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Initialize

```
clc; clear; close all;
```

3a)

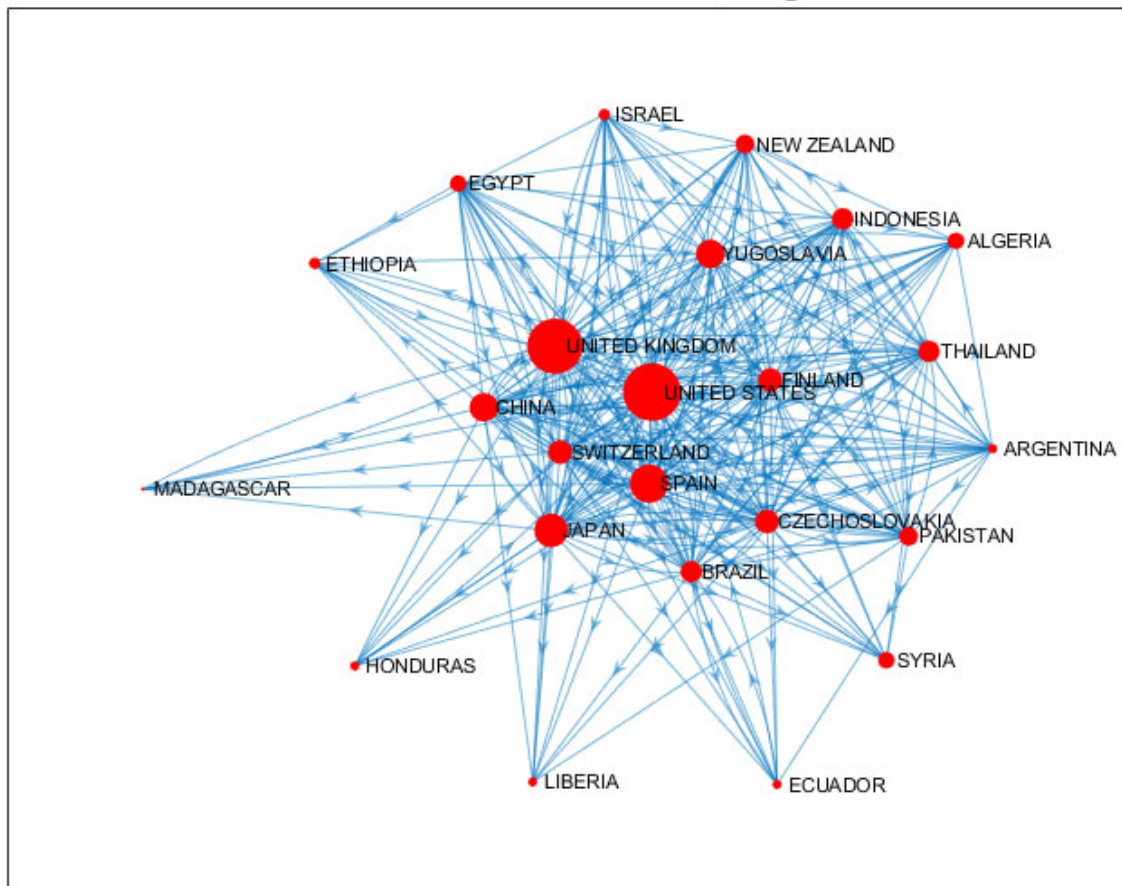
```
Gdata = load('prcentrality.mat');  
G = digraph(Gdata.A);  
  
fprintf('PageRank centralities no longer change after 8 iterations\n');  
%PageRank no longer changes past 8 iterations  
pageRank = centrality(G, 'pagerank', 'MaxIterations', 8);  
D = [Gdata.names pageRank];  
fprintf('%15s:\t%.4f\n', D');
```

```
PageRank centralities no longer change after 8 iterations  
    ALGERIA:      0.0370  
    ARGENTINA:    0.0291  
    BRAZIL:       0.0417  
    CHINA:        0.0481  
    CZECHOSLOVAKIA: 0.0441  
    ECUADOR:      0.0273  
    EGYPT:        0.0351  
    ETHIOPIA:     0.0314  
    FINLAND:      0.0430  
    HONDURAS:     0.0273  
    INDONESIA:    0.0397  
    ISRAEL:       0.0304  
    JAPAN:        0.0537  
    LIBERIA:      0.0282  
    MADAGASCAR:   0.0221  
    NEW ZEALAND:   0.0395  
    PAKISTAN:     0.0396  
    SPAIN:        0.0589  
    SWITZERLAND:  0.0432  
    SYRIA:        0.0348  
    THAILAND:     0.0420  
    UNITED KINGDOM: 0.0752  
    UNITED STATES: 0.0797  
    YUGOSLAVIA:   0.0489
```

3b)

```
graphPageRank(G, Gdata.names, pageRank);  
title('Network of Trades Between 24 Nations in 1992, 8 PageRank Iterations');
```

Network of Trades Between 24 Nations in 1992, 8 PageRank Iterations



3c)

```
[B, I] = maxk(pageRank, 3);
fprintf('\n\nCountries with highest PageRank scores: \n')
fprintf('%s\n', Gdata.names(I));
```

```
Countries with highest PageRank scores:
UNITED STATES
UNITED KINGDOM
SPAIN
```

3d)

```
close all;
% FollowProbability = 0.3
pageRankFP1 = centrality(G, 'pagerank', 'FollowProbability', 0.3);
figure;
graphPageRank(G, Gdata.names, pageRankFP1);
title('Network of Trades Between 24 Nations in 1992, 0.3 Follow Probability');

% FollowProbability = 0.5
pageRankFP2 = centrality(G, 'pagerank', 'FollowProbability', 0.5);
figure;
graphPageRank(G, Gdata.names, pageRankFP2);
```

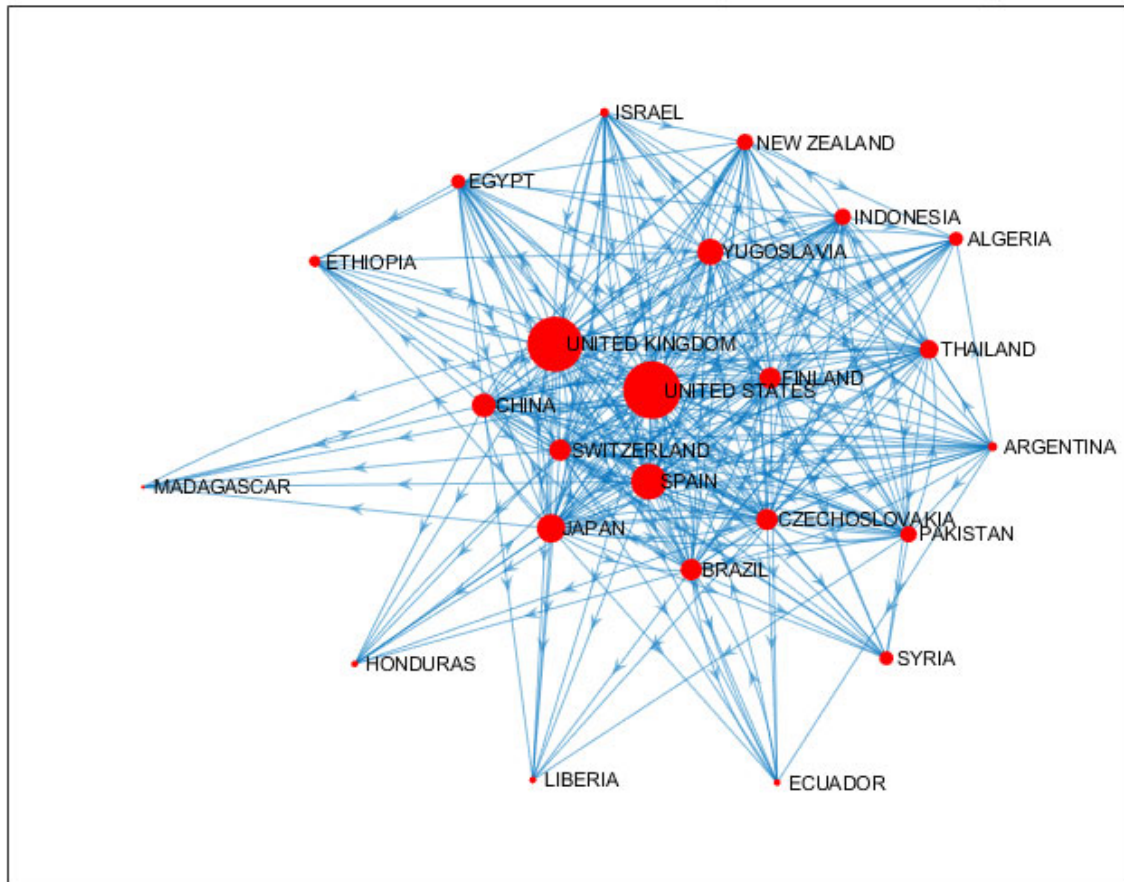
```

title('Network of Trades Between 24 Nations in 1992, 0.5 Follow Probability');

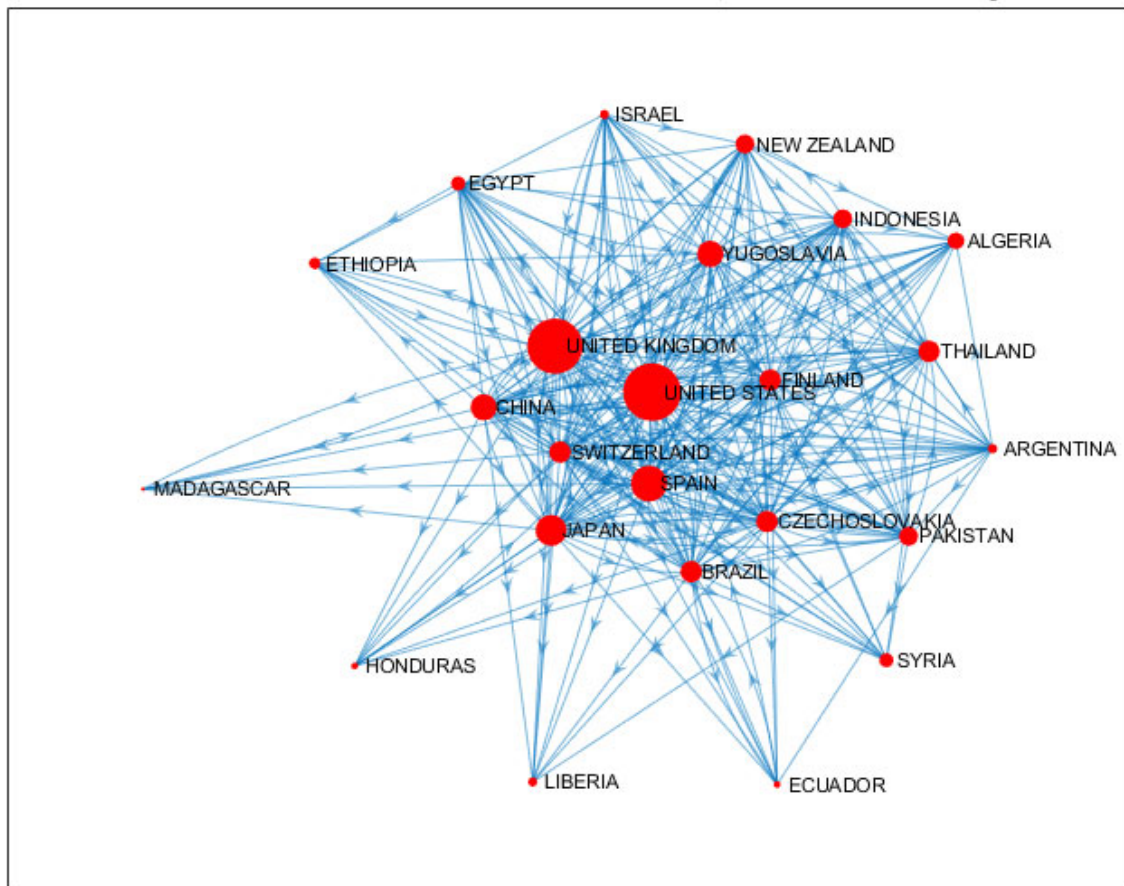
% FollowProbability = 0.7
pageRankFP3 = centrality(G, 'pagerank', 'FollowProbability', 0.7);
figure;
graphPageRank(G, Gdata.names, pageRankFP3);
title('Network of Trades Between 24 Nations in 1992, 0.7 Follow Probability');

```

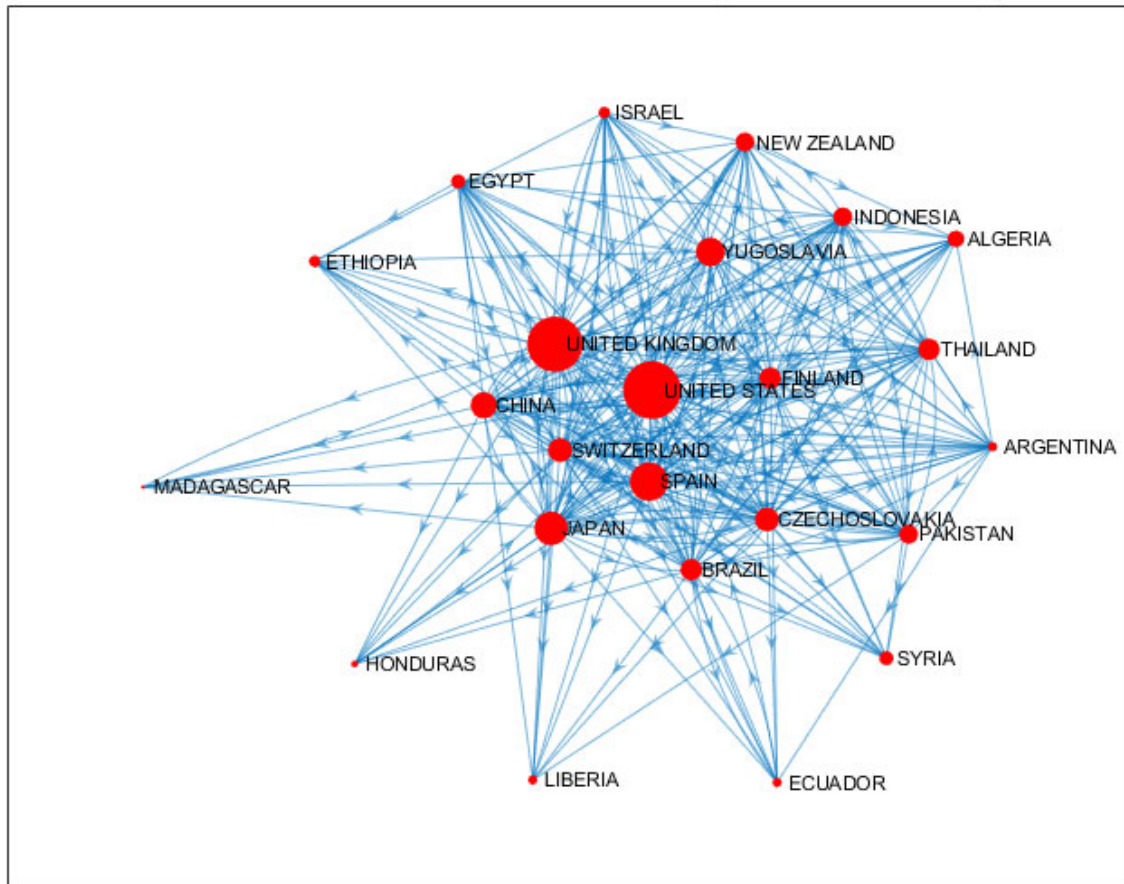
Network of Trades Between 24 Nations in 1992, 0.3 Follow Probability



Network of Trades Between 24 Nations in 1992, 0.5 Follow Probability



Network of Trades Between 24 Nations in 1992, 0.7 Follow Probability



3e)

```
pageRankComp = [pageRank pageRankFP1 pageRankFP2 pageRankFP3];
fprintf('%20s\t%20s\t%20s\t%20s\n', 'MaxIterations = 8', 'FollowProbability = 0.3', 'FollowProbability = 0.5',
'FollowProbability = 0.7');
fprintf('%20.5f\t%20.5f\t%20.5f\t%20.5f\n', pageRankComp);

explanation = ["Graphically, there is no drastic change between the " ;
"graph plots for each of the different PageRanks calculated. " ;
"For the Nations with low out-degrees but high in-degrees, the " ;
"PageRank for FollowProbability begins high but rapidly decreases " ;
"i.e. Liberia, Honduras, Ecuador. In contrast, the very highly " ;
"connected components (United States, United Kingdom) have low " ;
"initial PageRanks but rapidly increase. Lastly, as the " ;
"FollowProbability value increases, the pageRank approaches that " ;
"of the pageRank with 8 iterations. The values are the same when " ;
"FollowProbability = 0.85." ];
fprintf('%s\n', explanation);
```

MaxIterations = 8	FollowProbability = 0.3	FollowProbability = 0.5	FollowProbability = 0.7
0.03702	0.03944	0.03834	0.03751
0.02910	0.03685	0.03388	0.03109
0.04171	0.04244	0.04250	0.04219
0.04808	0.04360	0.04508	0.04673
0.04406	0.04207	0.04260	0.04335
0.02730	0.03612	0.03277	0.02960
0.03512	0.03859	0.03704	0.03583

0.03135	0.03766	0.03522	0.03296
0.04303	0.04186	0.04217	0.04261
0.02734	0.03589	0.03254	0.02948
0.03975	0.04039	0.03993	0.03974
0.03037	0.03714	0.03450	0.03208
0.05371	0.04592	0.04872	0.05154
0.02819	0.03623	0.03306	0.03019
0.02213	0.03409	0.02951	0.02521
0.03955	0.04032	0.03981	0.03957
0.03957	0.04033	0.03982	0.03959
0.05888	0.04855	0.05259	0.05629
0.04317	0.04191	0.04225	0.04273
0.03479	0.03844	0.03682	0.03554
0.04196	0.04139	0.04144	0.04168
0.07517	0.05779	0.06575	0.07176
0.07974	0.05897	0.06797	0.07524
0.04890	0.04400	0.04567	0.04746

Graphically, there is no drastic change between the graph plots for each of the different PageRanks calculated. For the Nations with low out-degrees but high in-degrees, the PageRank for FollowProbability begins high but rapidly decreases i.e. Liberia, Honduras, Ecuador. In contrast, the very highly connected components (United States, United Kingdom) have low initial PageRanks but rapidly increase. Lastly, as the FollowProbability value increases, the pageRank approaches that of the pageRank with 8 iterations. The values are the same when FollowProbability = 0.85.