

Whole networks exercise

Disucssion and explanation of results

Ucinet data set: **KNOKE BUREAUCRACIES** (KNOKBUR)

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- **UCINET DATASET** KNOKBUR
 - **DESCRIPTION** Two 10x10 matrices
 - **KNOKM** non-symmetric $(i,j) \neq (j,i)$, binary (1-0).
 - **KNOKI** non-symmetric $(i,j) \neq (j,i)$, binary (1-0).
 - **BACKGROUND** In 1978, Knoke & Wood collected data from workers at 95 organizations concerned with social welfare issues in Indianapolis. Respondents indicated with which other organizations (private firms, governmental agencies, voluntary organizations) their own organization had any of 13 different types of relationships in the last 2 years

Ucinet data set: **KNOKE BUREAUCRACIES** (**KNOKBUR**)

- Knoke and Kuklinski (1982) selected a subset of 10 organizations and two relationships
- **information exchange in KNOKI.**

Q: To and from which organisations did the respondent's organization send or receive "information about community affairs"

Money exchange is recorded in KNOKM,

- Q: To and from which organisations did the respondent's organization give or receive "money or other material resources"
- **QUESTION: the meaning of symmetrizing here?**

Attributes of these organisations

TABLE 1
Indianapolis Organizations Used in Network Examples

Organization Name	Symbol	Sector*	Influence Reputation
City/County Council	COUN	GOV	5.80
Chamber of Commerce	COMM	VOL	5.80
Board of Education	EDUC	GOV	4.75
Local Industries	INDU	PVT	5.38
Mayor's Office	MAYO	GOV	5.86
Women's Rights Organization	WRO	VOL	2.50
Star-News	NEWS	PVT	6.40
United Way	UWAY	VOL	5.94
Welfare Department	WELF	GOV	4.60
Westend Organization	WEST	VOL	3.50

*GOV = government; VOL = voluntary; PVT = private profit making.

Cohesion: density and average degree

- KNOKI vs KNOKM What changes and why does it change?
- How can we explain these changes based on the type of relations among these organisations?

Characterise the whole network : density and average degree

	Density	Nr of ties	Average degree
KNOKI (sym)	0.544	49	4.9
KNOKM (sym)	0.244	22	2.2

What we take from this: the network is more cohesive in the information relation; more relational activity here; to exchange info those organisation have on average direct links to almost 5 other organisation as to exchange money they just have relation to a bit more than 2 organisations

NOTES: you have info on the max degree on the (old or legacy) degree procedure; max degree is the number of nodes minus ego

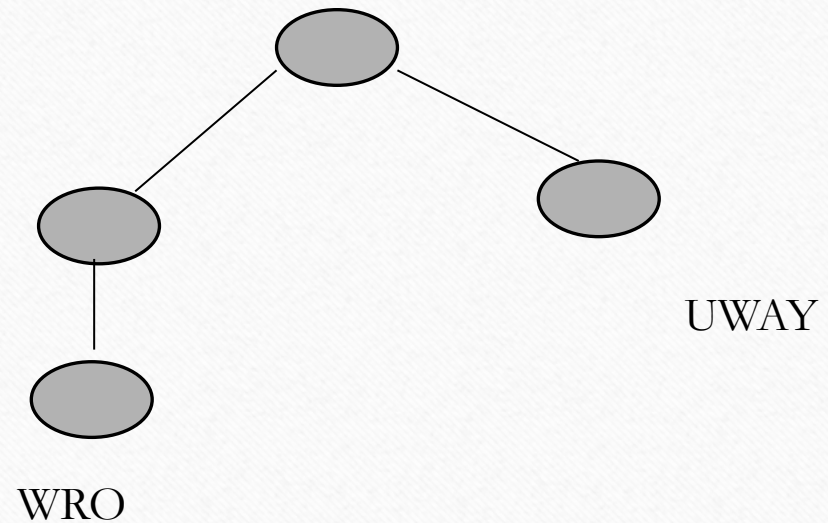
Characterise the whole network : reachability and distance

The meaning of reachability and distance

- It tells which actors are reachable , and whether this is by direct (path of size 1) or indirect (path of size more than 1)- observable in the matrix of Geodesic distances
- KNOKI- Average GD – 1. 533 ; KNOKM – Average GD – 1.429
- NOTE: on average each organisation that needs information is 1.5 link away from every other to get it ; in order to access the info flowing though the network the organisations must reach beyond their neighbour (adjacent node)

Characterise the whole network : reachability and distance

- The average GD on KNOKI is 1.533 ;
- But for instance WRO is at distance 3 from UWAY – see GD matrix



Characterise the whole network : reachability and distance

- KNOKI- Average GD – 1.533
- KNOKM – Average GD – 1.429 (it is less cohesive and still nodes are less distant from each other? Why is this?)
- What other measure we have seen so far that divides the network in subgroups of mutually reachable nodes?

Characterise the whole network : reachability and distance

- The reachability of the nodes in both networks
- KNOKI- everyone can reach everyone
- KNOKM – not everyone can reach everyone (disconnected network)
- See strong (directed network) components of both KNOKI and KNOKM and let me know the results

Characterise the whole network : reachability and distance

- With average distance of whole networks

We can compare different networks – how distant are nodes (organisations, students, etc) from each other and how it is related to the capacity for sharing resources , getting info, etc

- We can also check individual actors (student , organisation...) distance from all other in the network
 - Are NGO's are more distant in average than the government agencies?
 - Are students with poorer grades more distant than the others ?

Characterise the whole network : centralization

- A **network centralised** (i.e. just one or a few are in control of all or the majority of relations) may affect the motivation, happiness, health etc of those not in the centre (and of those in the centre , high stress for instance)
- Degree centralization looks at the extent to which one actor in the network is holding all of the ties in the network
- It is measured as a proportion, where a network with a centralization score 1 indicates all ties centring in one actor (max centralization = 1)

Characterise the whole network : centralization

- KNOKI (non sym) – 0.3827
- KNOKI (sym) - =0 .3611
- NOTE : for information exchange it is OK to symmetrise (still one should look how different does it look form the non symmetrized)

- KNOKEM (symmetrised) =0.3889
- KNOKM (non sym) – out degree: 0.3457; in degree: 0.469
- In the relation money exchange if we consider the Asymmetric network (i.e. directed), which makes more sense, we see that giving away money is less centralized in a few than receiving money; UWAY (in degree 6) and EDUL (5) concentrate the receiving money relation (what are they Gov, voluntary or private for profit?)

Characterizing whole networks : reciprocity

- The level of reciprocity of a network is relevant because
- A network predominantly with reciprocal relations is more egalitarian and stable than a network with predominantly non-reciprocal relations; the less reciprocal networks are similar to a hierarchy

Characterizing whole networks : reciprocity

A simple measure of reciprocity : the count of the number of reciprocal relations (links) divided by the total number of relations (links)

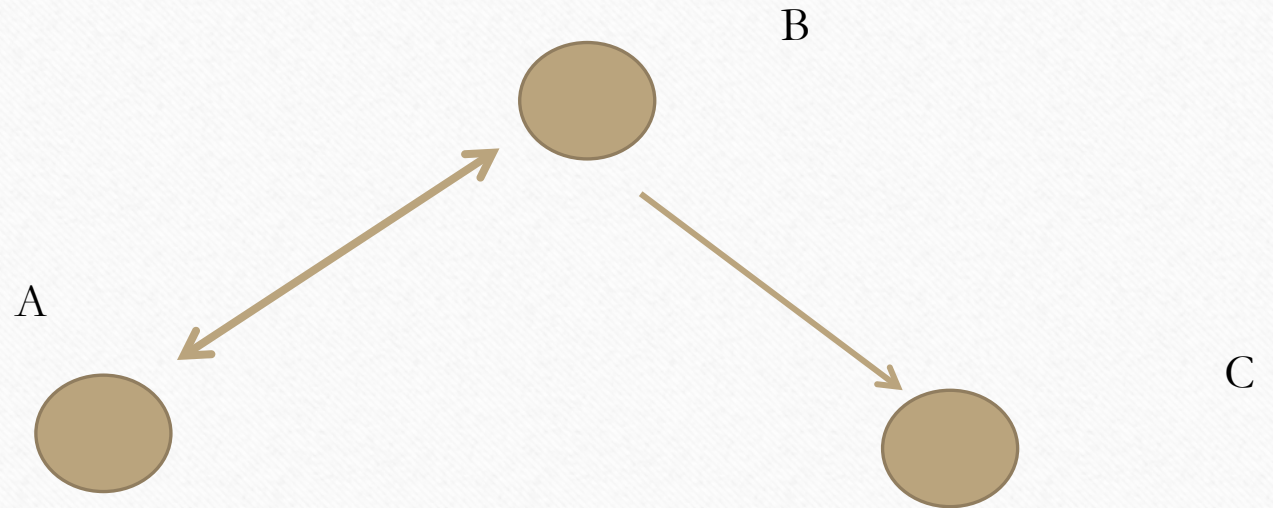
| I.e., $\text{Num}(X_{ij}>0 \text{ and } X_{ji}>0) / \text{Num}(X_{ij}>0 \text{ or } X_{ji}>0)$

This the dyad or hybrid reciprocity (as indicated in UCINET)

If the relations are directed we want to know if the relation from A to B is returned from B to A

Actors A & B have a reciprocal relation;

Actores B & C have a non reciprocal relation; actors A & C do not have a relation

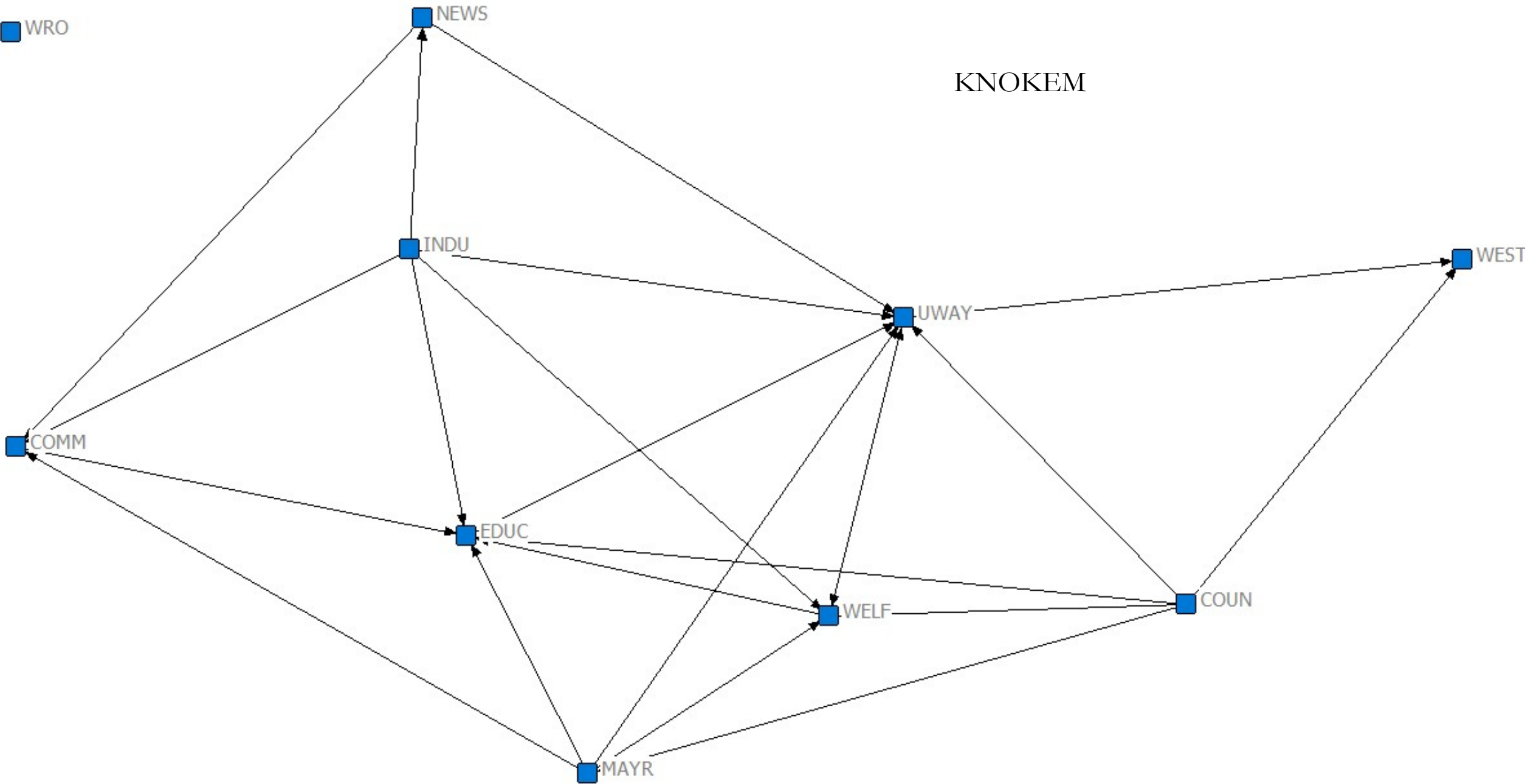


Characterise the whole network : reciprocity

- KNOKI - Hybrid Reciprocity: 0.5313
- Of all diads (a two node relation which is the minimal unit of relation) 53% have a reciprocal relation : it is not easy to say in absolute terms if that is very high or very low , but it suggests thta there is considerable degree of reciprocity, in this case institutionalised horizontal relations, in this organisational population
- KNOKM - Hybrid Reciprocity: 0.048
- The opposite happens for the KNOKM as there is very low reciprocity (close to zero); that its those who give money tend not to receive money in equal “amounts”; some finance others; those who are financed are often not in position to fiabance others

■ WRO

KNOKEM



		es
1	Recip Arcs	2
2	Unrecip Arcs	20
3	All Arcs	22
4	Arc Reciprocity	0,091
5	Sym Dyads	1
6	Asym Dyads	20
7	All Dyads	21
8	Dyad Reciprocity	0,048

KNOKM hybrid reciprocity

8 rows, 1 columns, 1 levels.

Arc and dyad measures are explained here:

<https://sites.google.com/site/ucinetsoftware/document/faq/reciprocity--arcordyad>

Hybrid Reciprocity: 0.0476

In the hybrid method, the overall and node-level reciprocity values are the same as in the dyad-based model.

I.e., $\text{Num}(X_{ij}>0 \text{ and } X_{ji}>0) / \text{Num}(X_{ij}>0 \text{ or } X_{ji}>0)$

NOTE: WRO is isolated;

Node-level Reciprocity Statistics -- All values are Proportions

	1	2	3	4	5	6
	Symmetric	Non-Symme	Out/NonSy	In/NonSym	Sym/Out	Sym/In
1 COUN	0,000	1.000	1.000	0,000	0,000	
2 COMM	0,000	1.000	0.250	0.750	0,000	0,000
3 EDUC	0,000	1.000	0.167	0.833	0,000	0,000
4 INDU	0,000	1.000	1.000	0,000	0,000	
5 MAYR	0,000	1.000	0.800	0.200	0,000	0,000
6 WRO						
7 NEWS	0,000	1.000	0.667	0.333	0,000	0,000
8 UWAY	0.143	0.857	0.167	0.833	0.500	0.167
9 WELF	0.200	0.800	0.250	0.750	0.500	0.250
10 WEST	0,000	1.000	0,000	1.000		0,000

Your interpretation of the results:

- **Never forget:**
- Which are the nodes – people, organisations?
- Which is the relation? What does that relation mean if you think of it? Time, energy, money etcBeing a friend takes more time and energy than being acquainted with someone. SO naturally we can have less friends than acquaintances

About your whole networks

- You tell me.
- Did your network differ a lot from your colleagues? In what dimensions?
How did you explain that?