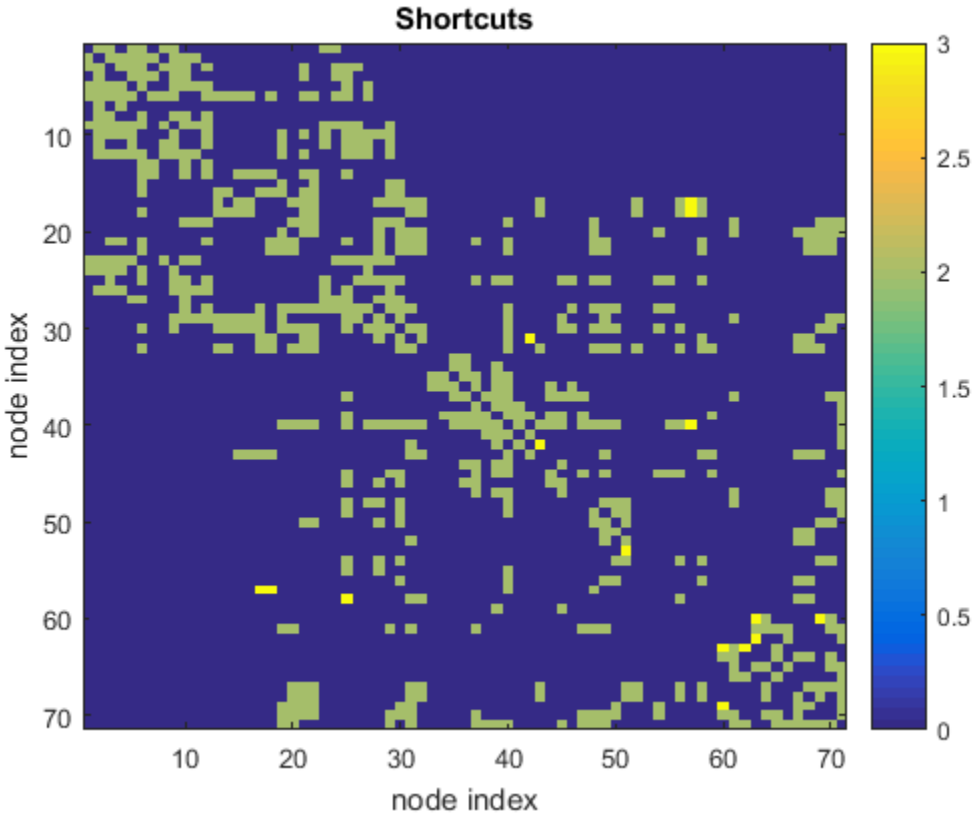

Eigenvector centrality
eigenvector centrality
node index
amount of nodes
eigenvector centrality
eigenvector centrality
1


Pagerank centrality
pagerank centrality
node index
amount of nodes
pagerank centrality
pagerank centrality
1

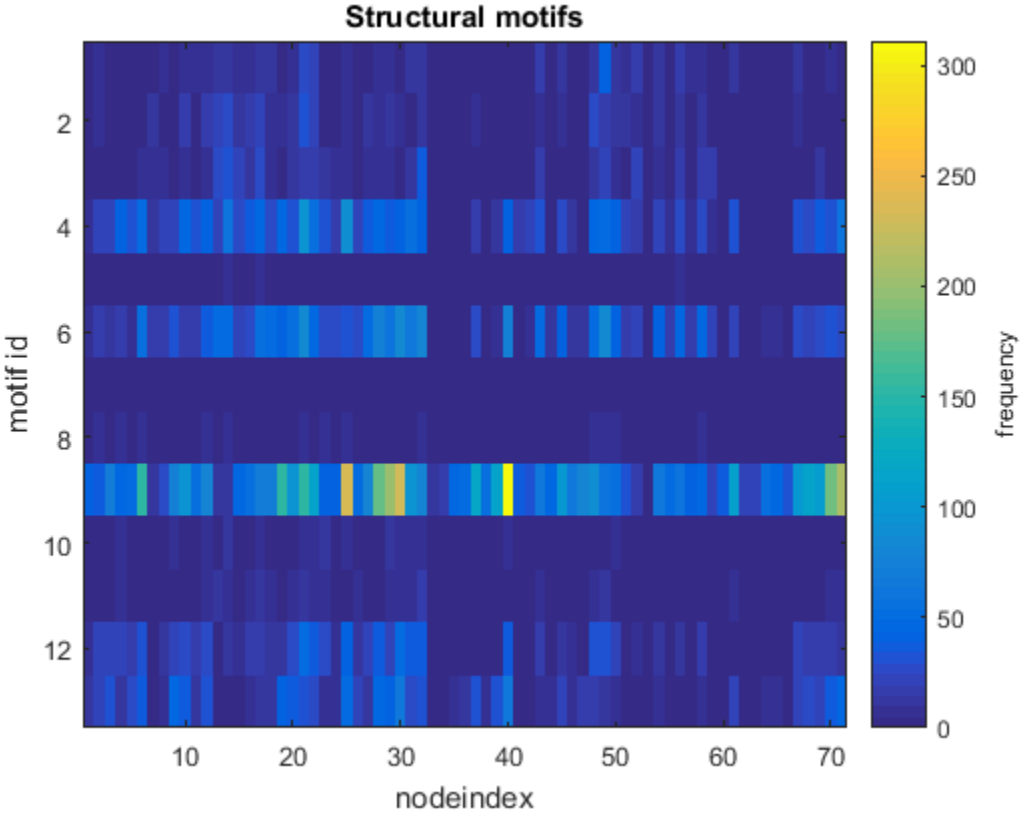

subgraph centrality
×10^4
10
5
0
0 10 20 30 40 50 60 70 80
node index
amount of nodes subgraph centrality
40
20
0
0 1 2 3 4 5 6 7 8 9
subgraph centrality
×10^4
subgraph centrality
×10^4
8
6
4
2
0
1

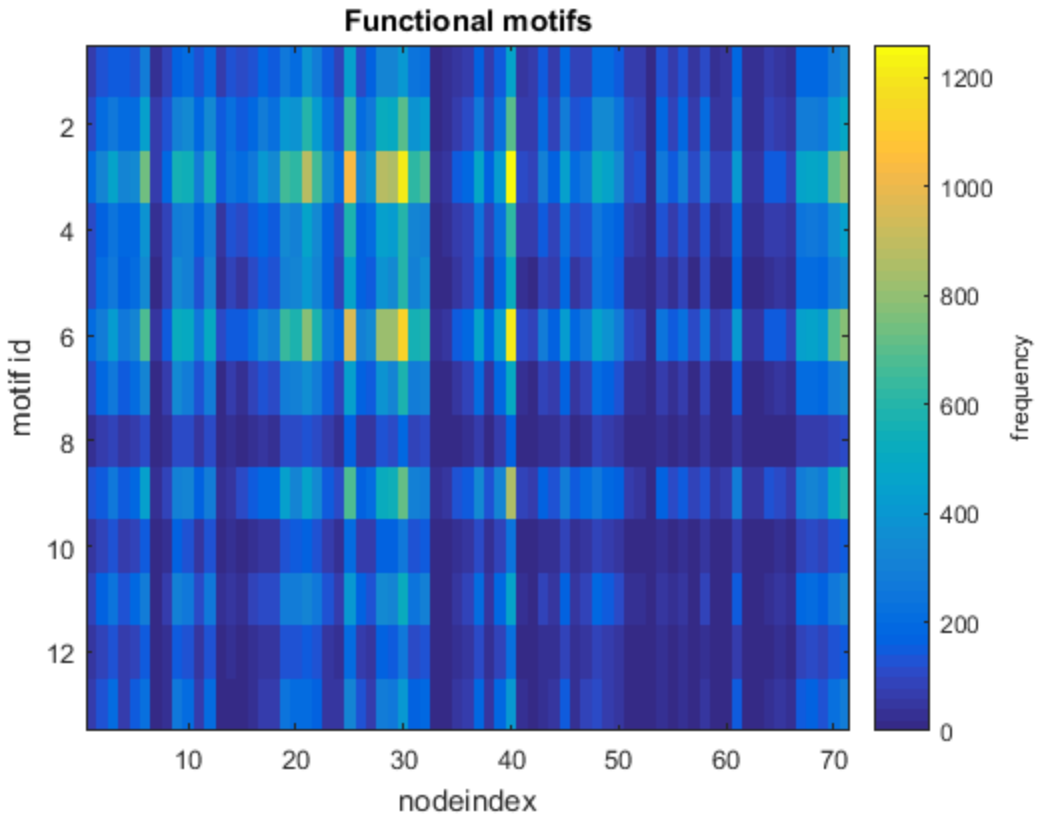

K-coreness centrality
10
5
0
0 10 20 30 40 50 60 70 80
node index
k-coreness centrality amount of nodes
40
20
0
0 2 4 6 8 10 12
k-coreness centrality
k-coreness centrality
10
8
6
4
2
1


Flow coefficient
flow coefficient
node index
amount of nodes
flow coefficient
flow coefficient
1


Shortcuts
node index
node index

Motifs


Structural motifs
motif id
2
4
6
8
10
12
10
20
30
40
50
60
70
nodeindex
300
250
200
150
100
50
0
frequency



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