



Simple Network Analysis with UCINET

Mo-Han Hsieh

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Agenda

- UCINET Basics
- The UCINET Environment
- A Quick Demo
- Import Data
- Export Data
- Data Processing
- Tips of Using UCINET



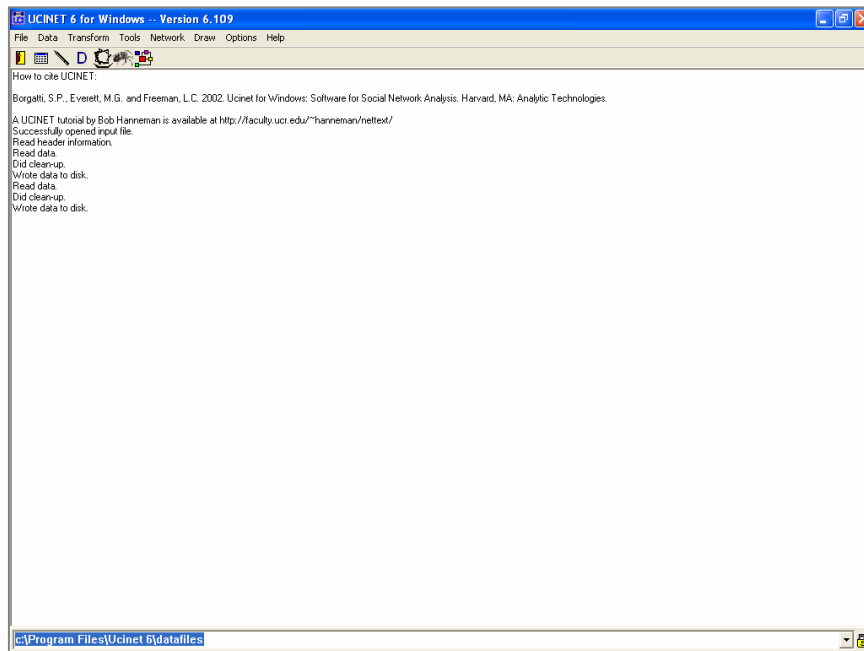
UCINET Basics

- Official User's Guide of UCINET
 - http://www.analytictech.com/Ucinet_Guide.doc
- Official UCINET Tutorial
 - <http://faculty.ucr.edu/~hanneman/nettext/>
- Help in UCINET
 - Help > Help Topics
 - Contents: Introduction Section, DL, and Standard Datasets.
 - Index: search by keywords.



The UCINET Environment (I)

- Main window
 - File, Data, Transform, Tools, Network, Options, and Help.





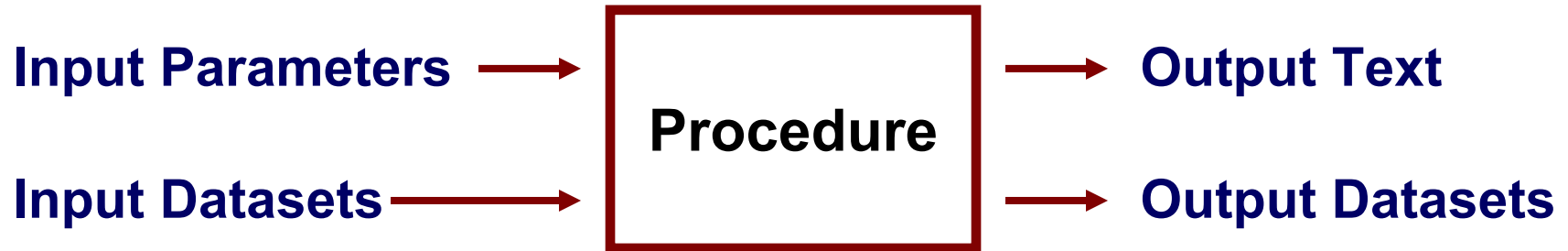
The UCINET Environment (II)

- The UCINET dataset
 - One dataset consists of Two files.
 - File with extension `##D`: actual data.
 - File with ext. `##H`: information about the data.
 - In referring to a dataset, refer to the `.##H` file.



The UCINET Environment (III)

- A typical UCINET procedure



- Output text in Log Files
 - **File>View Previous Output...**

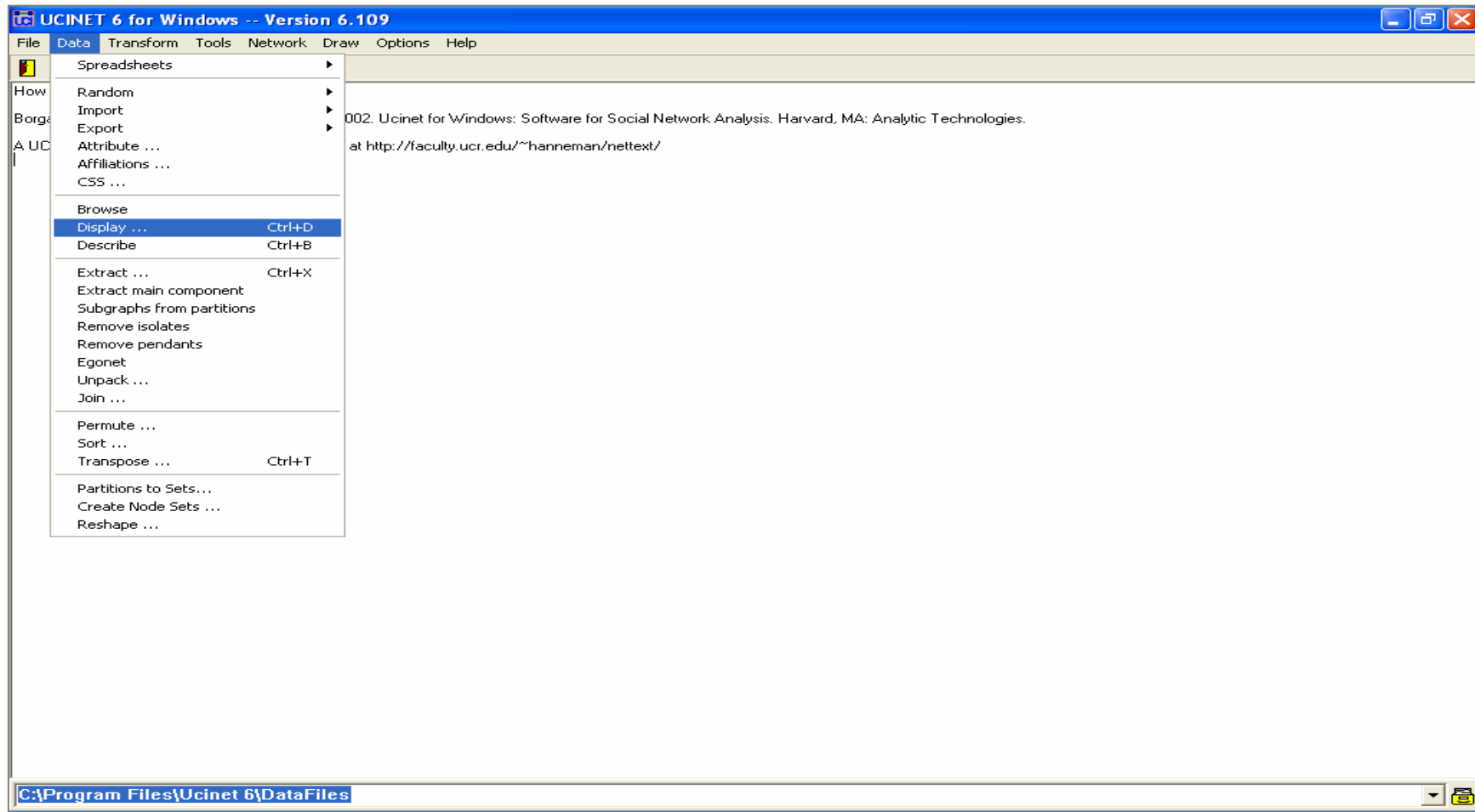


A Quick Demo

- Dataset: KNOKBUR (.###H & .###D)
- 10 organizations and two relationships.
 - Directed graph.
 - Money exchange in one matrix, and information exchange in the other.
 - See Knoke & Kuklinski (1982) for details.

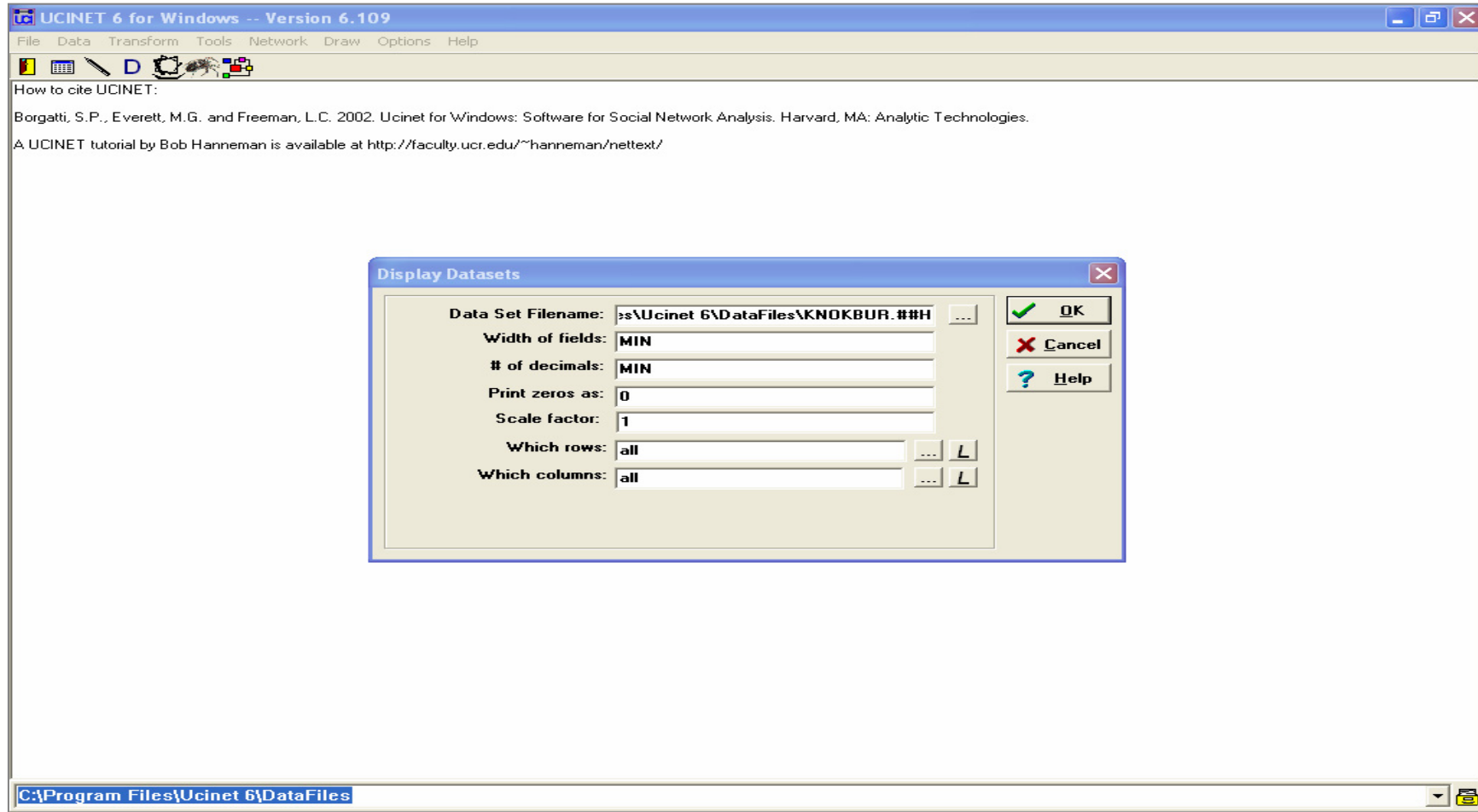


Main window: Data>Display...





Data Set Filename: KNOKBUR.##H





Output log #1

```
Output Log #1
File Edit
Log File Number 1
-----
DISPLAY
Width of field:          MIN
# of decimals:          MIN
Rows to display:        all
Columns to display:     all
Row partition:
Column partition:
Input dataset:          C:\Program Files\Ucinet 6\DataFiles\KNOKEBUR

Matrix #1: KNOKI
      1 2 3 4 5 6 7 8 9 0
      C C E I M W N U W W
-----
 1  0 1 0 0 1 0 1 0 1 0
 2  1 0 1 1 1 0 1 1 1 0
 3  0 1 0 1 1 1 1 0 0 1
 4  1 1 0 0 1 0 1 0 0 0
 5  1 1 1 1 0 0 1 1 1 1
 6  0 0 1 0 0 0 1 0 1 0
 7  0 1 0 1 1 0 0 0 0 0
 8  1 1 0 1 1 0 1 0 1 0
 9  0 1 0 0 1 0 1 0 0 0
10  1 1 1 0 1 0 1 0 0 0

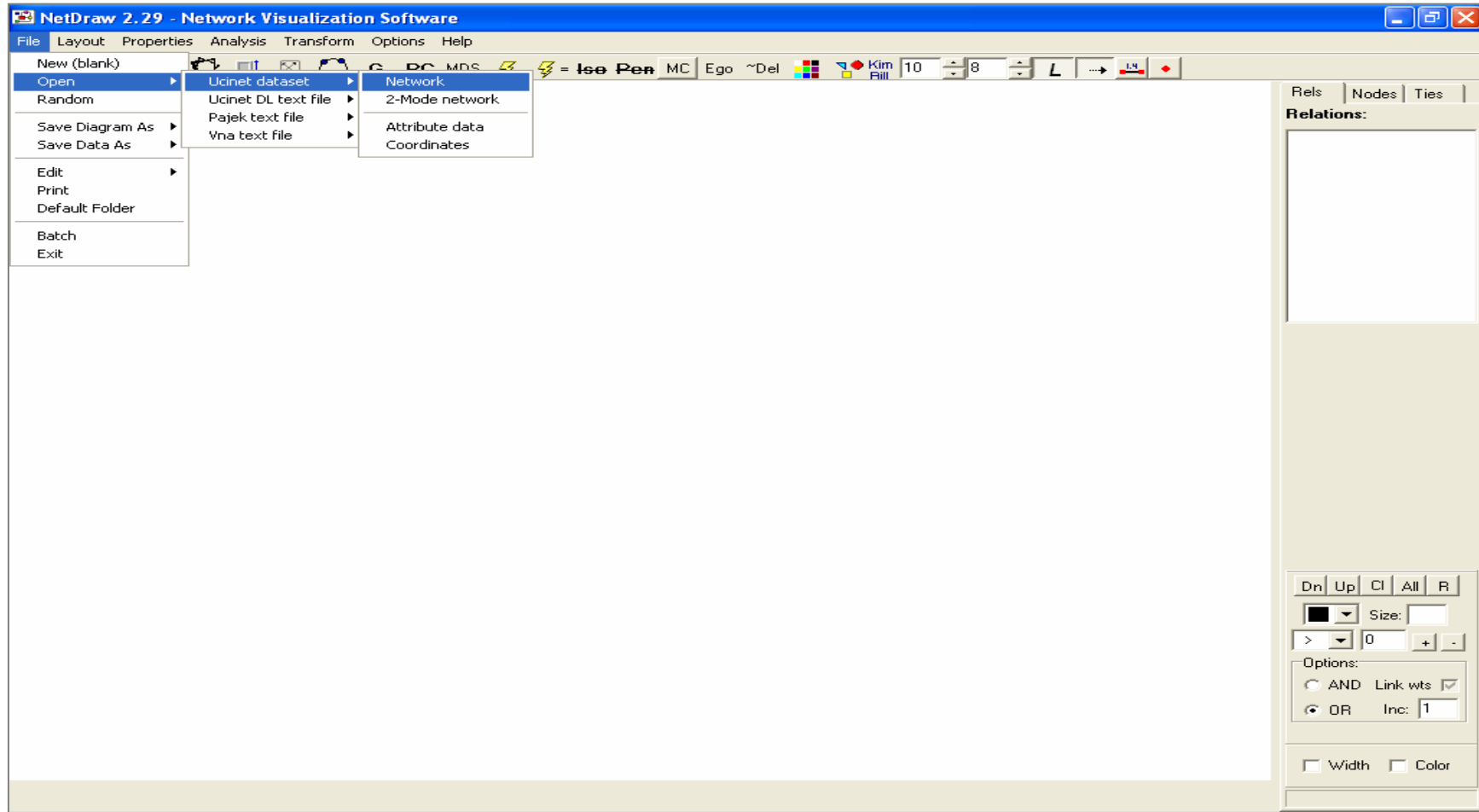
-----

Matrix #2: KNOKM
      1 2 3 4 5 6 7 8 9 0
      C C E I M W N U W W
-----
 1  0 0 1 0 1 0 0 1 1 1
 2  0 0 1 0 0 0 0 0 0 0
 3  0 0 0 0 0 0 0 1 0 0
 4  0 1 1 0 0 0 1 1 1 0
 5  0 1 1 0 0 0 0 1 1 0
 6  0 0 0 0 0 0 0 0 0 0
 7  0 1 0 0 0 0 0 1 0 0
 8  0 0 0 0 0 0 0 0 1 1
 9  0 0 1 0 0 0 0 1 0 0
10  0 0 0 0 0 0 0 0 0 0
```



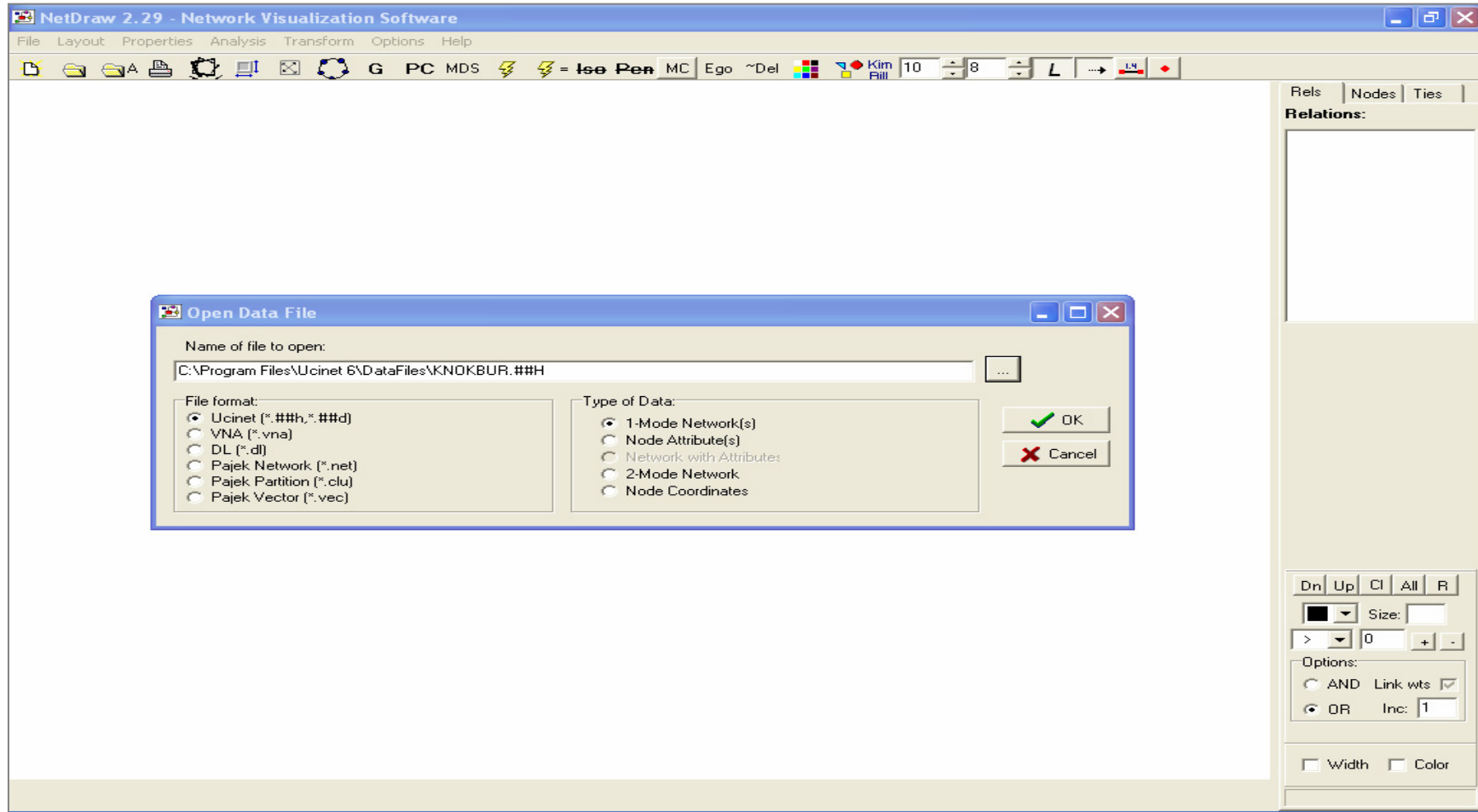
Main window: Draw

File>Open>Ucinet dataset>Network



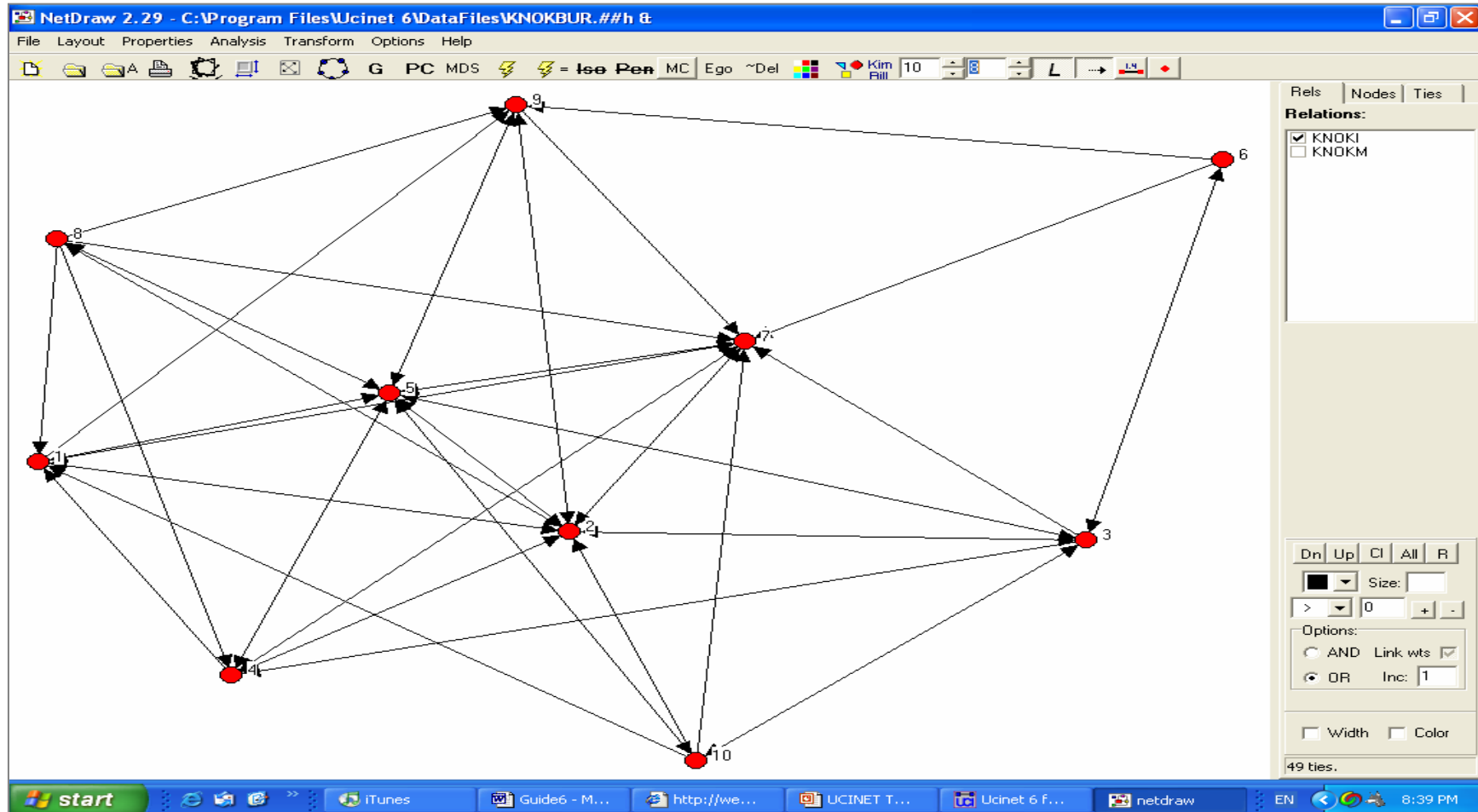


Name of file to open: KNOKBUR.##H



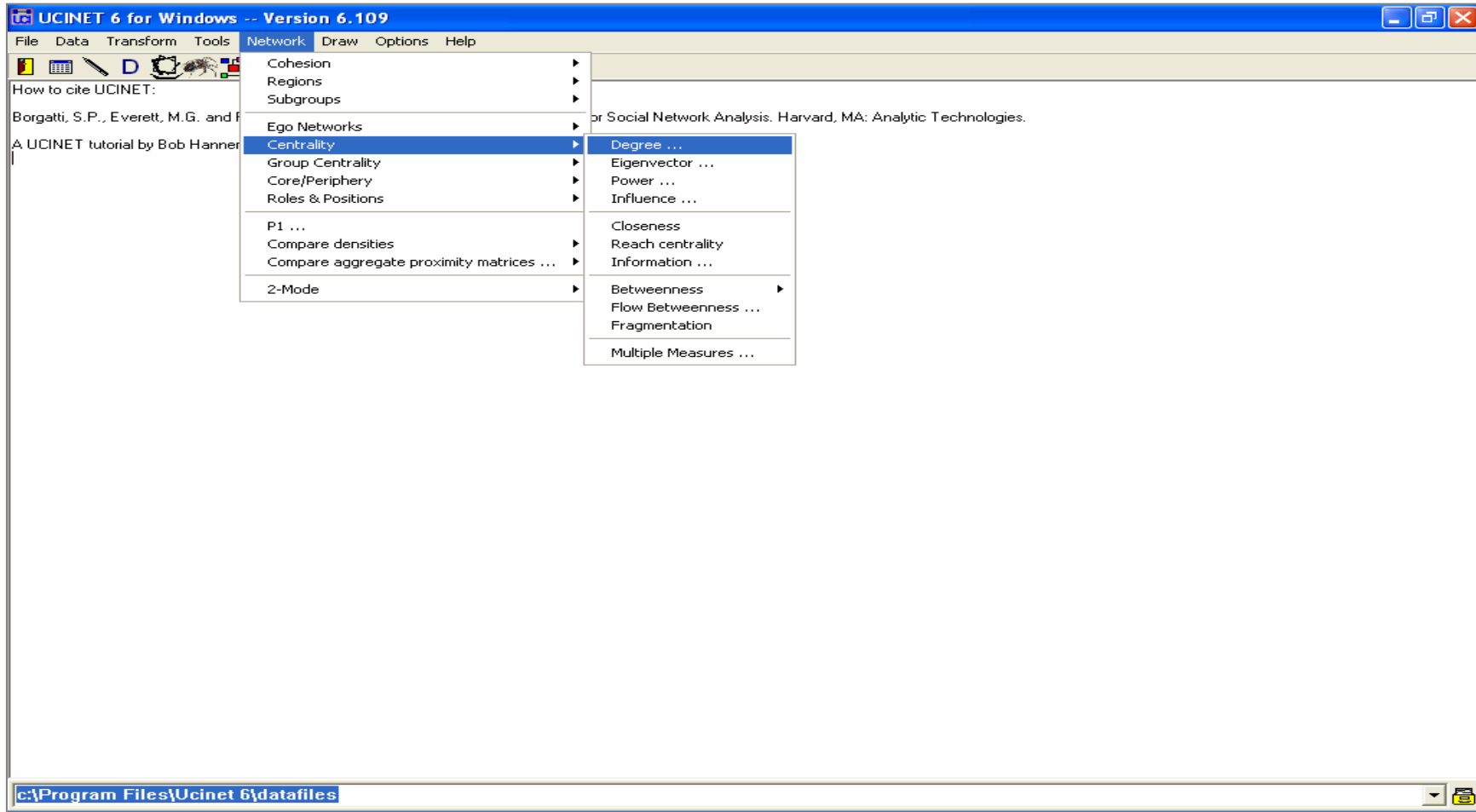


Graph representation of the network



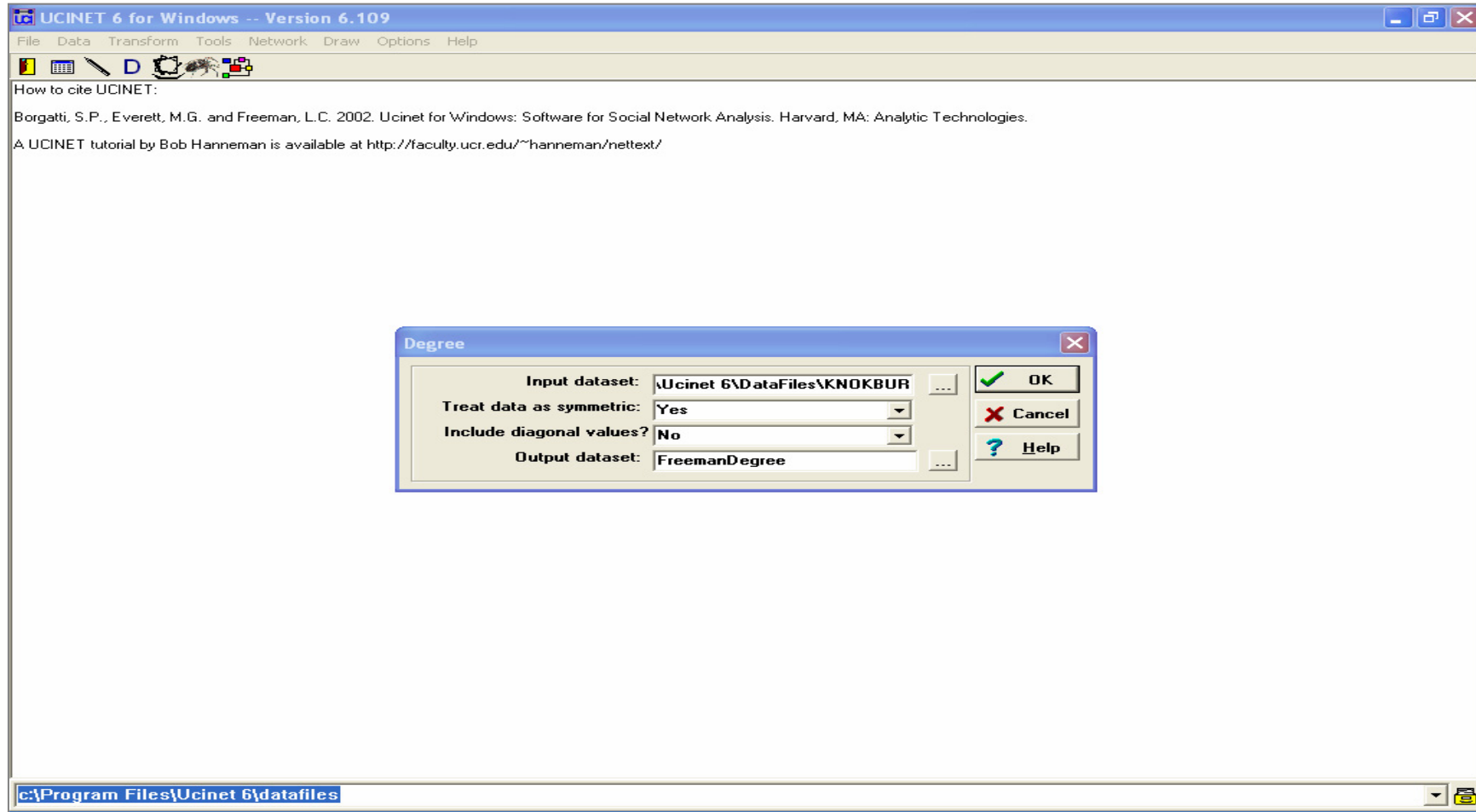


Main window: Network>Centrality>Degree...





Input dataset: KNOKBUR.##H





Output log #2

Output Log #1

File Edit

Log File Number 1

FREEMAN'S DEGREE CENTRALITY MEASURES

Diagonal valid? NO
Model: ASYMMETRIC
Input dataset: C:\Program Files\Ucinet 6\DataFiles\KNOKEBUR

Relation 1: KNOKI

	1 OutDegree	2 InDegree	3 NrmOutDeg	4 NrmInDeg
1	4.000	5.000	44.444	55.556
2	7.000	8.000	77.778	88.889
3	6.000	4.000	66.667	44.444
4	4.000	5.000	44.444	55.556
5	8.000	8.000	88.889	88.889
6	3.000	1.000	33.333	11.111
7	3.000	9.000	33.333	100.000
8	6.000	2.000	66.667	22.222
9	3.000	5.000	33.333	55.556
10	5.000	2.000	55.556	22.222

DESCRIPTIVE STATISTICS

	1 OutDegree	2 InDegree	3 NrmOutDeg	4 NrmInDeg
1 Mean	4.900	4.900	54.444	54.444
2 Std Dev	1.700	2.625	18.889	29.165
3 Sum	49.000	49.000	544.444	544.444
4 Variance	2.890	6.890	356.790	850.617
5 SSQ	269.000	309.000	33209.875	38148.148
6 MCSSQ	28.900	68.900	3567.901	8506.173
7 Euc Norm	16.401	17.578	182.236	195.316
8 Minimum	3.000	1.000	33.333	11.111
9 Maximum	8.000	9.000	88.889	100.000

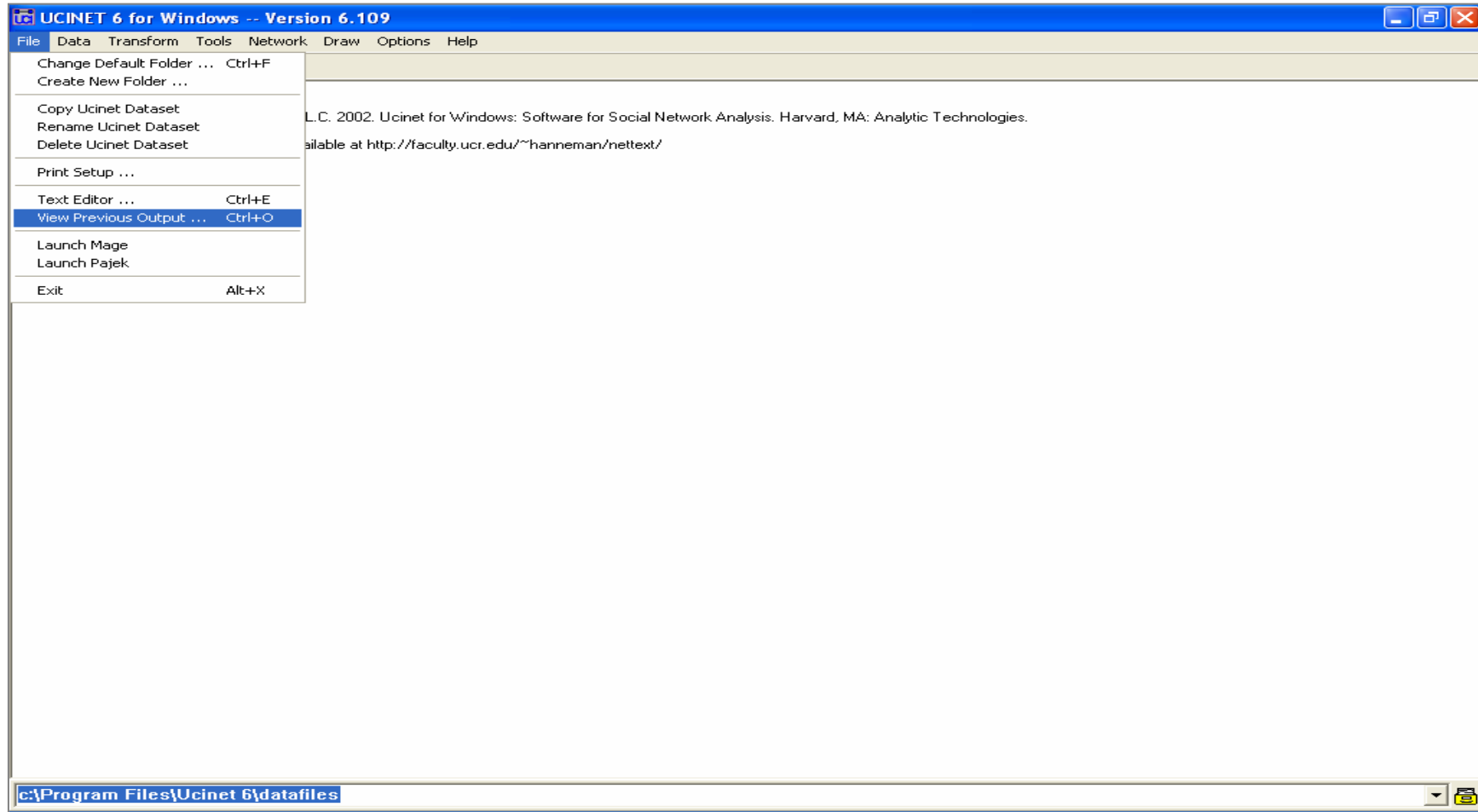
Network Centralization (Outdegree) = 38.272%
Network Centralization (Indegree) = 50.617%

Relation 2: KNOKM

	1 OutDegree	2 InDegree	3 NrmOutDeg	4 NrmInDeg
--	----------------	---------------	----------------	---------------

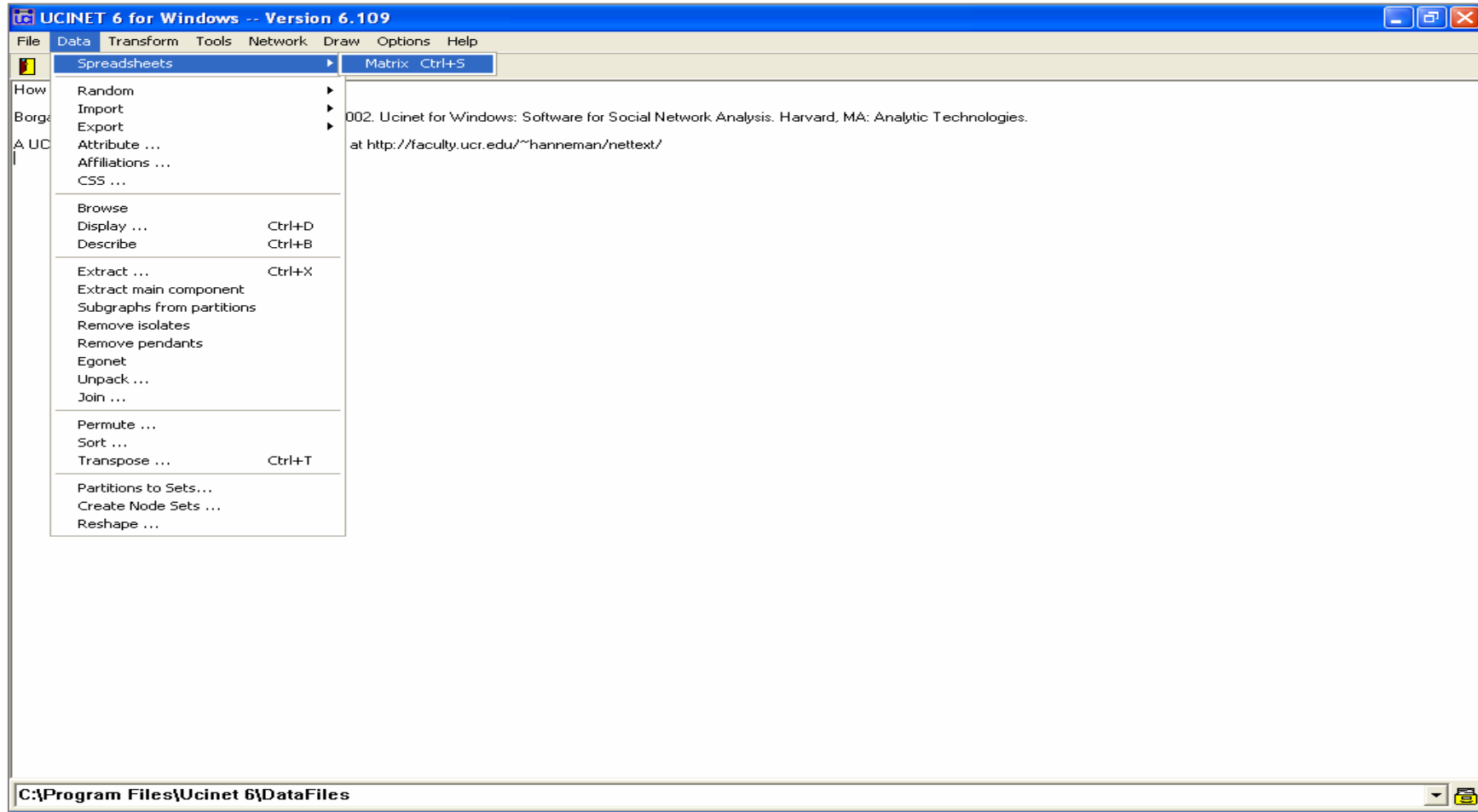


Main window: File>View Previous Output...



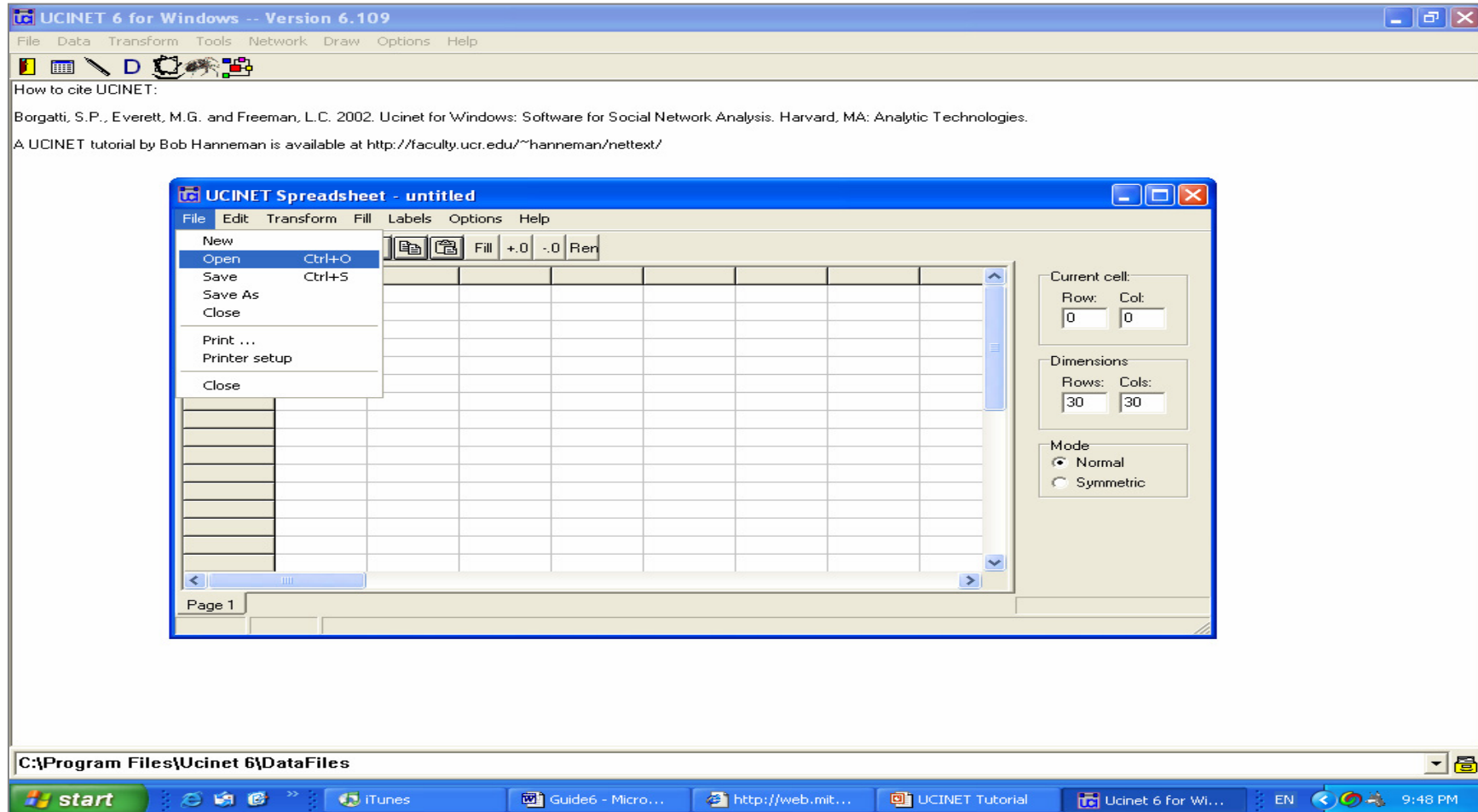


Main window: Data>Spreadsheets>Matrix





UCINET Spreadsheet: File>Open>FreemanDegree.###h





Spreadsheet of FreemanDegree.##h

UCINET Spreadsheet - C:\Program Files\Ucinet 6\DataFiles\FreemanDegree.##h

File Edit Transform Fill Labels Options Help

File Edit Transform Fill Labels Options Help

	OutDeg...	InDegree	NrmOut...	NrmlnDeg
1	4	5	44.44444 27490234	55.55555 72509766
2	7	8	77.77777 86254883	88.88888 54980469
3	6	4	66.66666 41235352	44.44444 27490234
4	4	5	44.44444 27490234	55.55555 72509766
5	8	8	88.88888 54980469	88.88888 54980469
6	3	1	33.33333 20617676	11.11111 06872559
7	3	9	33.33333 20617676	100
8	6	2	66.66666 41235352	22.22222 13745117
9	3	5	33.33333 20617676	55.55555 72509766
10	5	2	55.55555 72509766	22.22222 13745117

Current cell:
Row: Col:
0 0

Dimensions:
Rows: Cols:
10 4

Mode:
 Normal
 Symmetric

KNOKI KNOKM

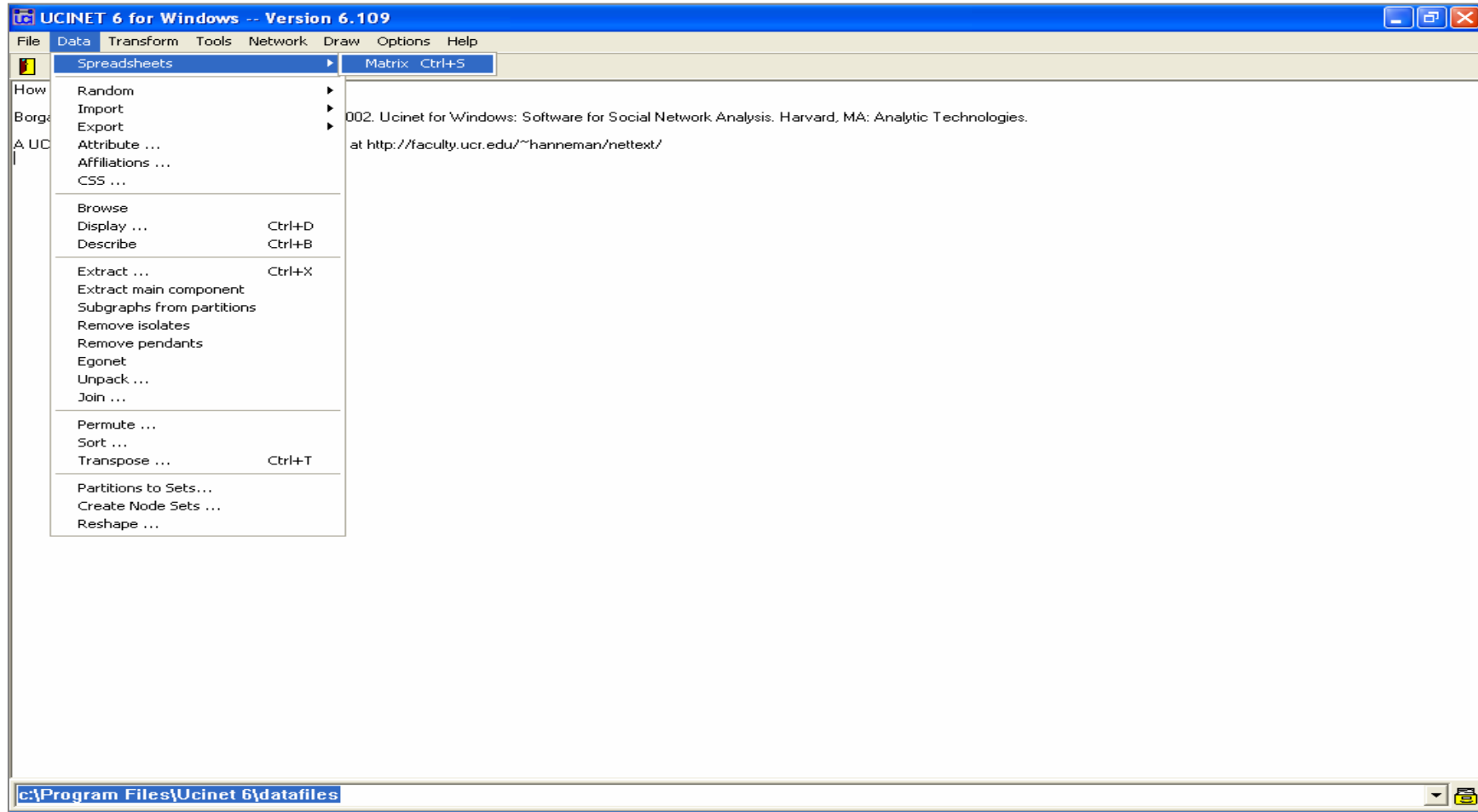


Import Data

- UCINET spreadsheet
 - Adjacency matrix
 - Manually input data or *cut and paste* from elsewhere
- From Excel file
- DL format
 - Full matrix & rectangular matrix
 - Multiple matrices
 - nodelist1 & nodelist2
 - ranklist1
 - edgelist1 & edgelist2
- More information about DL language
 - Main window: Help>Help Topics>Contents>DL



UCINET spreadsheet Data>Spreadsheets>Matrix





Manually Input Adjacency Matrix

The screenshot displays the UCINET 6 for Windows software interface. The main window is titled "UCINET 6 for Windows -- Version 6.109" and contains a menu bar (File, Data, Transform, Tools, Network, Draw, Options, Help) and a toolbar. Below the toolbar, there is a text area with the following content:

How to cite UCINET:
Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.
A UCINET tutorial by Bob Hanneman is available at <http://faculty.ucr.edu/~hanneman/nettext/>

Overlaid on this is a smaller window titled "UCINET Spreadsheet - untitled". This window has its own menu bar (File, Edit, Transform, Fill, Labels, Options, Help) and a toolbar with icons for file operations and data manipulation. The main area of this window is a spreadsheet grid. To the right of the grid is a control panel with the following settings:

- Current cell: Row: 0, Col: 0
- Dimensions: Rows: 30, Cols: 30
- Mode: Normal, Symmetric

The status bar at the bottom of the UCINET Spreadsheet window shows "Page 1". The taskbar at the bottom of the main UCINET window shows the file path "c:\Program Files\Ucinet 6\datafiles".

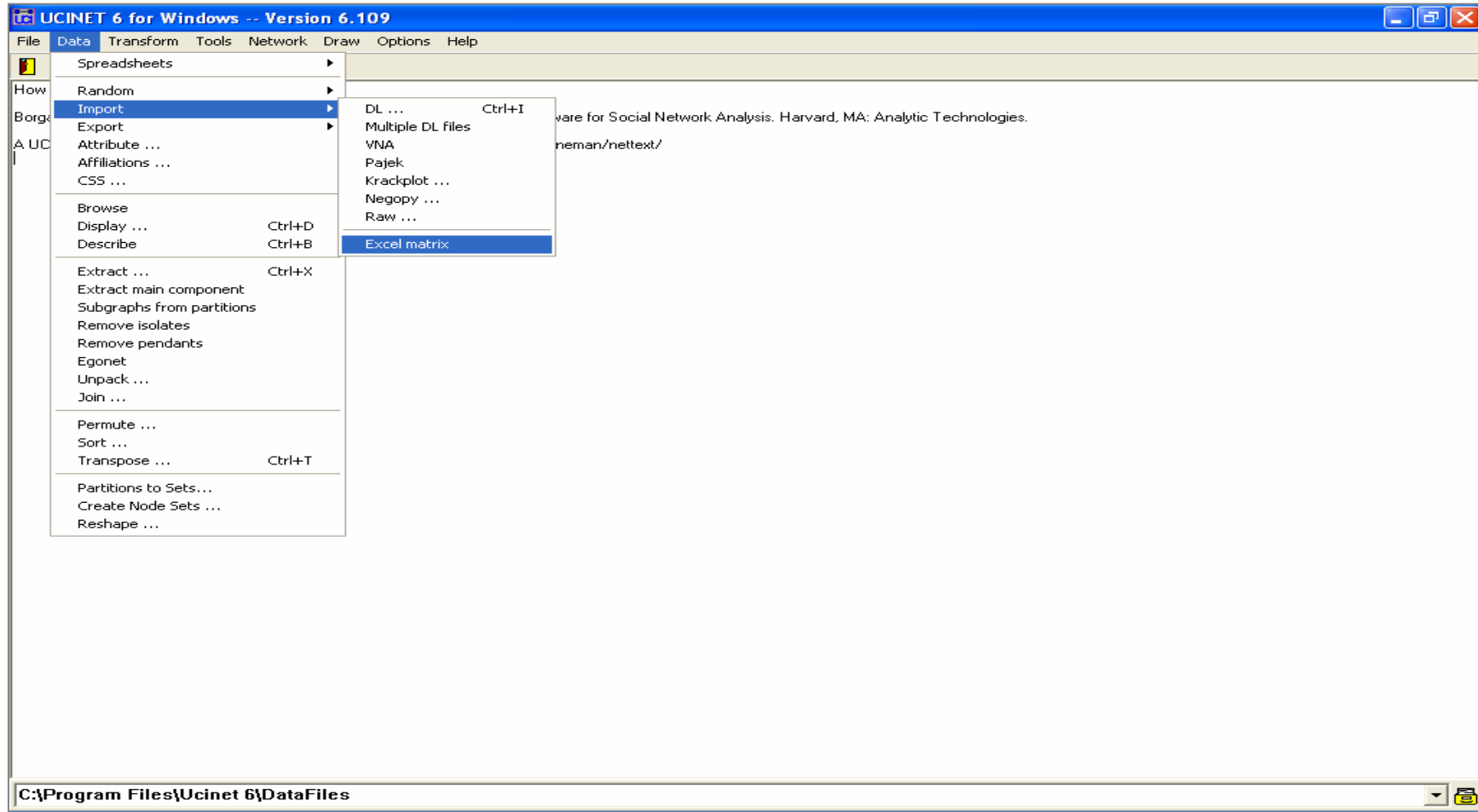


Import Adjacency Matrix from an Excel File

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	KNOKM	COUN	COMM	EDUC	INDU	MAYR	WRO	NEWS	UWAY	WELF	WEST				
2	1	0	0	1	0	1	0	0	1	1	1				
3	2	0	0	1	0	0	0	0	0	0	0				
4	3	0	0	0	0	0	0	0	1	0	0				
5	4	0	1	1	0	0	0	1	1	1	0				
6	5	0	1	1	0	0	0	0	1	1	0				
7	6	0	0	0	0	0	0	0	0	0	0				
8	7	0	1	0	0	0	0	0	1	0	0				
9	8	0	0	0	0	0	0	0	0	1	1				
10	9	0	0	1	0	0	0	0	1	0	0				
11	10	0	0	0	0	0	0	0	0	0	0				
12															
13															
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35															



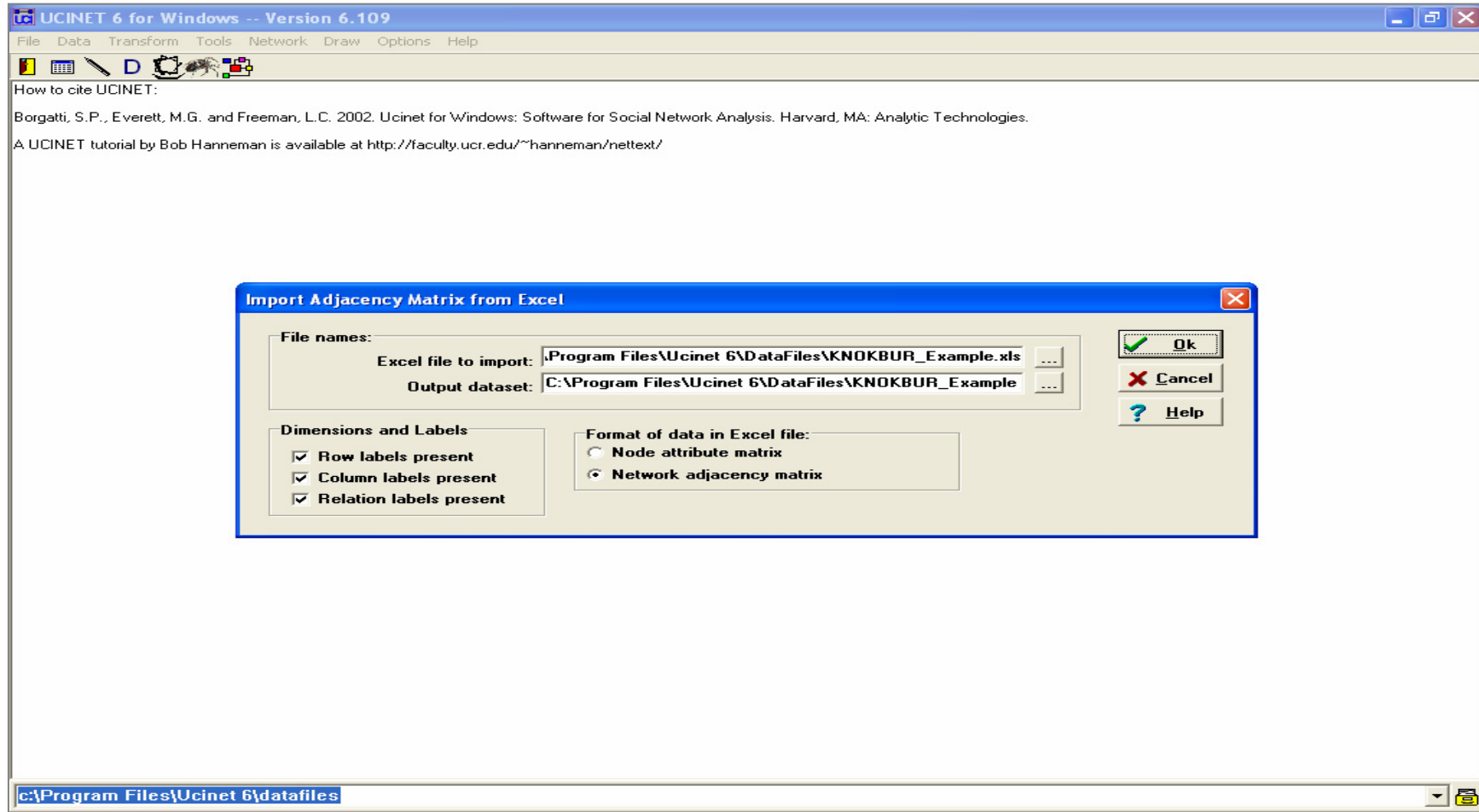
Data>Import>Excel matrix





Excel file to import: KNOKBUR_Example.xls

Output dataset: KNOKBUR_Example





DL Format: Full Matrix

- **Full Matrix Format**

```
dl n=4 format=fullmatrix
```

```
data:
```

```
0 1 1 0
```

```
1 0 1 1
```

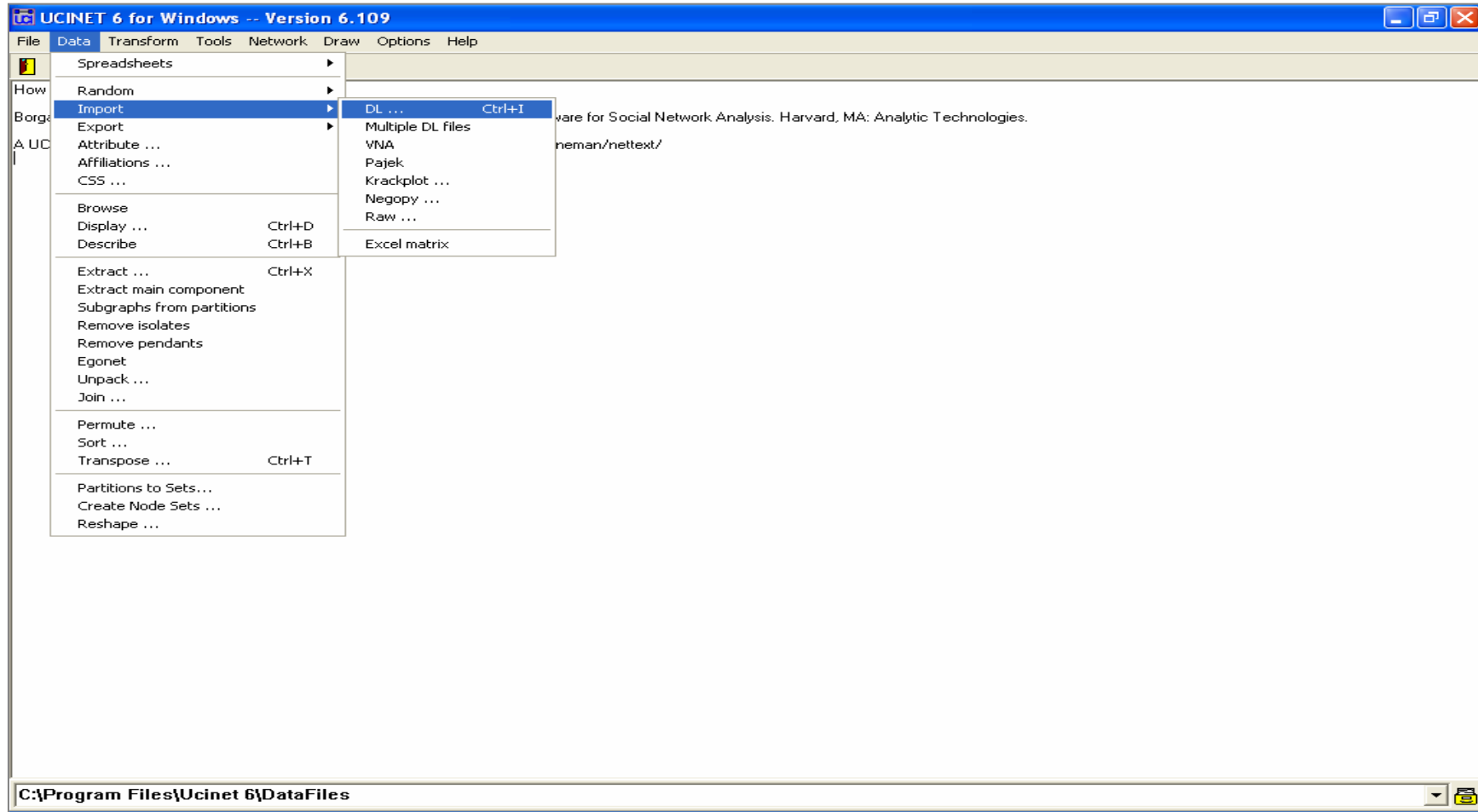
```
1 1 0 0
```

```
0 1 0 0
```

- **Save it as a text file (e.g. TEST.txt).**



Data>Import>DL...





DL Format: Rectangular Matrices

dl nr = 6, nc = 4

data:

0 1 1 0

1 0 1 1

1 1 0 0

0 1 0 0

1 0 1 1

1 1 0 0



DL Format: Labels

- DL file may contain labels of the nodes

```
dl n=4
```

```
labels:
```

```
MIT, "MIT ESD", MIT.ESD.342, ESD_Students
```

```
data:
```

```
0 1 1 0
```

```
1 0 1 1
```

```
1 1 0 0
```

```
0 1 0 0
```



DL Format: Multiple Matrices

dl n = 4, nm = 2

labels:

GroupA, GroupB, GroupC, GroupD

matrix labels:

Marriage, Business

data:

0 1 0 1

1 0 0 0

0 0 1 0

1 0 0 1

!

0 1 1 1

1 0 0 0

1 0 0 1

1 0 1 0



DL Format: External Data

- Data file can be read from other sources

dl n = 8

labels:

a1,a2,a3,a4,a5,a6,a7,a8

datafile C:\DATA\External_Data.DAT



DL Format: nodelist1 (I)

dl n = 4, format = nodelist1

labels:

A,B,C,D

data:

1 2 3

2 1 3 4

3 1 2

4 2

Resulting Matrix =>

	A	B	C	D
A	0	1	1	0
B	1	0	1	1
C	1	1	0	0
D	0	1	0	0



DL Format: nodelist1 (II)

dl n = 4, format = nodelist1

labels:

A,B,C,D

data:

1 2 3

2 1 3

2 4

3 1 2

4 2

Resulting Matrix =>

	A	B	C	D
A	0	1	1	0
B	1	0	1	1
C	1	1	0	0
D	0	1	0	0



DL Format: nodelist1 (III)

dl n = 4, format = nodelist1

labels embedded

data:

A B C

B A C D

C A B

D B

Resulting Matrix =>

	A	B	C	D
A	0	1	1	0
B	1	0	1	1
C	1	1	0	0
D	0	1	0	0



DL Format: nodelist2

dl nr=3, nc=4 format = nodelist2

row labels embedded

column labels embedded

data:

GP1 A B

GP2 C D

GP3 A D

Resulting Matrix =>

	A	B	C	D
GP1	1	1	0	0
GP2	0	0	1	1
GP3	1	0	0	1



DL Format: ranklist1

dl n=4 format = ranklist1

labels embedded

data:

A B C

B C D A

C A B D

D A C

Resulting Matrix =>

	A	B	C	D
A	0	1	2	0
B	3	0	1	2
C	1	2	0	3
D	1	0	2	0



DL Format: edgelist1

dl n=4 format = edgelist1

labels:

A,B,C,D

data:

1 2 1
1 3 2
2 1 1
2 3 1
2 4
3 1 1
3 2 na
4 2 5.2

Resulting Matrix =>

	A	B	C	D
A	0	1	2	0
B	1	0	1	1
C	1		0	0
D	0	5.2	0	0



DL Format: edgelist2

dl nr=3 nc=5, format = edgelist2

labels embedded:

data:

A1 B1 1

A1 B2 1.5

A1 B3 2

A2 B1 1

A3 B2 3

A3 B4 2

A3 B5 1

Resulting Matrix =>

	B1	B2	B3	B4	B5
A1	1	1.5	2	0	0
A2	1	0	0	0	0
A3	0	3	0	2	1

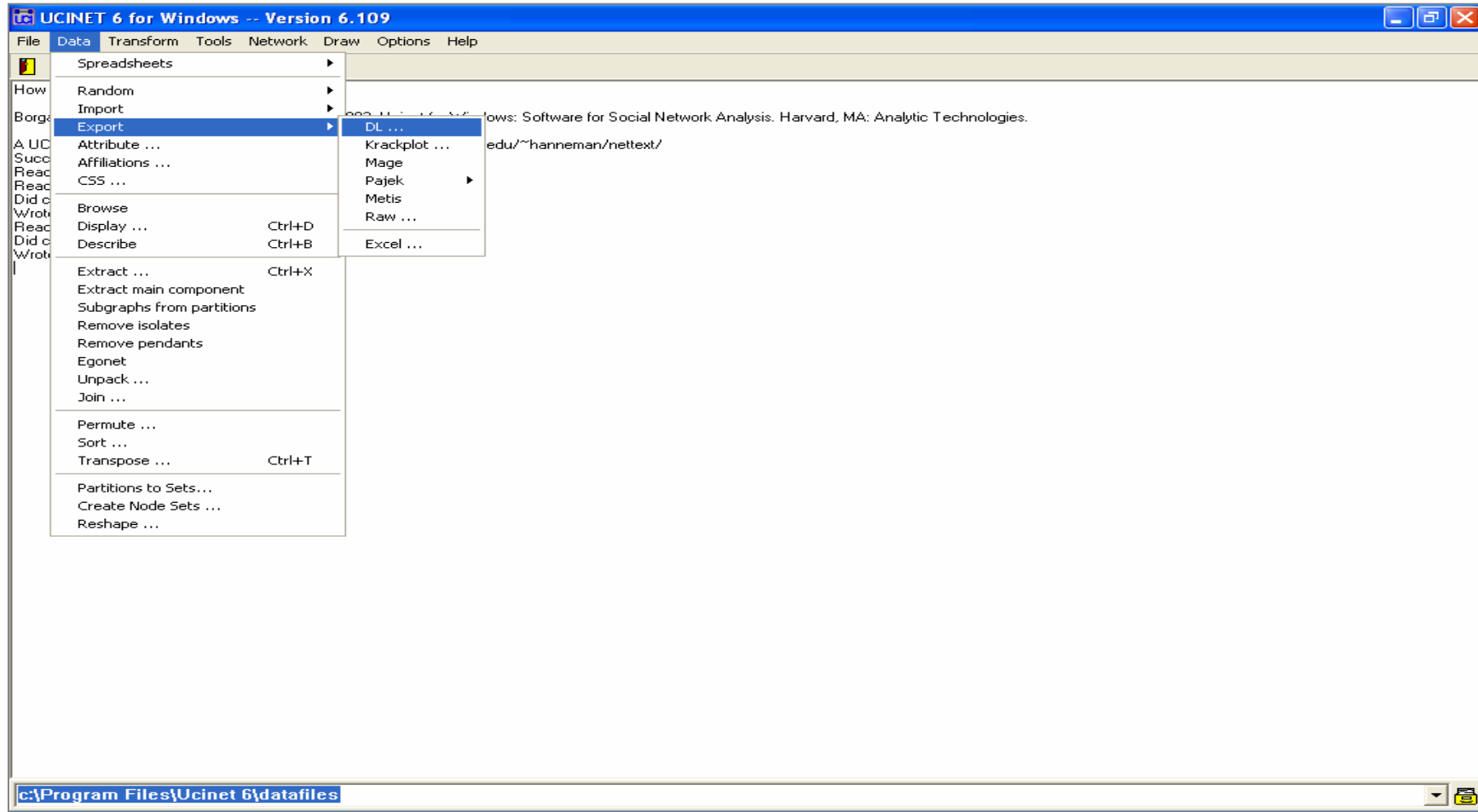


Export Data

- Export UCINET dataset to
 - Excel file
 - Number of columns < 257
 - DL format
 - Easy to do *cut and paste*
 - *Example: Cut and paste as a Matlab data file.*
 - Other format



Export Dataset Data>Export>DL...





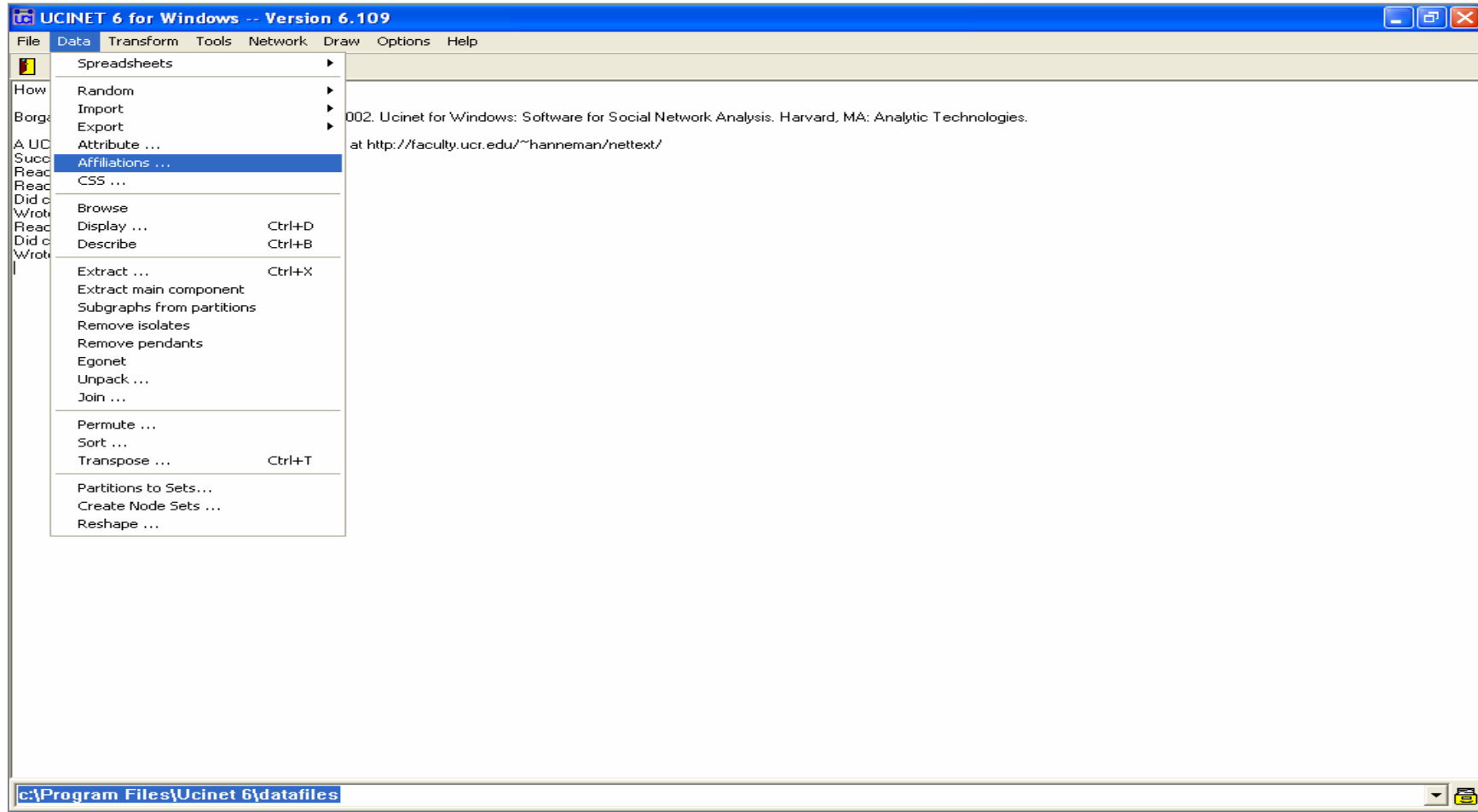
Data Processing

- Most of the data processing functions are in **Data** and **Transform** submenus.
- Some useful functions
 - Data>Affiliations...
 - Data>Extract...
 - Data>Remove isolates
 - Data>Join...
 - Data>Permute...
 - Data>Transpose...



Data Processing

Data > Affiliations...





Convert 2-mode data to 1-mode

The screenshot shows the UCINET 6 for Windows software interface. The main window title is "UCINET 6 for Windows -- Version 6.109". The menu bar includes "File", "Data", "Transform", "Tools", "Network", "Draw", "Options", and "Help". The main text area contains the following information:

How to cite UCINET:
Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.
A UCINET tutorial by Bob Hanneman is available at <http://faculty.ucr.edu/~hanneman/nettext/>
Successfully opened input file.
Read header information.
Read data.
Did clean-up.
Wrote data to disk.
Read data.
Did clean-up.
Wrote data to disk.

The "Affiliations (convert 2-mode data to 1-mode)" dialog box is open, showing the following settings:

- Input dataset: [Empty field]
- Which mode: Row
- Method: Cross-Products (co-occurrence)
- Normalization: None
- Output dataset: Affiliations

The dialog box includes "OK", "Cancel", and "Help" buttons. The status bar at the bottom of the window shows the file path: "c:\Program Files\Ucinet 6\datafiles".



Data Processing

Data>Extract...

The screenshot shows the UCINET 6 for Windows software interface. The main window title is "UCINET 6 for Windows -- Version 6.109". The menu bar includes File, Data, Transform, Tools, Network, Draw, Options, and Help. The toolbar contains icons for file operations and network analysis. The main text area displays the following content:

How to cite UCINET:
Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.
A UCINET tutorial by Bob Hanneman is available at <http://faculty.ucr.edu/~hanneman/nettext/>
Successfully opened input file.
Read header information.
Read data.
Did clean-up.
Wrote data to disk.
Read data.
Did clean-up.
Wrote data to disk.

The "Extract SubMatrix" dialog box is open, showing the following settings:

- Input dataset: [Empty field]
- Keep or Delete: Keep
- Which rows: ALL
- Which columns: ALL
- Which matrices: ALL
- Output dataset: Extract

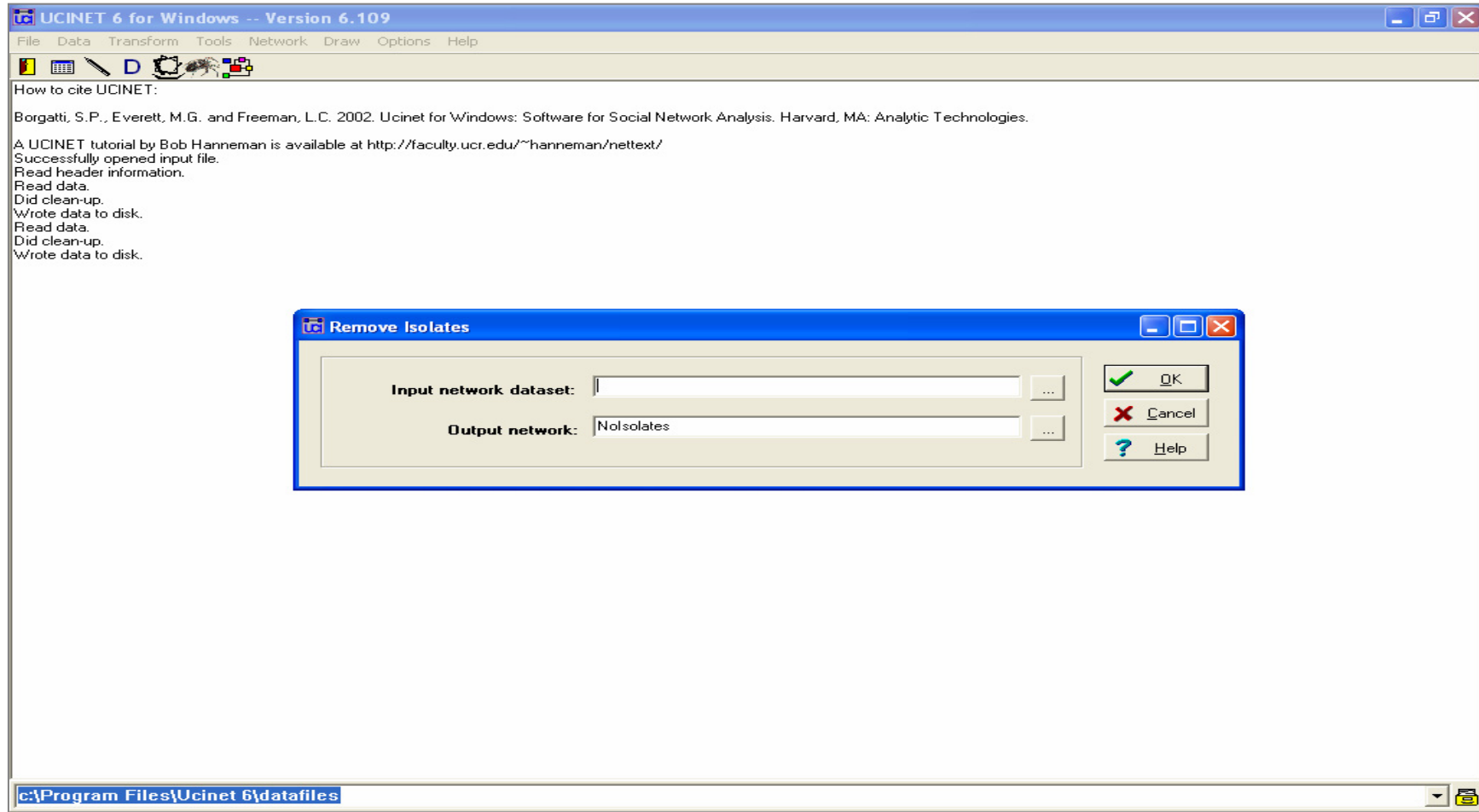
The dialog box also includes buttons for OK, Cancel, and Help.

The status bar at the bottom of the window shows the file path: c:\Program Files\Ucinet 6\datafiles



Data Processing

Data>Remove isolates





Data Processing

Data>Join...

UCINET 6 for Windows -- Version 6.109

File Data Transform Tools Network Draw Options Help

How to cite UCINET:
Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.
A UCINET tutorial by Bob Hanneman is available at <http://faculty.ucr.edu/~hanneman/nettext/>
Successfully opened input file.
Read header information.
Read data.
Did clean-up.
Wrote data to disk.
Read data.
Did clean-up.
Wrote data to disk.

Join

c: [hp_pavilion]

c:\
Program Files
Ucinet 6
datafiles
Attribute

Possible Files:
almo incidence.###
BKFRAT.###
BKFHAM.###
BKOFF.###
BKTEC.###
borg4cent.###
Camp92.###
campatr2.###
campnet.###
carteryear1.###
carteryear4.###
CITIES.###
ClusterMetrics.###
Components Partition.###

Files selected:

Destination filename:
Joined

Dims to join:
 Rows
 Columns
 Matrices

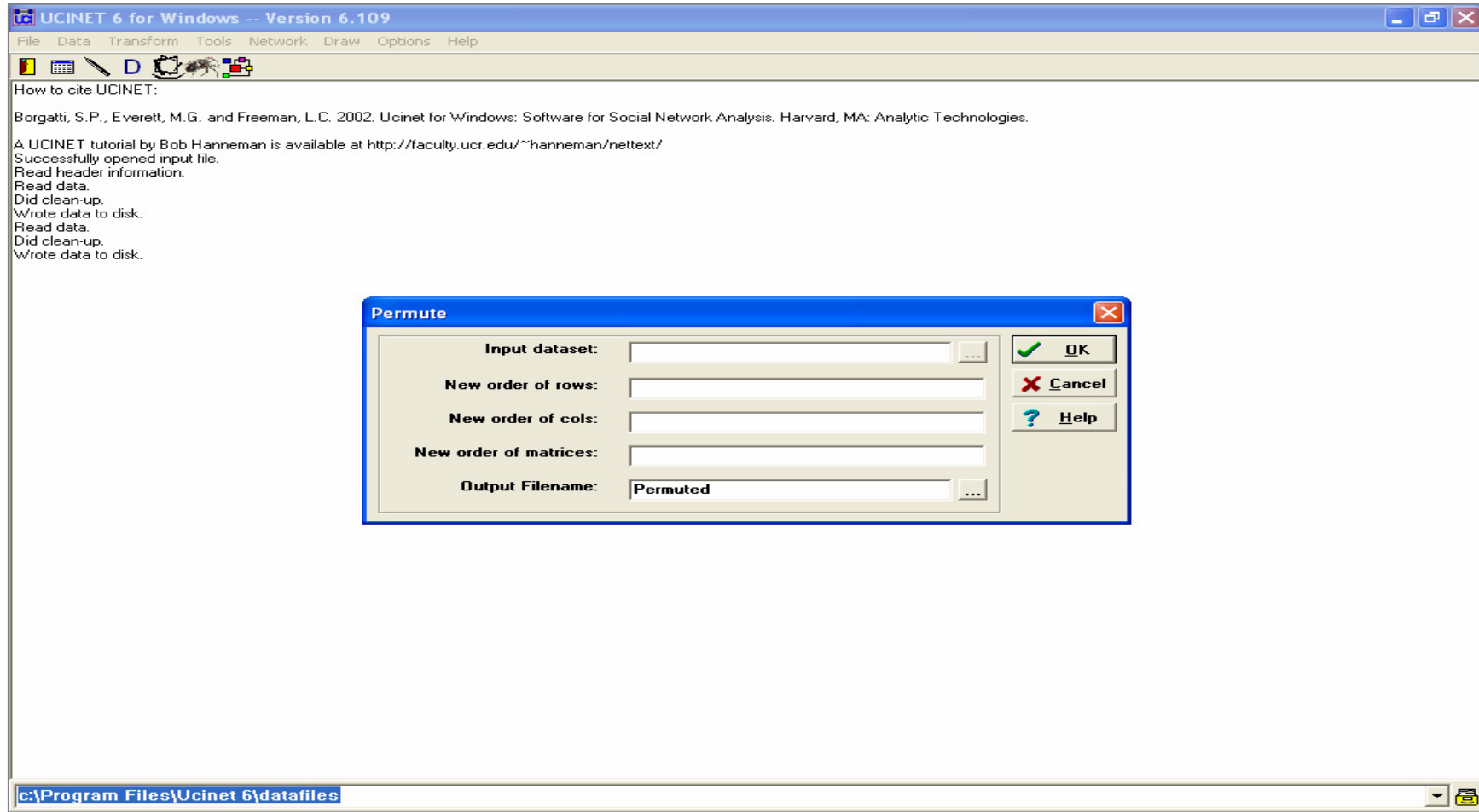
OK
Cancel
Help

c:\Program Files\Ucinet 6\datafiles



Data Processing

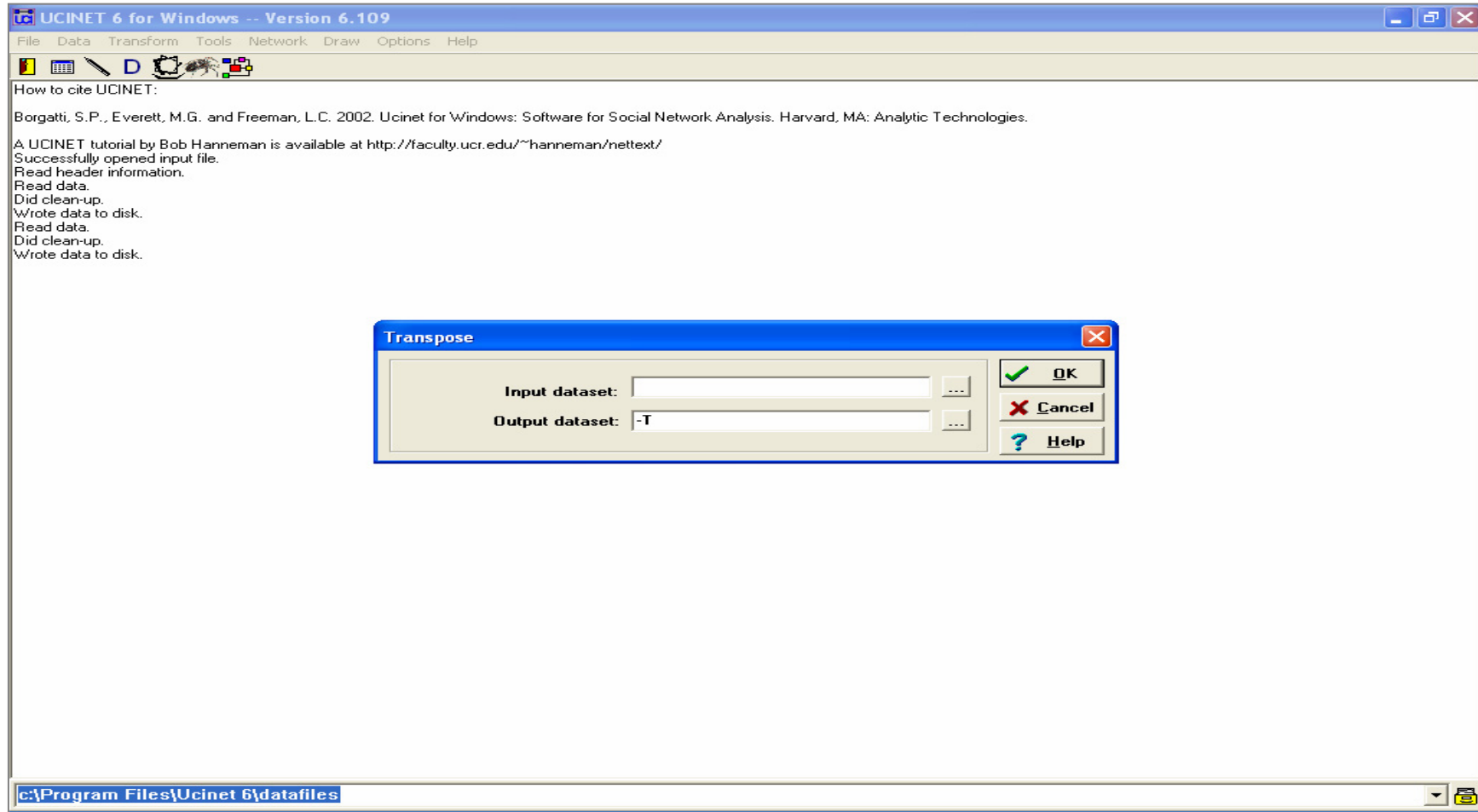
Data>Permute...





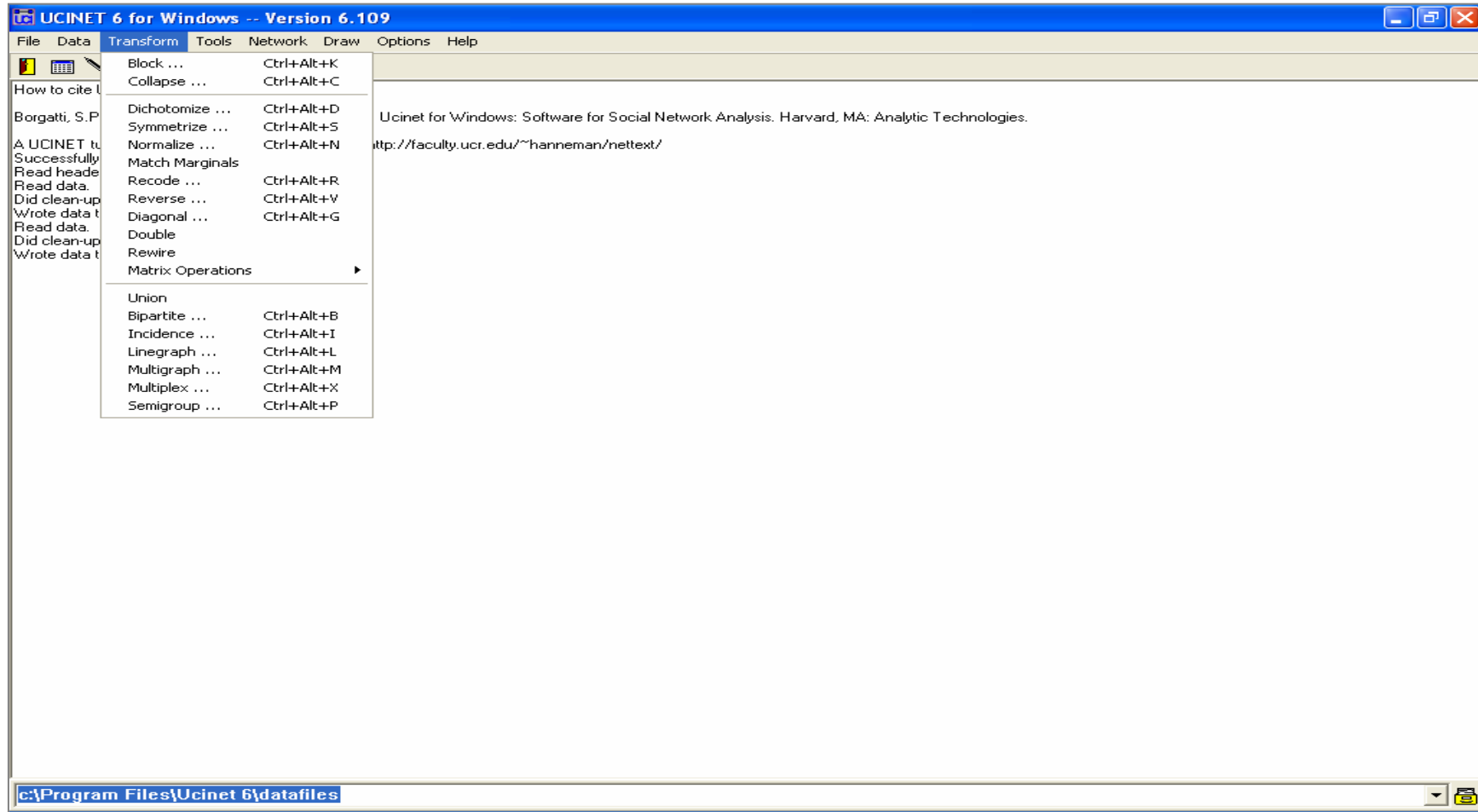
Data Processing

Data > Transpose...





Main window: Transform





Tips of Using UCINET

- Before using an UCINET function
 - Check it out in Help>Help Topics>Index
 - *Purpose, Description, Parameters, Log File, Timing, Comments, and References.*
 - Timing is sometimes important
 - Function with $O(N^3)$ can be a problem for networks with more than 1,000 nodes.
- Setup the following two directories before start working with the UCINET
 - File>Change Default Folder...
 - Options>Output folder



References

- Borgatti, Everett and Freeman, UCINET 6 for Windows: User's Guide. Harvard: Analytic Technologies.
- Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet 6 for Windows. Harvard: Analytic Technologies.