
SOCIAL NETWORK REPRESENTATION

LECTURE 02

LEARNING OBJECTIVES

Social Network = graph , social graph

- Know the components of a graph
- Understand how a social network can be represented
- Be able to draw a graph to represent a simple network

WHAT WE WILL COVER

- Part 1 – Components of a social graph
- Part 2 – Types of social graphs
- Part 3 - Storing and transforming social network data
- Part 4 - Transforming network data exercises

A FUN GAME

imagin' val

- Go through some of the exercises to obtain “**secret codes**”.
- Combine them to get the “**final secret code**”.
- If you get it right the **first time**, then you are **very good!**

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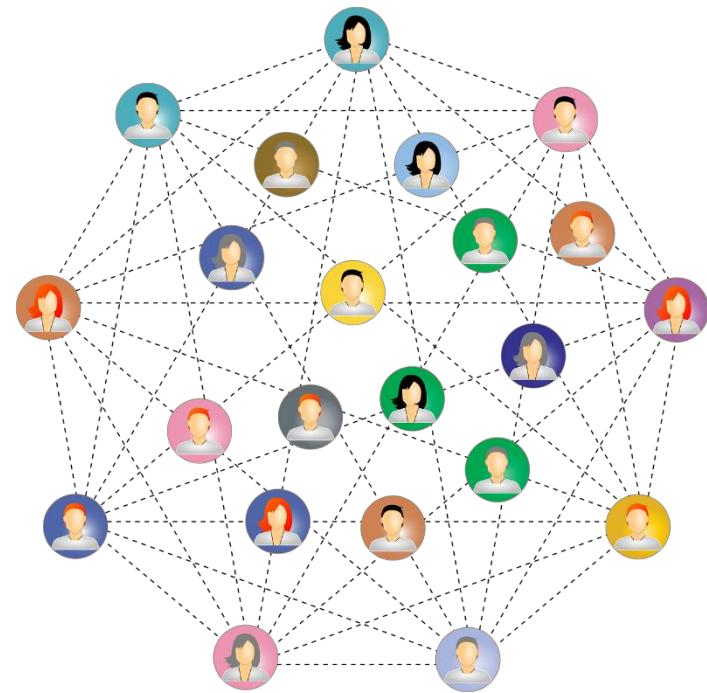
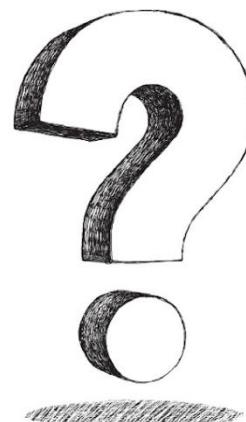


PART 1 – COMPONENTS OF A SOCIAL GRAPH

SOCIAL GRAPH

- What are the main components of a social graph?

social actors. and tie

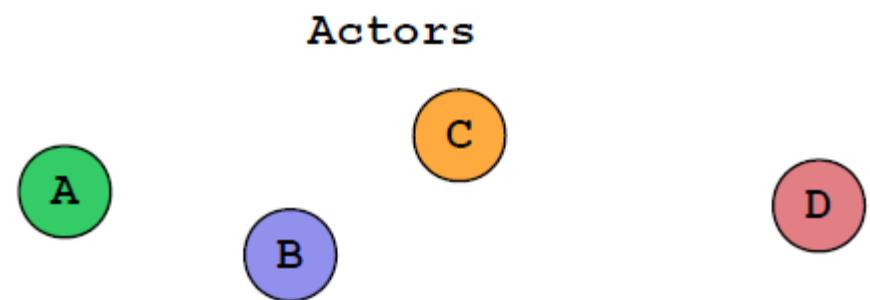


Graph Theory

DEFINITION - ACTOR

vertices

- Also called a **Node** or a **Vertex**
- An individual that can have relationships with other individuals
- An individual that we choose to study
- Each node can be coloured to represent different attributes
 - Blue = Boy, Green = Girl

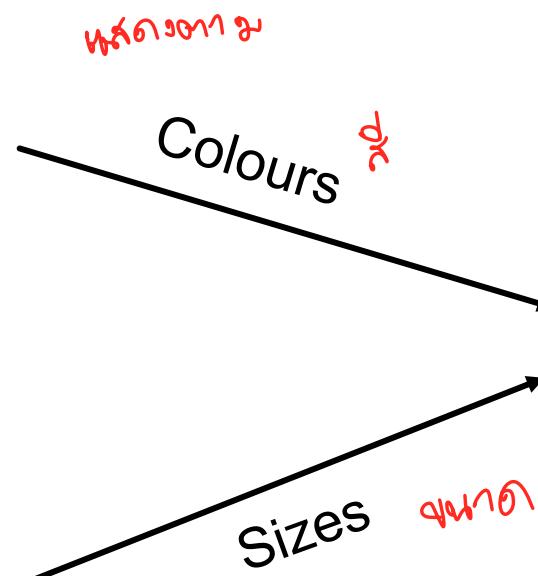


NODE - ATTRIBUTES

រូបសម្រាប់

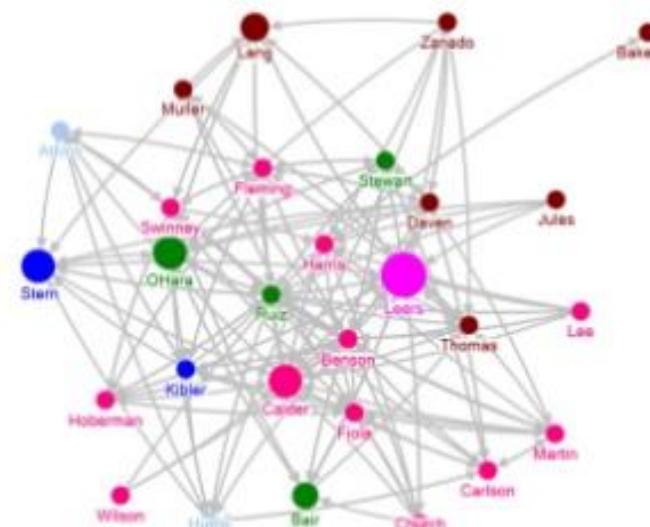
- Nodes can have attributes
- Information from surveys

- Department
- Job title
- Location
- Expertise
- Age
- Gender



ព័ត៌មានរបៀបការងារ / ចំណេះដឹង

1. What division of California Computers do you work for?
 - Integrated Communications Technologies
 - Software Applications
 - Data Control Systems
 - Field Design

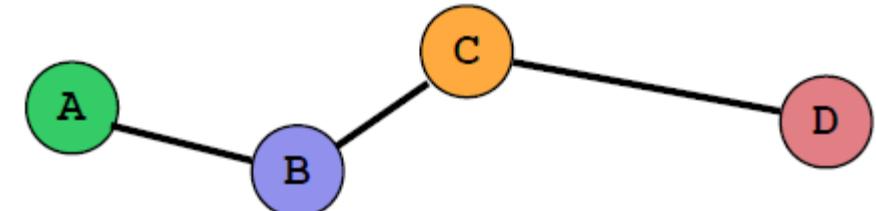


DEFINITION - TIE

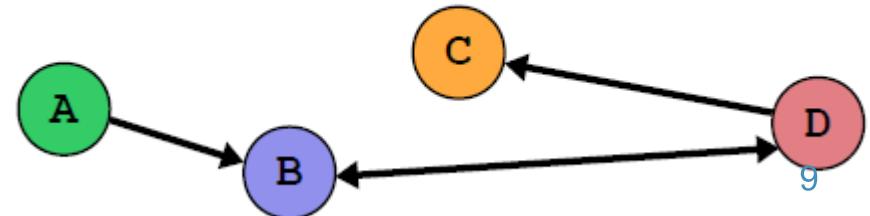
- Also called a **Relation** or an **Edge** *ເຄີຍຫຼັບຫົວໜ່ວຍ*
- Describes a **relationship between actors**
 - “went to the same school”, “likes”, “talks to”

Tie

Undirected Ties



Directed Ties

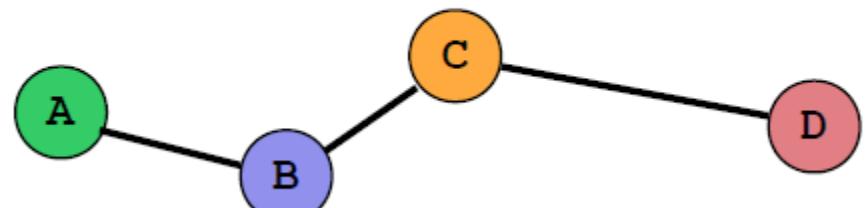


DEFINITION – UNDIRECTED RELATIONSHIP

មិនជាកំណត់ទំនួរ

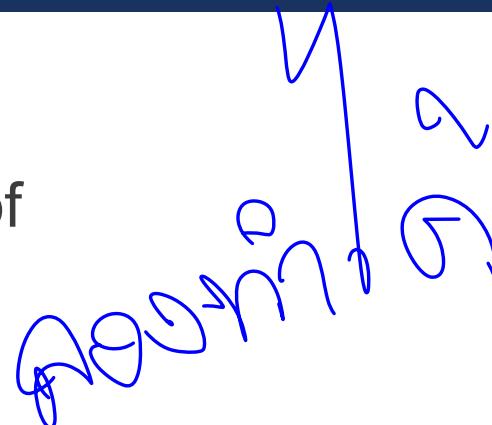
- Undirected – means the same thing to both actors គាយត្រូវបានដឹងថា ពេលមានការសង្គម នឹងជាកំណត់ទំនួរ
- “went to the same school”
- Mutuality or Reciprocity
- Symmetric = សមមានរយៈ

Undirected Ties



UNDIRECTED RELATIONSHIP – QUESTIONS

- Can you think of any other examples of symmetric or undirected relationship?
- Is real-world friendship symmetric?
- Is Facebook friendship symmetric?
- Is Twitter following scheme symmetric?



<https://forms.gle/eHA5HW7vC5xWCQtMA>

DEFINITION – DIRECTED RELATIONSHIP

- **ສີຕິດາມ** Directed – one-way relationship = ສີຕິດາມທະນື່ງ

- Asymmetric relationship

- Sentiment relation

- “likes”

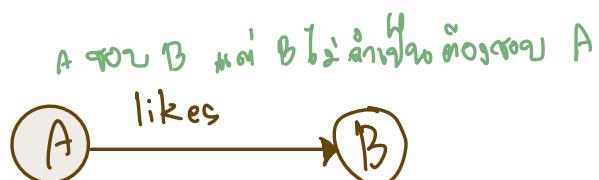
- “dislike”

- If I text you, will you text me back?

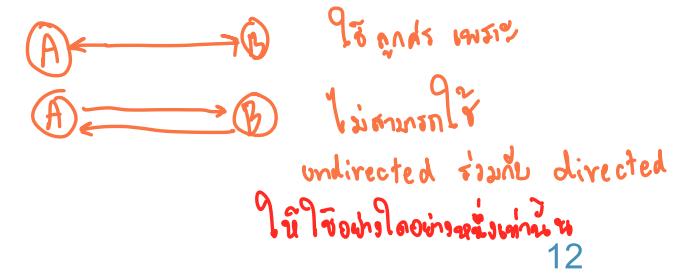
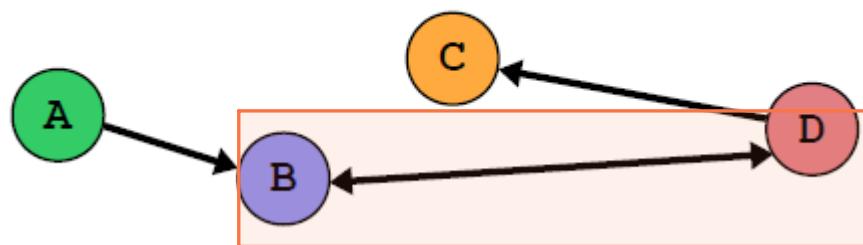
- If this is true, it is symmetric.

- If not, it is asymmetric.

- Possible to be **bidirectional**

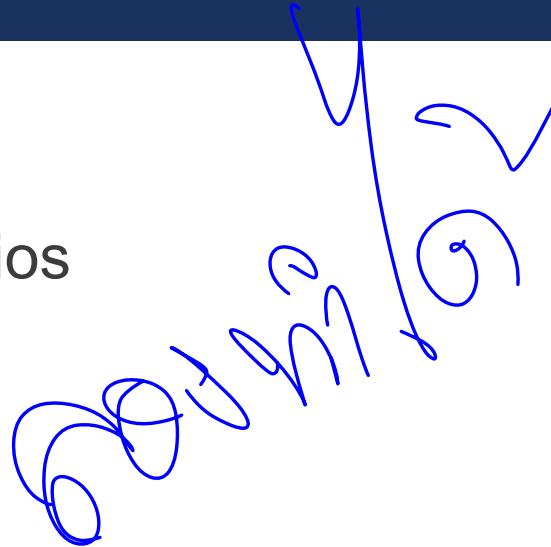


Directed Ties



DIRECTED RELATIONSHIP – QUESTION

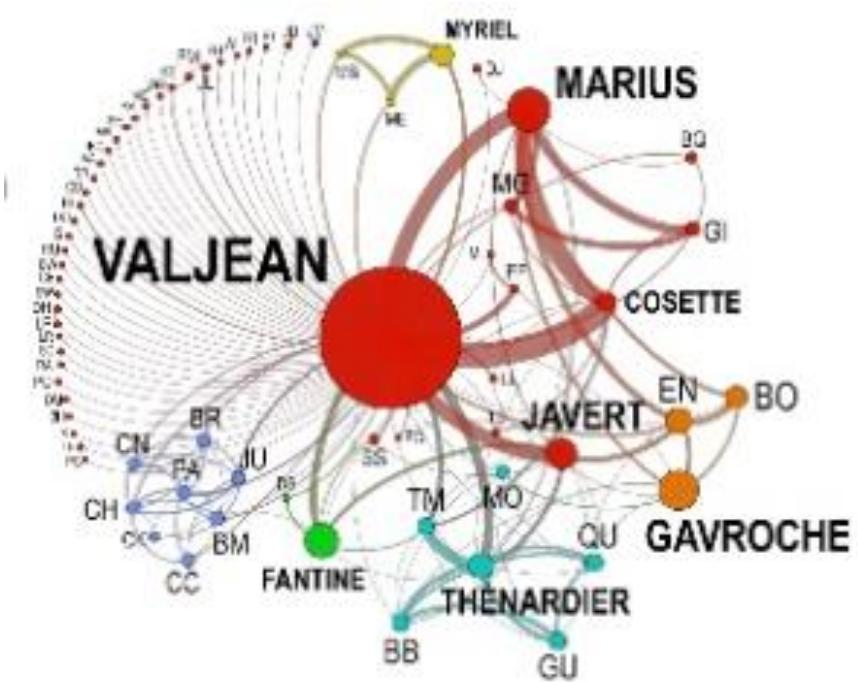
- Can you think of any other scenarios which show a directed relationship between two actors?
- Let's do an exercise by answering the questions.



<https://forms.gle/huoVJAD9JJDf9G54A>

EDGE - IMPLICATIONS

- Edges define the shape of the network
- In a survey, we ask:
 - “I get information from this person”
 - “I socialise with this person”
 - “I think this person is an expert”
 - “I go to this person to ask questions”
 - “I attend the same class as this person”



EDGE - SURVEYS

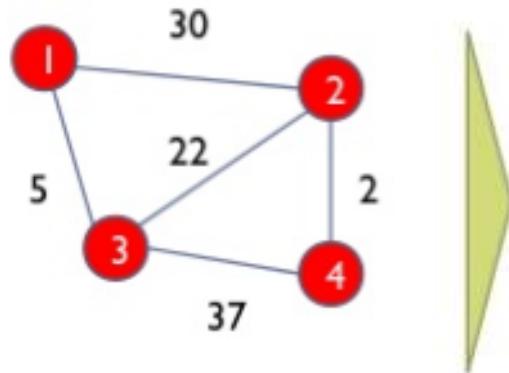
Whom do you go to for advice

- Alice
- Bob
- Charlie
- David
- Edward

Pick 3 persons you hang out with on regular basis

- Alice
- Bob
- Charlie
- David
- Edward

ADDING WEIGHTS TO EDGES



Edge list: add column of weights

Vertex	Vertex	Weight
1	2	30
1	3	5
2	3	22
2	4	2
3	4	37

Adjacency matrix: add weights instead of 1

Vertex	1	2	3	4
1	-	30	5	0
2	30	-	22	2
3	5	22	-	37
4	0	2	37	-

Weights:

权重

- Frequency of interactions
- Number of exchanged items
- Perception of relationship strengths
- Distance ...

距离

EDGE - SURVEYS

Indicate your relationship with each of the following people.

	0	1	2	3
Never met	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Talk to frequently			

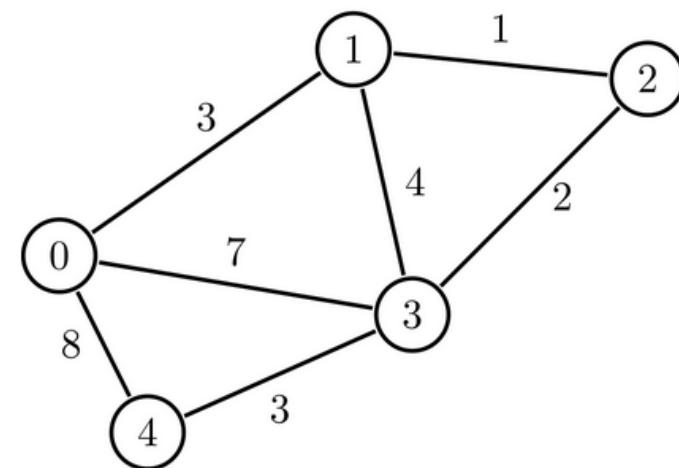
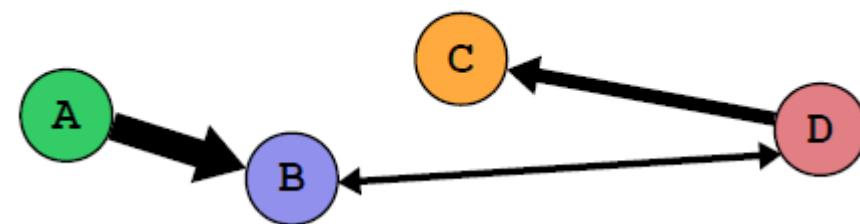
How often do you share ideas on how to improve performance with this person?

	Very often	Often	Sometimes	Seldom	Never	Don't know this person
Adam Houmøller	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ditte Oestergaard	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Henrik Drejer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jonas Fil	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Peter Roe Iversen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Sophia Friis	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trine Mainz	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

DEFINITION – WEIGHED TIE

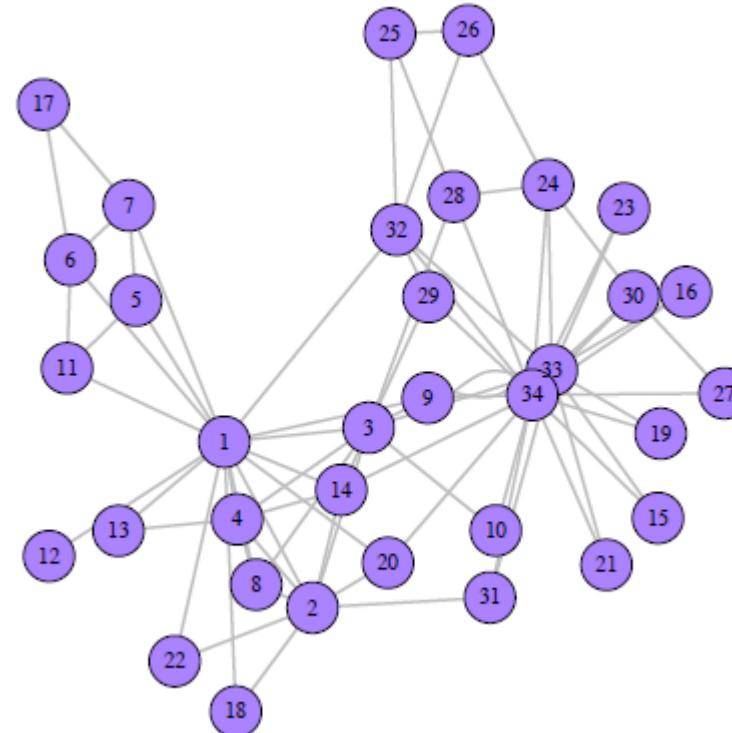
- A tie or an edge that shows strength of relationship
- Could be
 - Cost, distance, ...

Weighted Ties



DEFINITION - NETWORK

- Also called a **Graph**
 - A collection of actors and ties
- Node social Actor
Edges Tie



An undirected network (graph)
ຂວາງ ទិន្នន័យ សង្គមចាប់ពីការរំលែក

PRACTICE QUESTIONS

- Let's finish off this part with some practice questions.



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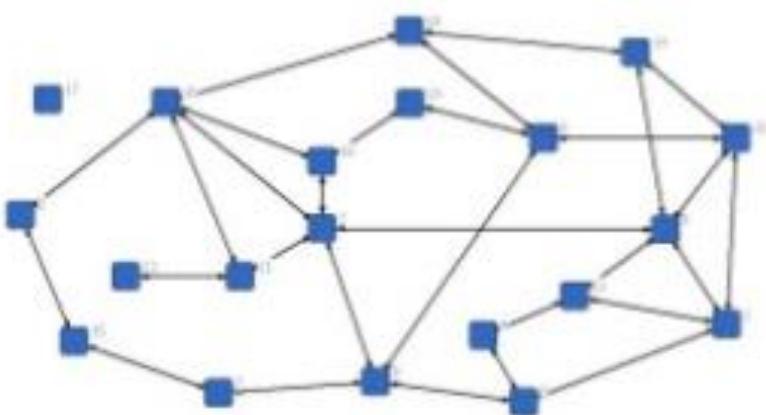


PART 2 – TYPES OF SOCIAL GRAPHS

ONE-MODE NETWORK VS TWO-MODE NETWORK

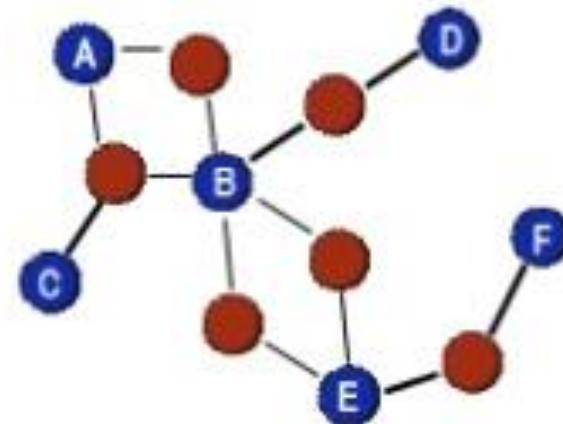
■ One Mode:

- All nodes are of the same type
- E.g., students



■ Two Mode:

- Nodes belong to two sets
- E.g., researchers and papers or teachers and schools



TWO-MODE NETWORKS – QUESTION

- Can you think of any other examples of a two-mode network?

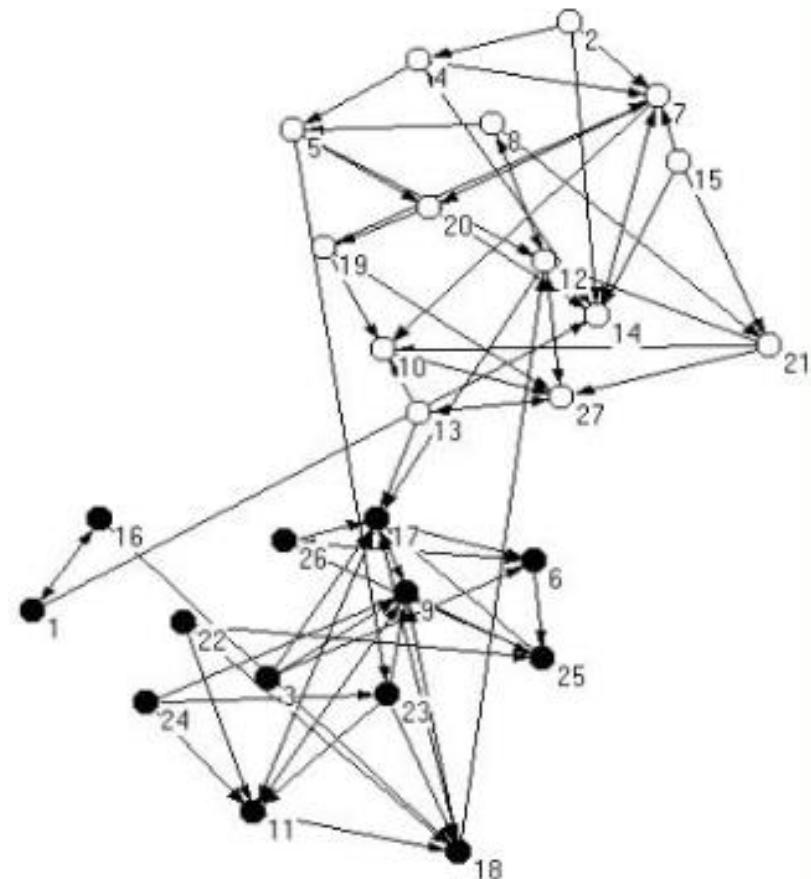


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TYPES OF SNA – SOCIOCENTRIC NETWORK

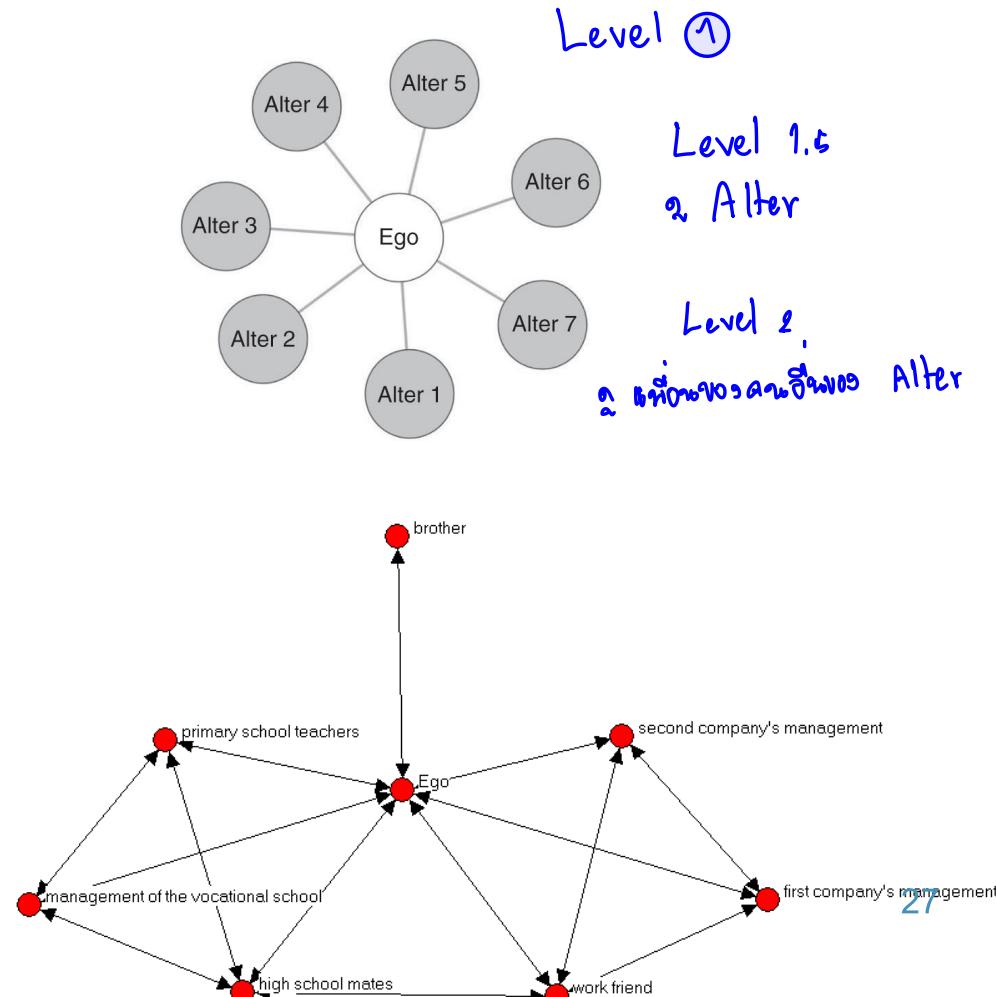
- Interaction within a socially or geographically bounded group
 - Collect data from group members about their relationship with other group members in a selected social setting



ጀ Node የ አ Node በ ኢትዮጵያ

TYPES OF SNA – EGOCENTRIC NETWORK

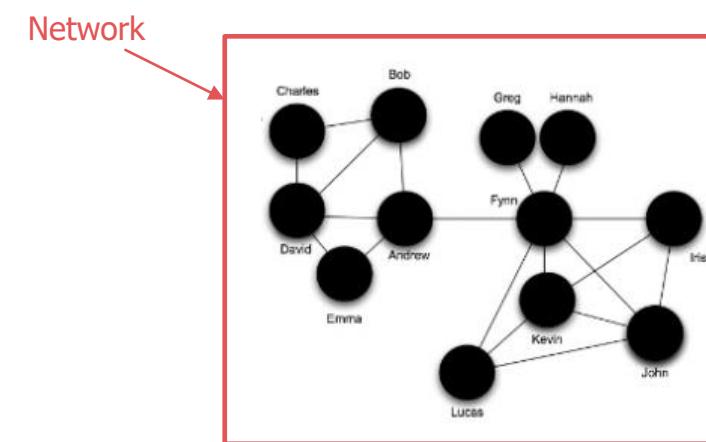
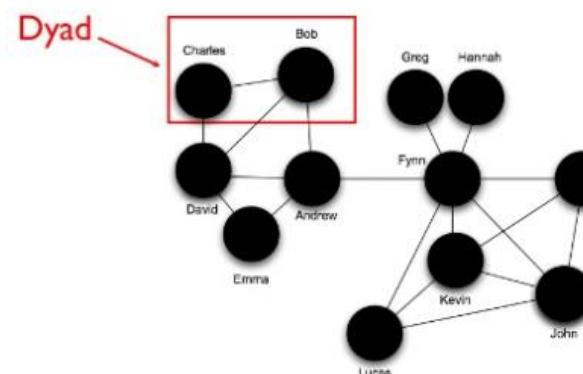
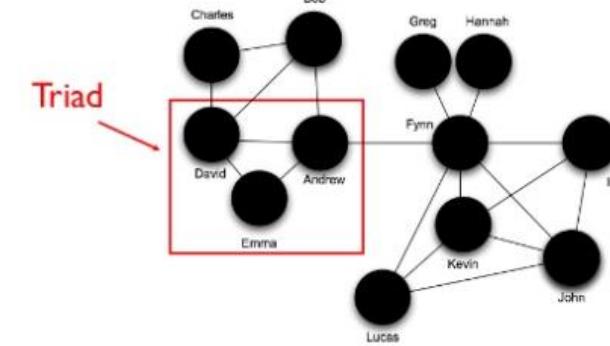
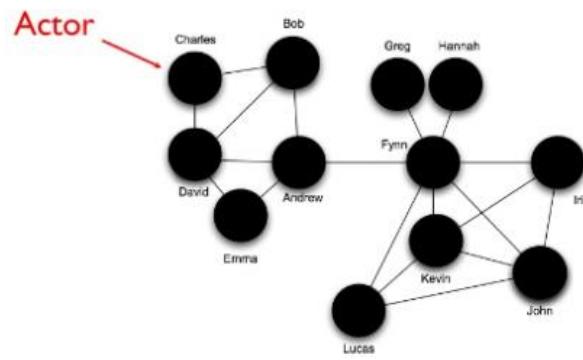
- Focus on one individual and his relationship with others
- Effect of social context on individual attitudes and actions
- Collect data from respondent (ego) about interactions with network members (alters) in all social settings



WHAT CAN WE ANALYSE?

Units of analysis:

- Nodes
- Dyads *with 2 Node*
- Triads *with 3 Node*
- Subgraphs *within Network*
- Networks



A NETWORK

a

b

c

d

e

f

Isolate

Dyad

Triad

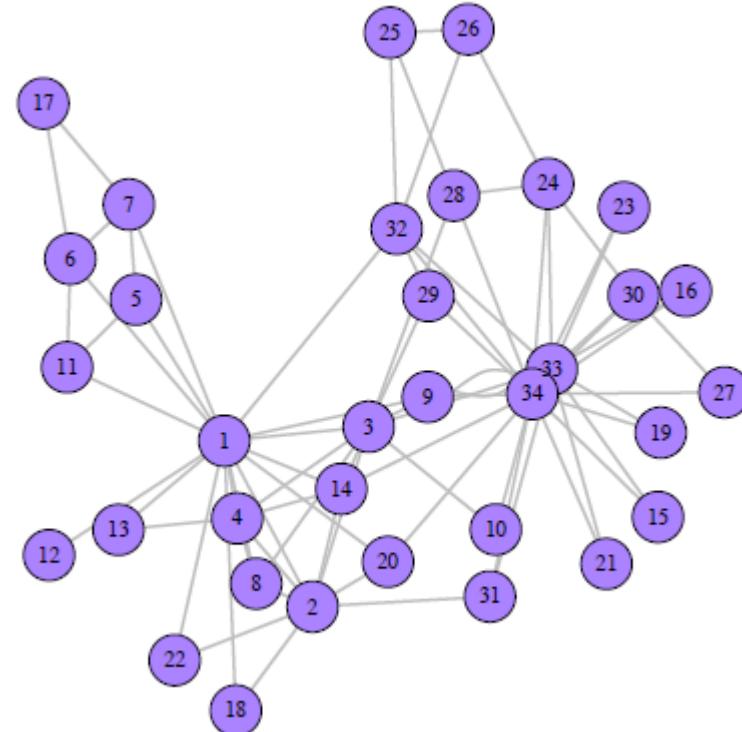
Isolated node



PART 3 – STORING AND TRANSFORMING SOCIAL NETWORK DATA

SOCIAL GRAPH

- How are data stored?



Undirected

STORING NETWORK DATA

- Matrix Form (Undirected):

~~77~~ 99

	Node 1	Node 2	Node 3
Node 1	-	<u>Value = 1</u>	Value
Node 2	Value	-	Value
Node 3	Value	Value	-

* ព័ត៌មាន នឹងចែកជា នៅរយៈ Value ទៅលើ
គ្រប់គ្រង នឹង 1,0 នៅរយៈ



“Reflexive Tie” or a “Loop” 34

TRANSFORMING DATA – MATRIX TO EDGE LIST

■ Matrix (Undirected)

ສູ່ມືຕະຫາວິທະນາກົດຕົວເລີດ

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

- Symmetrical matrix for undirected network
- You can focus on either the upper or lower triangle

Let's transform the matrix into an edge list

STORING NETWORK DATA

- Edge List:

Source	Target	Weight
Node 1	Node 3	Value
Node 1	Node 2	Value
Node 2	Node 3	Value

TRANSFORMING DATA – MATRIX TO EDGE LIST

Matrix

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



Edge list

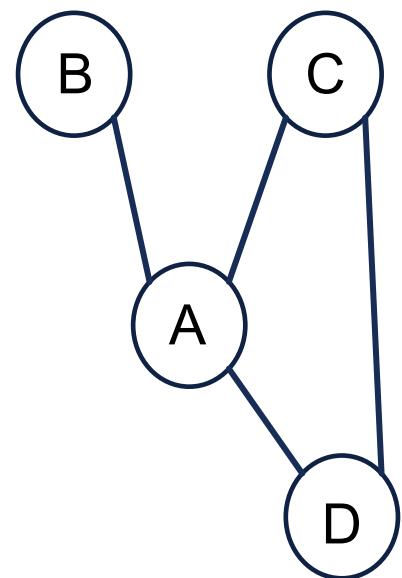
Source	Target	Weight
A	B	1
A	C	1
A	D	1
C	D	1

TRANSFORMING DATA – MATRIX TO EDGE LIST TO GRAPH

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



	Source	Target	Weight
	A	B	1
	A	C	1
	A	D	1
	C	D	1



TRANSFORMING DATA

Source	Target	Weight
A	D	1
D	B	1
C	B	1
D	A	1
E	F	1

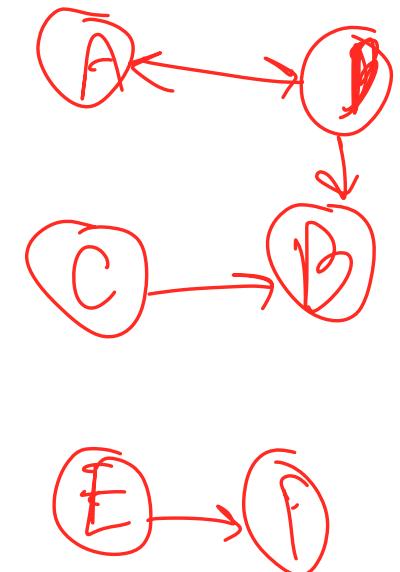
- What type of table is this?
Edge list
- What can we observe here?

Directed graph

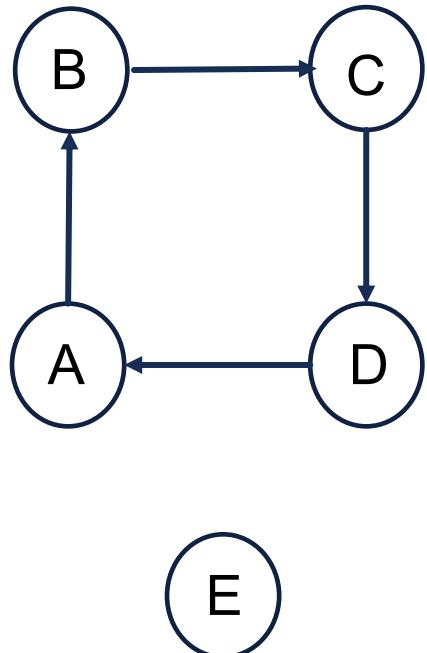
TRANSFORMING DATA – EDGE LIST TO MATRIX

Source	Target	Weight
A	D	1
D	B	1
C	B	1
D	A	1
E	F	1

	A	B	C	D	E	F
A	-	0	0	1	0	0
B	0	-	0	0	0	0
C	0	1	-	0	0	0
D	1	1	0	-	0	0
E	0	0	0	0	-	1
F	0	0	0	0	0	-

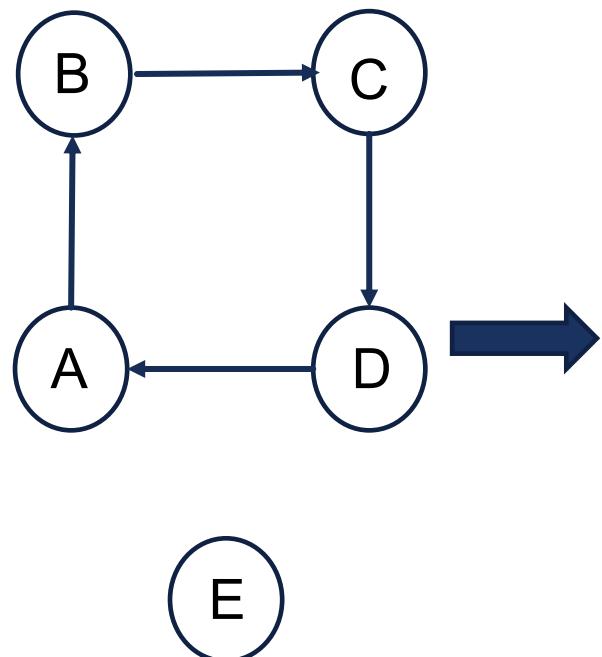


TRANSFORMING DATA



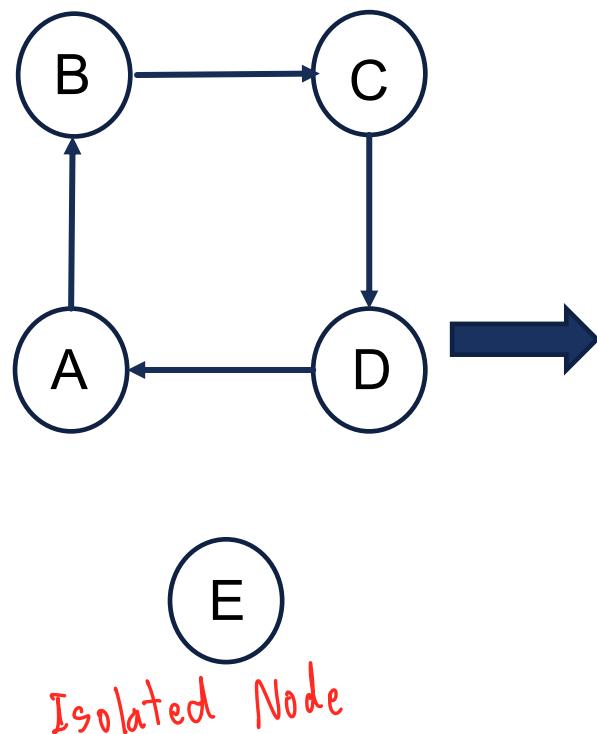
- Let's transform it into a matrix and an edge list

TRANSFORMING DATA – GRAPH TO MATRIX



	A	B	C	D	E
A	-	1	0	0	0
B	0	-	1	0	0
C	0	0	-	1	0
D	1	0	0	-	0
E	0	0	0	0	-

TRANSFORMING DATA – GRAPH TO MATRIX TO EDGE LIST



	A	B	C	D	E
A					
B					
C					
D					
E					

Source	Target	Weight
A	C	1
B	C	1
C	D	1
D	A	1

A, B, C, D, E

Edge list are list Node ที่ร่วมกันต้องมาก่อน

THE SECRET CODE!

- What is the secret code?
- You are not allowed to submit the code more than once!



<https://forms.gle/DyfptSyjcAhoDRpV7>

SUMMARY

- Components of a graph 
- How a network can be represented by a graph
- How to draw:
 - A matrix
 - An edgelist
 - A Graph

1. list រូបរាង 10 នាម

2. រូបគមន់សំខាន់

3. ទំនាក់ទំនងចំណែក (ការថត)

4. ពាណាពាលិច្ឆនាសក្រើ នៅវាតម្រូវការ ដែលទាំងអស់ នឹងមានការងារ
នៅក្នុង Relationship

រាយការណ៍ទំនាក់ទំនង

ទំនាក់ទំនង

5. សំណងការ និងការកំណត់
ជាប្រភេទ នៃការងារ និងការកំណត់ Node ឱ្យរាយការ

Node ឱ្យរាយការ Network នៃ បន្ទាន់រាយការ = Bridge

ជាប្រភេទ នៃការកំណត់

ជាប្រភេទ ជាប្រភេទ

សំណងការ

Social Graph តាមលក្ខណៈ

Social Graph ក្នុងគម្រោង

ឈាមគម្រោង = នី

EXERCISE – TRANSFORMING AN EDGELIST

- Given the following edgelist:

Source	Target	Weight
A	D	1
A	B	1
B	A	1
C	D	1

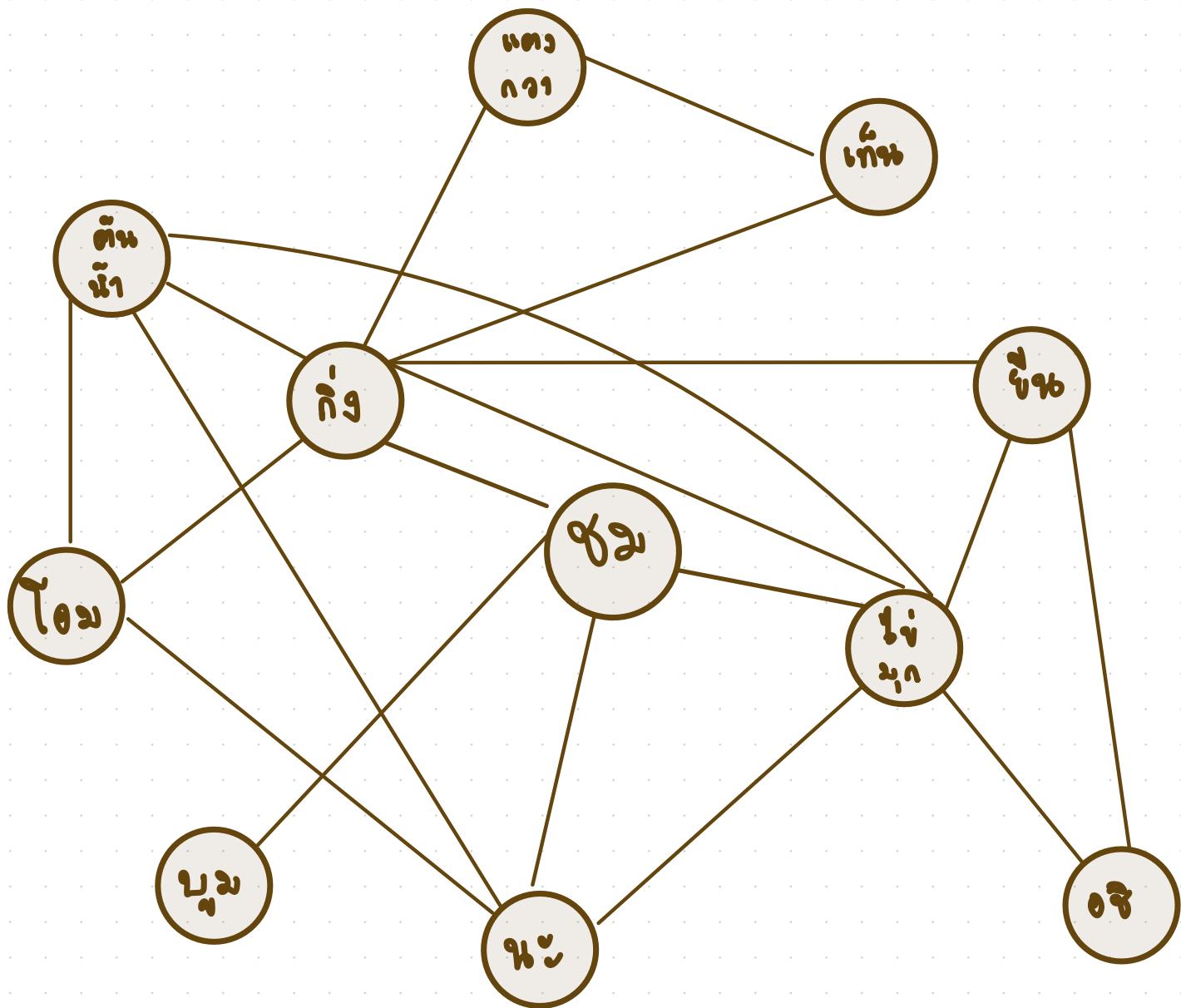
- How would you transform it to:

- A matrix

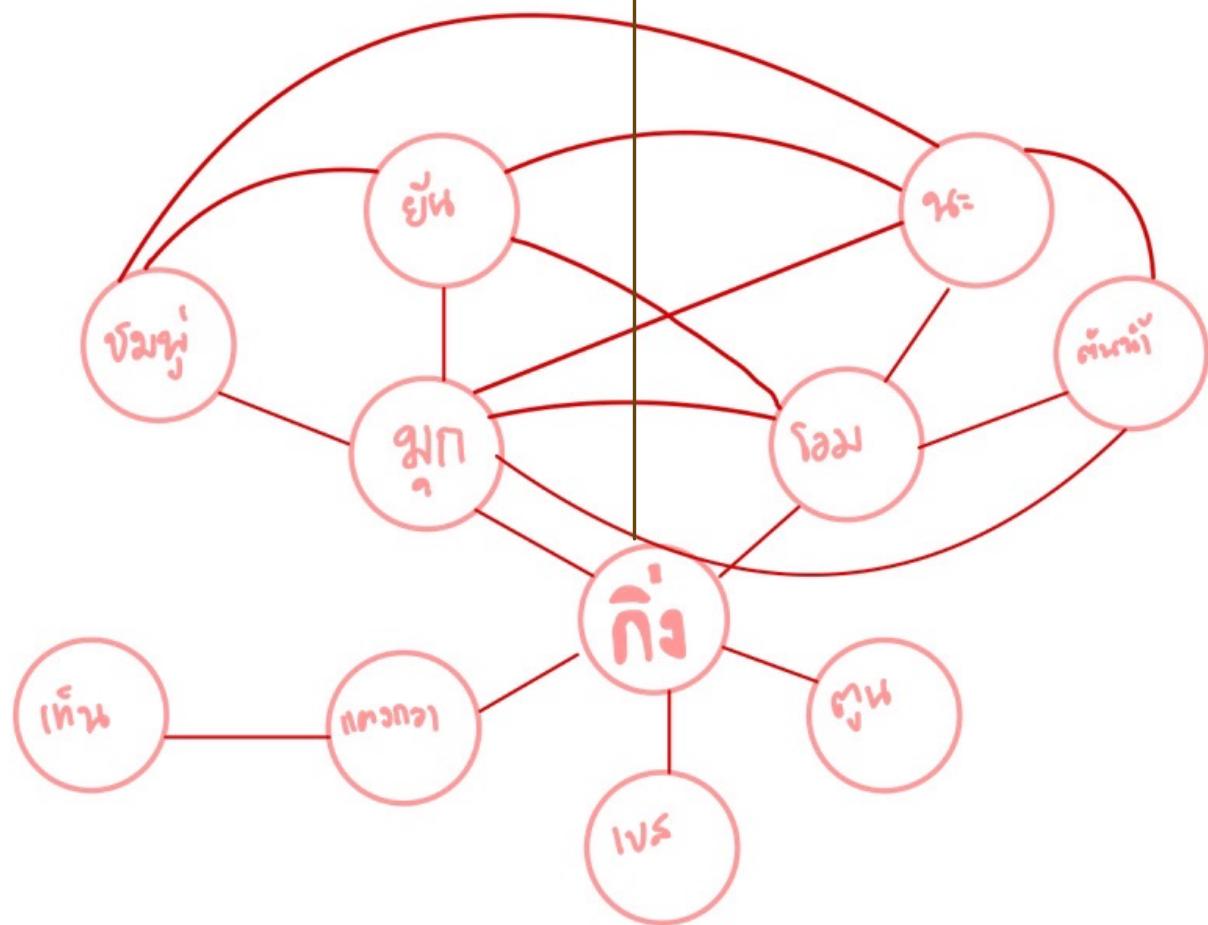
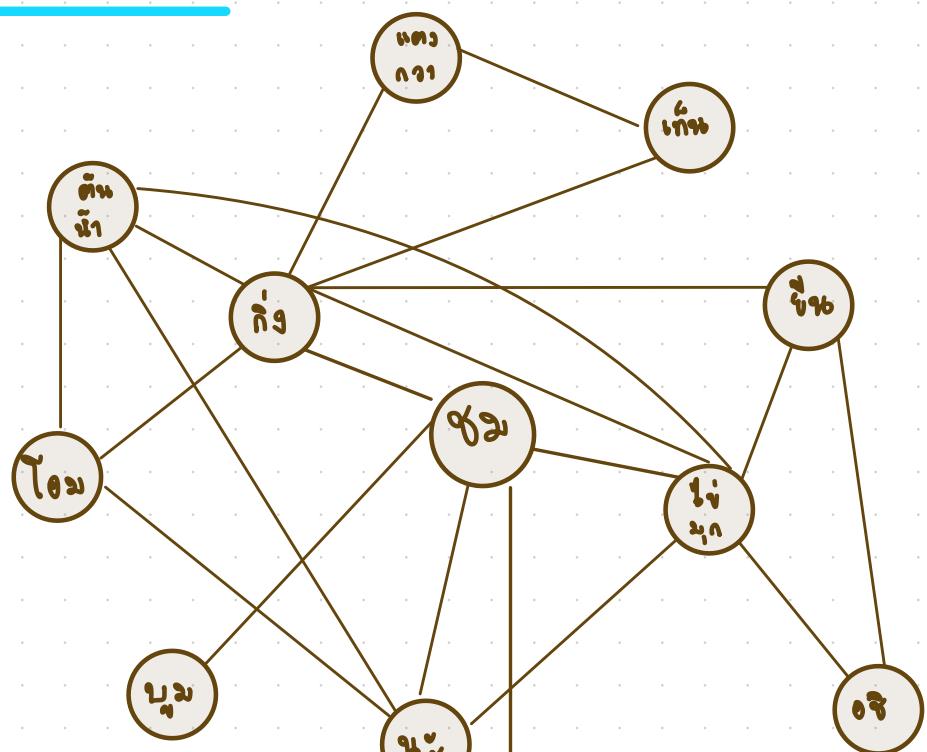
- A graph

	Name	Relational	Recommend
1.	ឈុំ	ស្ថាបេអាគ	យិត្យុរ
2.	កែវ	សោភ់ខ្លួន	យិត្យុរ
3.	ជូន	សោភ់ខ្លួន	-
4.	ទុក	សោភ់ខ្លួន	-
5.	Toan	សោភ់ខ្លួន	គី
6.	ពោន់ខំ	សោភ់ខ្លួន	Toan
7.	ឈុំរុក	សោភ់ខ្លួន	-
8.	ឈុំ	ស្ថាបេអាគ	ឈុំ
9.	លានុញ្ញនា	សោភ់ខ្លួន ឬ សោភ់ខ្លួន	គី
10.	រោង	សោភ់ខ្លួន ឬ សោភ់ខ្លួន	គីគុណា

Graph

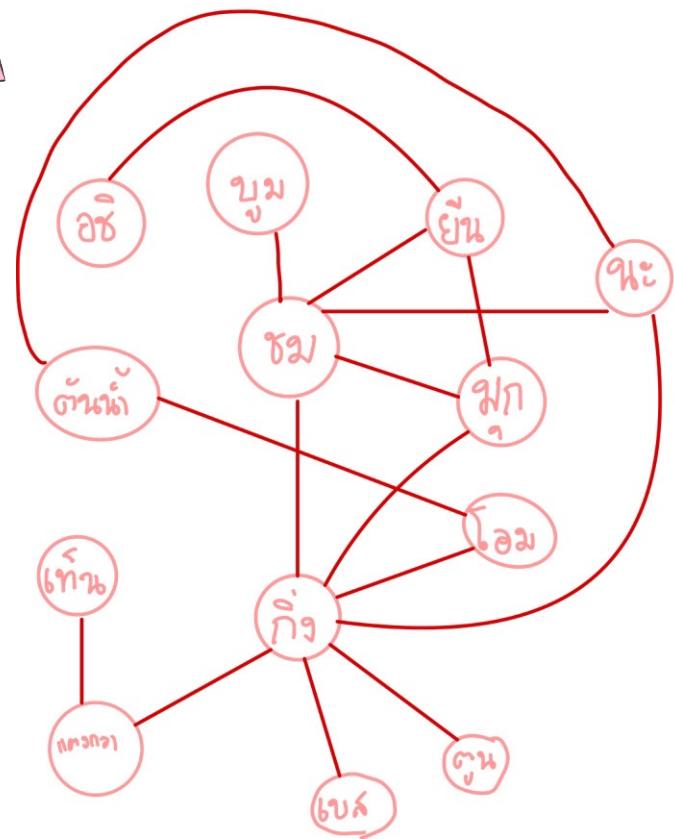


Merge



Merge

รวมเข้าด้วยกัน B6601294 นางสาวจุฬามาศ พานุช B6601294



Questions.

Who is the bridge between one or more network?

ໄດ້ຮັບສະພານເຊື່ອມຕ່ອງຮ່ວມເຄື່ອງຂ່າຍຕັ້ງແຕ່ 1 ເຄື່ອງຂ່າຍໜີ້ໄປ

ລະພານເຊື່ອມຮ່ວມເຄື່ອງຂ່າຍ(Bridge) ດີວ່າ ດີ່ງ

Who has the most and the least connections?

ໄດ້ຮັບສະພານເຊື່ອມຕ່ອງມາດທີ່ສຸດແລະນັວຍທີ່ສຸດ

ຄົນທີ່ມີການເຊື່ອມຕ່ອງມາດທີ່ສຸດ ດີ່ງ

ຄົນທີ່ມີການເຊື່ອມຕ່ອນ້ອຍທີ່ສຸດ ດີວ່າ ເບລ ຕູນ

