1) Simple core-periphery analysis
@ Fitness: 0.3434
@ What is the number of errors? Maybe, (0+12+12+4) when the ideal matrix is based on strong core-periphery structure.
@ How was the fitness calculated? When using the most simplistic equation, R2 is 0.689. (The number of total possible ties is 10*9, and the number of total errors is 28)
@ This structure looks like weak core-periphery rather than strong one.

```
Starting fitness: 0.343
Final fitness: 0.343

Core/Periphery Class Memberships:

    1:  comm mayr news
    2:  coun edu indu wro uway welf west

Blocked Adjacency Matrix

                                1
           5 2 7   4 1 6 3 8 9 0
           m c n   i c w e u w w
          -----------------------
  5 mayr |   1 1 | 1 1   1 1 1 1 |
  2 comm | 1   1 | 1 1   1 1 1   |
  7 news | 1 1   | 1             |
         -------------------------
  4 indu | 1 1 1 |               |
  1 coun | 1 1   |               |
  6  wro |       |       1       |
  3  edu | 1 1   |     1       1 |
  8 uway | 1 1   |               |
  9 welf | 1 1   |               |
 10 west | 1     |       1       |
          -----------------------


Density matrix

          1     2
      ----- -----
  1   1.000 0.571
  2   0.571 0.095
```

<Tips for this function in Ucinet help menu>
a) Uses a genetic algorithm to fit a core/periphery model to the data.
b) The following comments are common in all functions.
“Care should be taken when using this routine. The algorithm seeks to find the minima of the cost function. Even if successful this result may still have a high value in which case the blocking may not conform very closely to structural equivalence. In addition there may be a number of alternative partitions which also produce the minimum value; the algorithm does not search for additional solutions. Finally it is possible that the routine terminates at a local minima and does not locate the desired global minima. To test the robustness of the solution the algorithm should be run a number of times from different starting configurations. If there is good agreement between these results then this is a sign that there is a clear split of the data into the reported blocks.” (Borgatti, S.P., Everett, M. G. and Freeman, L.C. 2002. Ucinet 6 for Windows. Harvard: Analytic Technologies)

2) Faction analysis

@ Goodness of fit is not provided. How can I calculate this?
@ The number of total errors is 88. Maybe, for each block, 2, 3, 3, 18 when the ideal matrix is based on factional structure.

@ When using the same simplistic equation, R2 is 0.711. (The number of total possible ties is 10*9, and the number of total errors is 26)
@ This structure looks like factional structure.

```
Final number of errors:  26

Group Assignments:

     1:   edu wro west
     2:   coun comm indu mayr news uway welf

Grouped Adjacency Matrix

                    1
              6 3 0   2 4 1 7 8 9 5
              w e w   c i c n u w m
             ----------------------
  6   wro  |   1   |               |
  3   edu  | 1   1 | 1           1 |
 10  west  |   1   |             1 |
           -------------------------
  2  comm  |   1   |   1 1 1 1 1 1 |
  4  indu  |       | 1     1     1 |
  1  coun  |       | 1           1 |
  7  news  |       | 1 1         1 |
  8  uway  |       | 1           1 |
  9  welf  |       | 1           1 |
  5  mayr  |   1 1 | 1 1 1 1 1 1   |
             ----------------------

Density Table

         1     2
       ----  ----
  1    0.67  0.14
  2    0.14  0.57
```

<Tips for this function in Ucinet help menu>
a) Optimizes a cost function which measures the degree to which a partition consists of clique like structures using a tabu search method. The routine uses a tabu search minimization procedure to optimize this measure to find the best fit: Is this Tabu search? I thought that optimization is Tabu search!
b) This is the same as above.

3) Tabu search
@ R2 is 0.516.
@ The number of total errors is 12. Therefore, according to the equation above, the R2 is 0.867.
@ This structure looks like weak core-periphery.
* The strange thing is that this function (structural equivalence blockmodeling) assumes that ideal structure is strong core-periphery. We can know this from the way of calculation of errors for each block. I thought this function can fit the data into the most appropriate structure without any priori assumptions about ideal structure.

```
Number of errors: 12
R-square = 0.516

Errors per block

      1 2
      - -
  1   0 3
  2   3 6


Block Assignments:

    1:   comm mayr
    2:   coun edu indu wro news uway welf west

Blocked Adjacency Matrix

                                       1
             5 2   1 4 3 6 7 8 9 0
             m c   c i e w n u w w
            ------------------------
  5 mayr   |   1 | 1 1 1   1 1 1 1 |
  2 comm   | 1   | 1 1 1   1 1 1   |
  ------------------------------------
  1 coun   | 1 1 |                 |
  4 indu   | 1 1 |         1       |
  3  edu   | 1 1 |       1       1 |
  6  wro   |     |     1           |
  7 news   | 1 1 |   1             |
  8 uway   | 1 1 |                 |
  9 welf   | 1 1 |                 |
 10 west   | 1   |     1           |
            ------------------------


Density Table

          1     2
       ----  ----
  1    1.00  0.81
  2    0.81  0.11
```

<Tips for this function in Ucinet help menu>
a) Optimizes a cost function which measures the degree to which a partition forms structurally equivalent blocks using a tabu search method. (This is also the same algorithm as faction analysis?: Tabu search?)
b) The same as above.

<Alternative method>
@ QAP correlation for the sake of comparison!
@ However, this is sensitive to permutation…! This means Ucinet just read the list of nodes in order from the top to the bottom or from the left to the right, I guess.

UCINET Spreadsheet -- C:\Documents and Settings\JaeWoo Kim\Desktop\knoke.##h

File Edit Transform Fill Labels Options Help

Fill +.0 -.0 Ren

	coun	comm	edu	indu	mayr	wro	news	uway	welf	west
coun	0	1	0	0	1	0	0	0	0	0
comm	1	0	1	1	1	0	1	1	1	0
edu	0	1	0	0	1	1	0	0	0	1
indu	0	1	0	0	1	0	1	0	0	0
mayr	1	1	1	1	0	0	1	1	1	1
wro	0	0	1	0	0	0	0	0	0	0
news	0	1	0	1	1	0	0	0	0	0
uway	0	1	0	0	1	0	0	0	0	0
welf	0	1	0	0	1	0	0	0	0	0
west	0	0	1	0	1	0	0	0	0	0

UCINET Spreadsheet -- C:\Documents and Settings\JaeWoo Kim\My Documents\구 직 시 장\cluster corresponder

File Edit Transform Fill Labels Options Help

Fill +.0 -.0 Ren

	west	welf	uway	news	wro	mayr	indu	edu	comm	coun
west	0	0	0	0	0	1	0	1	0	0
welf	0	0	0	0	0	1	0	0	1	0
uway	0	0	0	0	0	1	0	0	1	0
news	0	0	0	0	0	1	1	0	1	0
wro	0	0	0	0	0	0	0	1	0	0
mayr	1	1	1	1	0	0	1	1	1	1
indu	0	0	0	1	0	1	0	0	1	0
edu	1	0	0	0	1	1	0	0	1	0
comm	0	1	1	1	0	1	1	1	0	1
coun	0	0	0	0	0	1	0	0	1	0

Univariate statistics

		1 Permut	2 knoke
1	Mean	0.378	0.378
2	Std Dev	0.485	0.485
3	Sum	34.000	34.000
4	Variance	0.235	0.235
5	SSQ	34.000	34.000
6	MCSSQ	21.156	21.156
7	Euc Norm	5.831	5.831
8	Minimum	0.000	0.000
9	Maximum	1.000	1.000
10	N of Obs	90.000	90.000

Hubert's gamma: 8.000

Bivariate Statistics

		1 Value	2 Signif	3 Avg	4 SD	5 P(Large)	6 P(Small)	7 NPerm
1	Pearson Correlation:	-0.229	0.206	-0.002	0.203	0.937	0.206	2500.000
2	Simple Matching:	0.422	0.937	0.529	0.096	0.937	0.206	2500.000
3	Jaccard Coefficient:	0.133	0.937	0.239	0.100	0.937	0.206	2500.000
4	Goodman-Kruskal Gamma:	-0.476	0.206	-0.018	0.391	0.937	0.206	2500.000
5	Hamming Distance:	52.000	0.937	42.387	8.600	0.206	0.937	2500.000

Therefore,

@ This is observed matrix.

UCINET Spreadsheet -- C:\Documents and Settings\JaeWoo Kim\Desktop\coreperi observed.##h

File Edit Transform Fill Labels Options Help

Fill +.0 -.0 Ren

	1	2	3	4	5	6	7	8	9	10
1		1	1	1	1	0	1	1	1	1
2	1		1	1	1	0	1	1	1	0
3	1	1		1	0	0	0	0	0	0
4	1	1	1		0	0	0	0	0	0
5	1	1	0	0		0	0	0	0	0
6	0	0	0	0	0		1	0	0	0
7	1	1	0	0	0	1		0	0	1
8	1	1	0	0	0	0	0		0	0
9	1	1	0	0	0	0	0	0		0
10	1	0	0	0	0	0	1	0	0	

@ This is ideal matrix of strong core-periphery structure.

UCINET Spreadsheet -- C:\Documents and Settings\JaeWoo Kim\Desktop\knoke strong coreperi 3 7.##h

File Edit Transform Fill Labels Options Help

	1	2	3	4	5	6	7	8	9	10
1		1	1	0	0	0	0	0	0	0
2	1		1	0	0	0	0	0	0	0
3	1	1		0	0	0	0	0	0	0
4	0	0	0		0	0	0	0	0	0
5	0	0	0	0		0	0	0	0	0
6	0	0	0	0	0		0	0	0	0
7	0	0	0	0	0	0		0	0	0
8	0	0	0	0	0	0	0		0	0
9	0	0	0	0	0	0	0	0		0
10	0	0	0	0	0	0	0	0	0	

@ The result of QAP correlation

Univariate statistics

		1 corepe	2 knoke
1	Mean	0.378	0.067
2	Std Dev	0.485	0.249
3	Sum	34.000	6.000
4	Variance	0.235	0.062
5	SSQ	34.000	6.000
6	MCSSQ	21.156	5.600
7	Euc Norm	5.831	2.449
8	Minimum	0.000	0.000
9	Maximum	1.000	1.000
10	N of Obs	90.000	90.000

Hubert's gamma: 6.000

Bivariate Statistics

		1 Value	2 Signif	3 Avg	4 SD	5 P(Large)	6 P(Small)	7 NPerm
1	Pearson Correlation:	0.343	0.073	0.001	0.177	0.073	1.000	2500.000
2	Simple Matching:	0.689	0.073	0.606	0.045	0.073	1.000	2500.000
3	Jaccard Coefficient:	0.176	0.073	0.063	0.055	0.073	1.000	2500.000
4	Goodman-Kruskal Gamma:	1.000	0.073	-0.103	0.709	0.073	1.000	2500.000
5	Hamming Distance:	28.000	0.073	35.427	3.926	1.000	0.073	2500.000

@ Therefore, I can use Pearson Correlation coefficient as the indicator of goodness of fit for two matrices, regardless of its significance?
@ In the same way, I can apply this method to factional analysis result and structural equivalence blockmodeling result?
@ Do I really have to use three approaches?
@ Do I really have to make observed matrix and ideal matrix step by step by hand?

This is why in my examination paper I used the QAP (Quadratic Assignment Procedure) correlation approach to get the right and comparable measure of the goodness of fit. The conclusion I reached is that the estimation of the goodness of fit in SCP and OSE is based on the QAP correlation algorithm since the goodness of fit provided by them was the same with the result I got from the QAP approach. Therefore, applying this QAP approach to FA makes it possible to compare the three measures of the goodness of fit finally.

Unlike other procedures such as SCP and OSE, FA in Ucinet does not give the result about the goodness of fit. To get this measure, at first glance, it is reasonable to use the following equation for symmetric matrices if you know about the number of actors for each block (A for the first block; B for the second block) and the final number of errors in total (X, Y and Z for each block).

<Table 2> Observed block density

	1 (A)	2 (B)
1 (A)	X	Y
2 (B)	Y	Z

R^2 is [(the number of total possible ties – the final number of errors in total)]/(the number of total possible ties). The number of total possible ties, when excluding diagonal ties, is (A+B)(A+B)–(A+B), so this can be reduced to (A+B)(A+B–1). Finally, R^2=[(A+B)(A+B–1)–(X+Y+Y+Z)]/[(A+B)(A+B+1)]. However, this simplistic approach is very sensitive to the pattern of permutation. What is worse, this equation would give us the same goodness of fit as long as the two variables, the number of total possible ties and the final number of errors are the same, regardless of the number of ties for each block.

Another plausible approach is to use the number of actual ties instead of the number of total possible ties to consider actual densities. Therefore, R_{adj}^2 is [(the number of actual ties – the final number of errors in total)]/ (the number of actual ties) in this approach. However, this approach is also very problematic in the sense that it does not take into account different ways of permutation for the same matrix. Moreover, this also has the same limitations like the former approach as the following equation shows: Density=$(1–R^2)/(1–R_{adj}^2)$.