

2018 - 2019 Analyzing your affiliation networks at CUHK

There were 78 students who played the affiliation network game, where there were 17 who provided their names but indicated that they had not joined any of the societies/organizations.

Total Number of joined student societies/organizations	Number of Students
10	1
6	1
5	1
4	3
3	5
2	14
1	36
0	17

There are 104 student societies/organizations. The following are the top 16 student societies/organizations.

Societies/organizations	Number of Participants
Astronomy Club	7
Game and Chess Society	7
Animation & Comic Society	5
Mandarin Drama Team of CUHK	5
Three Heart Club	5
CUHK Bridge Club	4
Modern Dance Society	4
The Mahjong Study Society	4
AISEEC	3
CUHK Dragon Boat Club	3
Shaw Band	3
Society of Magic	3
崇基學生會 CCSU	3
逸夫學生會 SCSU	3
Mathematical Society	3
Computer Science Society	3

For the sake of simplicity, we used the numbers for labelling the 78 students, while we used English letters for labelling the 104 student societies/organizations. The matching list file is shown below:

A	AIESEC	AA	Modern Dance Society	BA	The Iaido and Japanese Swordsmanship Club	CA	逸夫學生會 SCSU
B	Air Cadets	AB	Morning Running Club	BB	The International Student Association of CUHK (ISA)	CB	新亞學生會 NASU
C	Animation & Comic Society	AC	Nano - NA Band Society	BC	The Japanese Culture Society	CC	聯合書院粵語辯論隊
D	Archery Club	AD	New Asia Drama Club	BD	The Mahjong Study Society	CD	聯合書院學生會幹事會
E	Astronomy Club, SU, CUHK	AE	New Asia Drama Club	BE	The Meteorological Society of CUHK	CE	普通话話劇社團
F	Campus YMCA of CUHK	AF	New Asia Kung Fu Society	BF	The New-Century Administration & Management Elite Society	CF	數學系系會
G	Chinese University Student Press	AG	Outdoor Activity Society	BG	The Shaw College Cinematography Society	CG	UC Math
H	Christian International Interchange Society	AH	Phoenix Water Polo Club	BH	The Society of Psychology Promotion	CH	IE engineering boys club
I	Chung Chi Drama Club	AI	ReadWhite	BI	The Wine Society	CI	The Computer Science Society
J	Cosmopolitan Society	AJ	Rock Climbing Club	BJ	The Martial Art Society of Chung Chi College	CJ	Rotaract Club of New Asia College
K	CU Grassroots Concern Group	AK	Rotaract Club of Chung Chi College	BK	Three Heart Club	CK	Central Asian Association
L	CUHK Bridge Club	AL	Rowing Club y	BL	United College Band Society	CL	新亞天文
M	CUHK Chung Chi Photography Society	AM	S.H. Ho Ving Tsun Society	BM	United College Choir	CM	CUHK Boardgame Society
N	CUHK Dragon Boat Club	AN	Sailing Club	BN	Youth Empact	CN	聯合書院學生會內地生聯合會
O	CUHK Student Union	AO	SCM Old Ghost Fellowship SCN	BO	Youth Literary Awards Association (YLAA)	CO	中華文化節
P	CUHK Chorus	AP	Shaw Band	BP	中大本土學社	CP	獨立時代電子雜誌社
Q	CUHK English Debate Team	AQ	Shaw Debate Team	BQ	中大國是學會	CQ	Statistics
R	Custore	AR	Shaw College Drama Club	BR	中大農業發展組	CR	Strategic Investment Society
S	Doujin Culture Society	AS	Society of Magic	BS	伍宜孫書院學生會 Wu Yee Sun College Student Union	CS	Mathematics Society, CUSU
T	Fellowship of Evangelical Students	AT	Softball Club	BT	吐露詩社 Tolopoem	CT	聯合書院學生會天文學會
U	Game and Chess Society	AU	Strategic Marketing Society	BU	和聲書院學生會 WSSU	CU	和聲 choir
V	Judo Club 柔道部	AV	The Band Society of Chung Chi College	BV	香港中文大學台灣學生會 CUHK TSA	CV	和甜
W	Karate Club	AW	The China Trade Society	BW	香港中文大學敬文書院學生會	CW	Korea Cultural Society
X	Mandarin Debate Team of CUHK	AX	The Chinese Martial Arts Society of United College	BX	崇基學生會 CCSU	CX	和聲扶青
Y	Mandarin Drama Team of CUHK	AY	The Chinese Medicine Promotion Society	BY	晨興書院學生會 The Student Union of Morningside College	CY	香港中文大學聯合書院工商管理學院院會
Z	Model United Nations Club	AZ	The Golden Z Club	BZ	善衡學生會幹事會	CZ	New Asia Chinese Music Society

Let us study a few figures using R:

1. Loading and configuring two-mode data

```
# This loads the igraph package
install.packages('igraph')
library(igraph)

# Use the following affiliation csv file "affiliation.csv"
# choose an adjacency matrix from a .csv file
dat=read.csv(file.choose(),header=TRUE,row.names=1,check.names=FALSE)

# coerces the data set into a matrix
m=as.matrix(dat)

# this will create an 'igraph object'
g=graph.adjacency(m,mode="undirected",weighted=NULL)
```

2. Use the bipartite.mapping() R function

```
bipartite.mapping(g)

#Add the "type" attribute to the network.
V(g)$type <- bipartite_mapping(g)$type
```

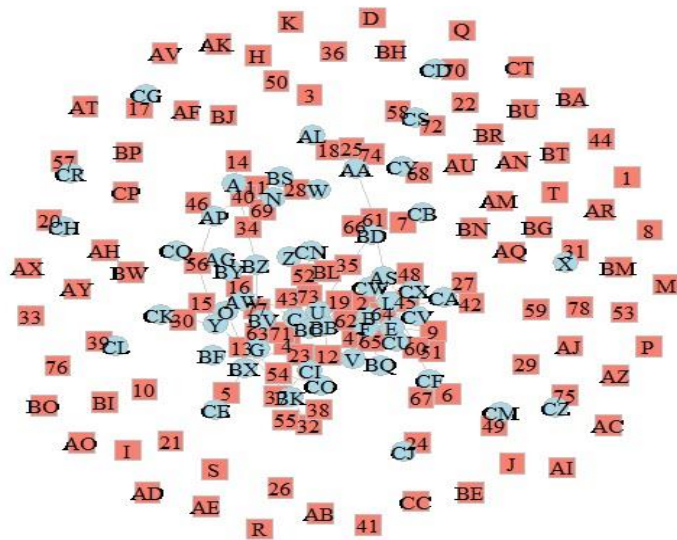
3. Plotting an affiliation (or a bipartite) network

```
V(g)$color <- ifelse(V(g)$type, "lightblue", "salmon")
V(g)$shape <- ifelse(V(g)$type, "circle", "square")
E(g)$color <- "lightgray"

V(g)$label.color <- "black"
V(g)$label.cex <- 1
V(g)$frame.color <- "gray"
V(g)$size <- 8

plot(g, layout = layout_with_graphopt)
```

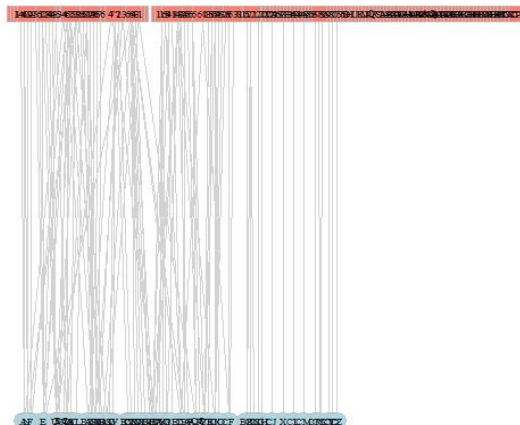
This figure shows that students and students' organizations cluster together at the center, while no connected nodes between students and students' organizations are located in the periphery of the figure.



Alternatively, we can use the affiliation-specific (or bipartite-specific) layout.

```
plot(g, layout=layout.bipartite, vertex.size=7, vertex.label.cex=0.6)
```

Please notice that the tail of the set of red nodes means a set of disconnected nodes among students and students' organizations.



4. Calculating centrality values:

```
types <- V(g)$type
deg <- degree(g)
bet <- betweenness(g)
clos <- closeness(g)
eig <- eigen_centrality(g)$vector

cent_df <- data.frame(types, deg, bet, clos, eig)

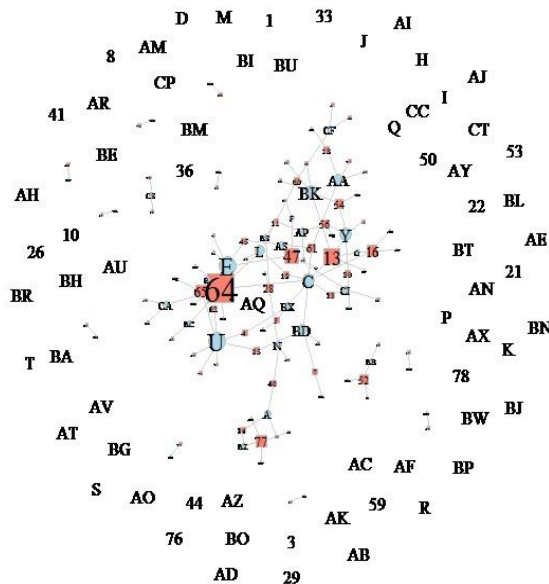
cent_df[order(cent_df$type, decreasing = TRUE),]
```

5. Sizing Vertices by Centrality:

```
V(g)$size <- degree(g)
V(g)$label.cex <- degree(g) * 0.2

plot(g, layout = layout_with_graphopt)
```

Can you find a few large nodes, like 64, E and U? What does the size of the node mean?



Thank you very much,

UGEC2532 Students & Jeff WONG