

**HUDM5124 ASSIGNMENT 13:** Apply the structure-definition part of the NETSCAL algorithm (Hutchinson, 1989) to the Breiger subset data on occupational mobility, in order to identify the “necessary” links needed. That data is posted in Canvas Session 13.

As a guide, follow the example of this method as illustrated for the Corter (1995) data on social nominations among Teachers College departments.

Table: Data from Corter (1995) Table 3: TC social nominations data (Summed number of nominations of column departments by respondents in row department, converted to proportions.

**Similarity matrix of “social nominations”:**

	02: clin_p	05: dev_p	10: math	11: meas	15: soc_p	N
02: clin_psy	--	1/2	0	0	1/2	2
05: devel_ed	3/5	--	1/5	3/5	4/5	5
10: math_sci	1/3	1/3	--	2/3	1/3	3
11: measmnt	3/4	3/4	2/4	--	3/4	4
15: soc_cnsl	6/7	6/7	0	4/7	--	7

**Method:** [You may do this assignment by hand, or use and adapt the provided R code.]

1. Convert these proportions (similarities) to dissimilarities by subtracting each entry from 1.
2. Apply Corollary 1 from the Hutchinson (1989) article to each potential arc in the graph to see which arcs can be eliminated. This is done as follows:
  - a. Assume a completely connected weighted directed graph  $G^*$ , with edge weights = the (asymmetric) dissimilarities.
  - b. Check each edge in  $G^*$  to see if it is monotonically “essential”. By Corollary 1, an edge is essential if it is less than the MIN, across all indirect paths of length 2, of the MAX of the two edge lengths in that indirect path.
  - c. “Prune” graph  $G^*$  by dropping all non-essential edges to obtain graph  $G$ .
3. Draw the resulting directed graph  $G$  (do not worry about estimating arc lengths, the second part of the NETSCAL algorithm).