



---

Graph Social Network Analysis

Subjects : BADS7202 and BADS7201

---



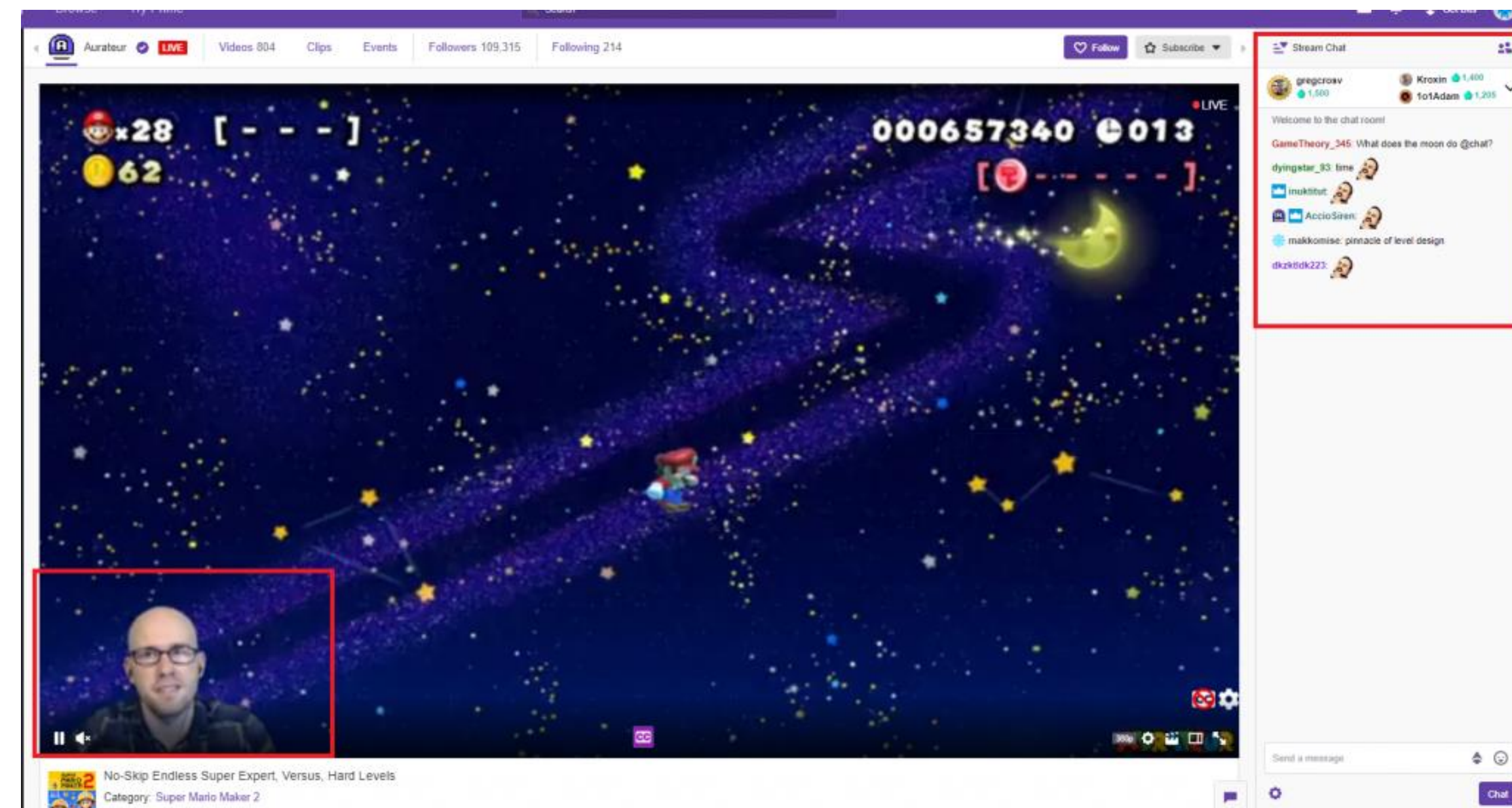
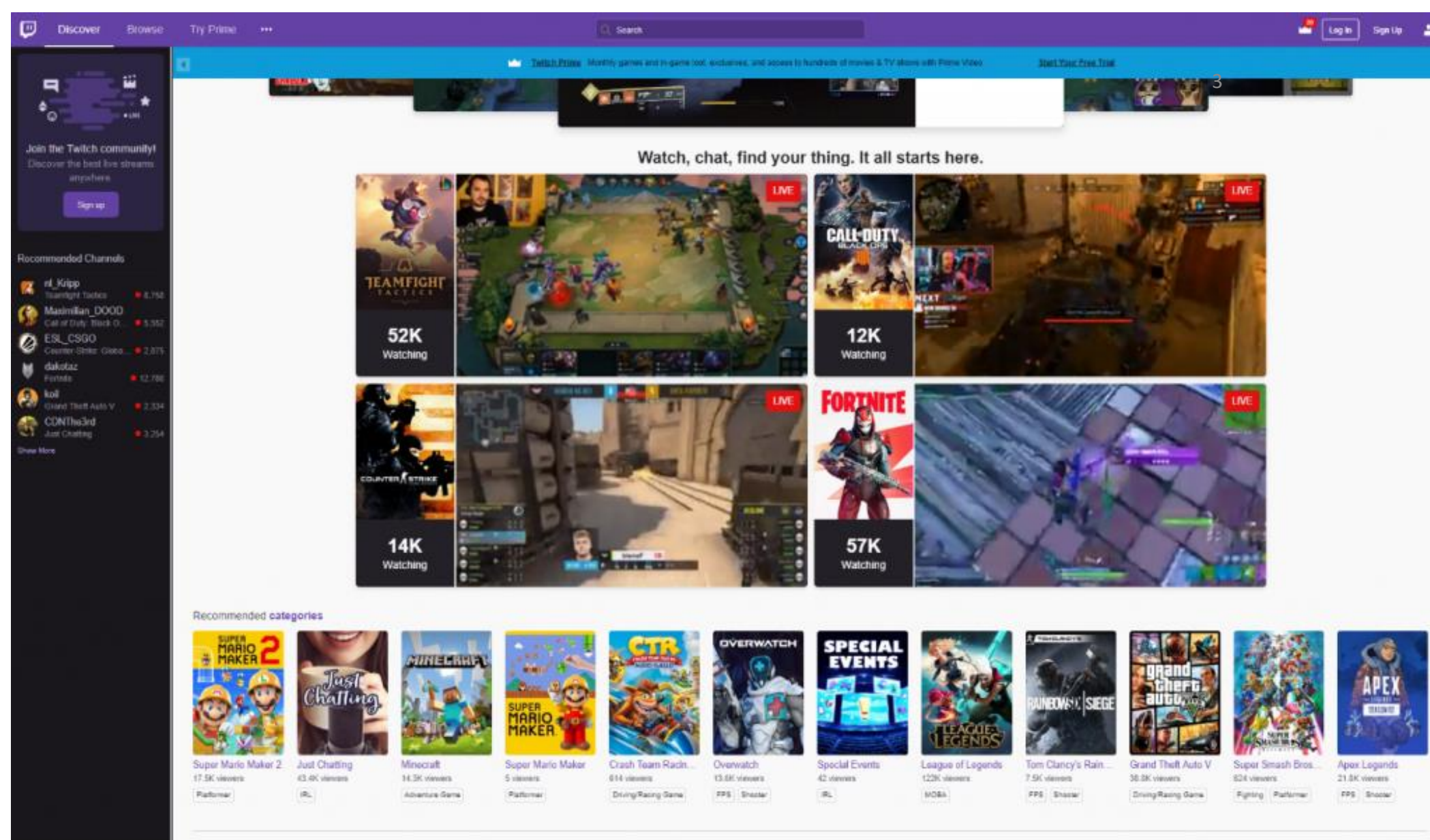
# Agenda

- 1 What is Twitch
- 2 Why Twitch
- 3 Data Preparation and Collection
- 4 Graph analysis with Gephi<sup>2</sup>
- 5 Cascade Modeling
- 6 Result and Conclusion



# What **twitch** ?

Twitch is a live streaming platform for gamers. Non-gamers may not see the appeal of watching other people play video games, but with 15 million users everyday Twitch is hugely popular.





# Why **twitch** ?

Twitch กับสถิติการเติบโตอย่างยิ่งใหญ่ในปี 2017 ยอดผู้ชมในไทย 2 พันล้านนาทียิ่ง  
ซึ่งทำให้ผู้ชมสามารถมีส่วนร่วมให้ความสนใจ

**355**  
BILLION

(355 พันล้าน)  
นาทียในการรับชม

**2+**  
MILLION

(2 ล้าน+)  
แอดที่ฟสตรีมเมอร์ในแต่ละ  
เดือน

**27+**  
THOUSAND

(27,000 พันล้าน+)  
พาร์ทเนอร์สตรีมเมอร์

**124+**  
MILLION

(24 ล้าน+)  
จำนวนคลิปทั้งหมด

**15+**  
MILLION

(15+ ล้าน)  
จำนวนผู้ชมในแต่ละวัน

**30+**  
MILLION

(30+ ล้าน)  
เงินที่บริจาคการกุศล

**150+**  
THOUSAND

(150+ พันล้าน)  
สตรีมเมอร์รุ่นใหม่

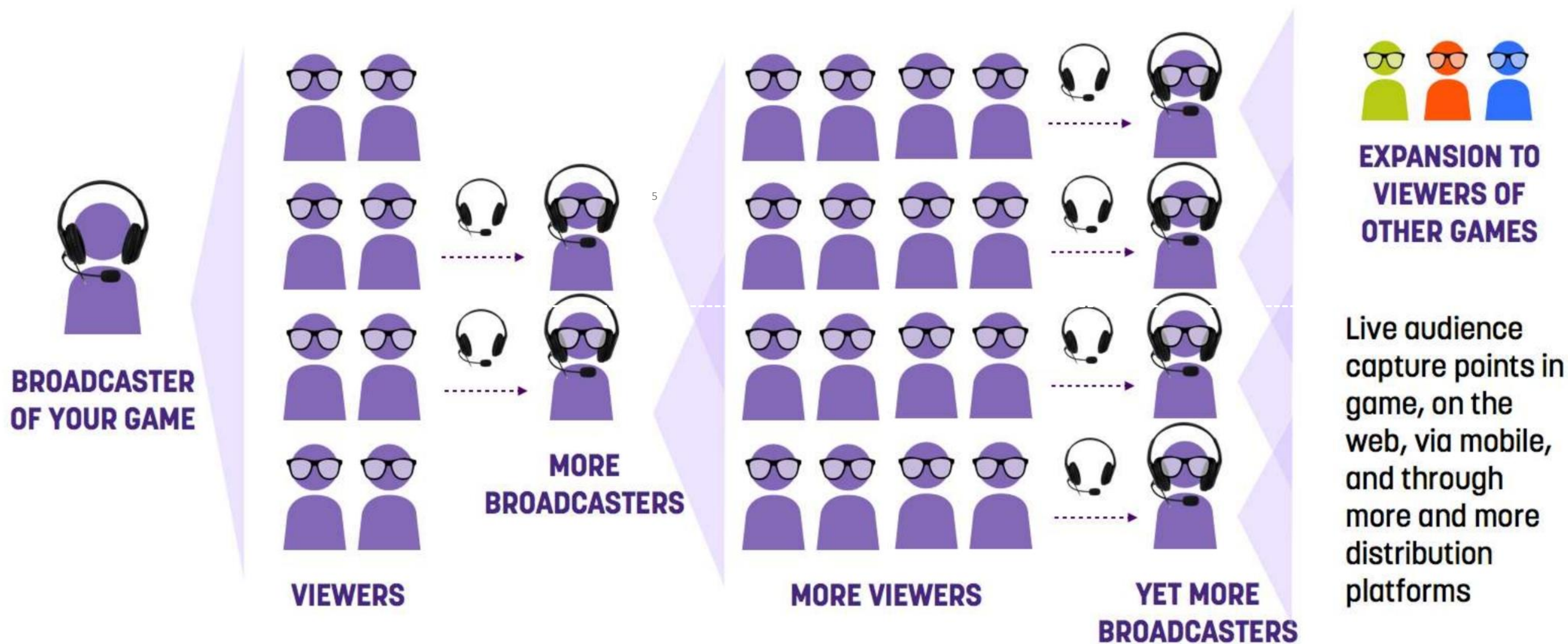
**223%**

สตรีมเมอร์ที่ทำรายได้





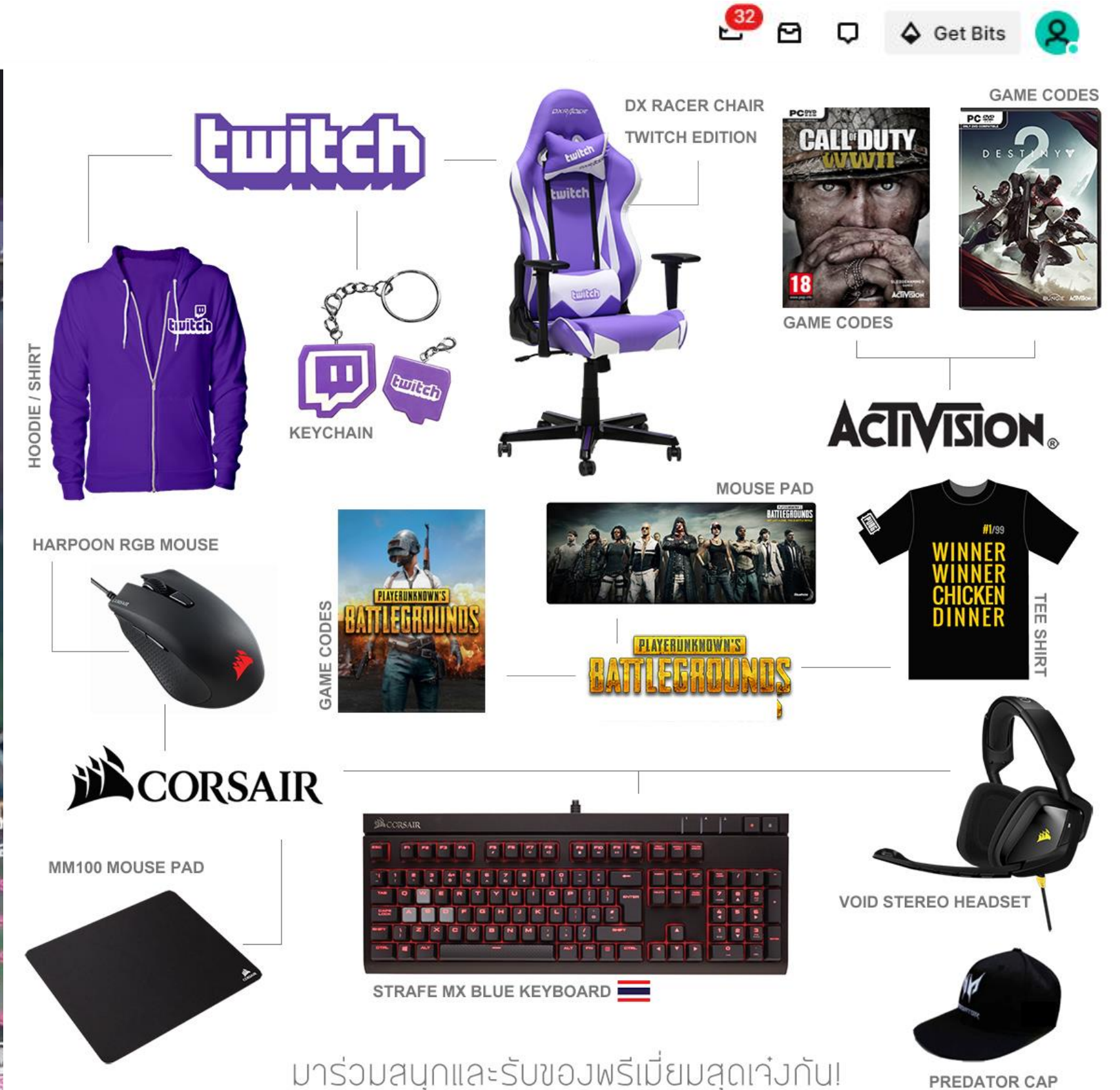
# Live streaming makes it possible to grow a community around any game or product





# Why twitch?

Present item in game while streaming, review game and other related gamer's product.



มาร่วมสนุกและรับของฟรีเต็มสุดเจ๋งกัน!  
[LINK.TWITCH.TV/THAILANDGAMESHOW](https://link.twitch.tv/ThailandGameShow)



# Why twitch ?

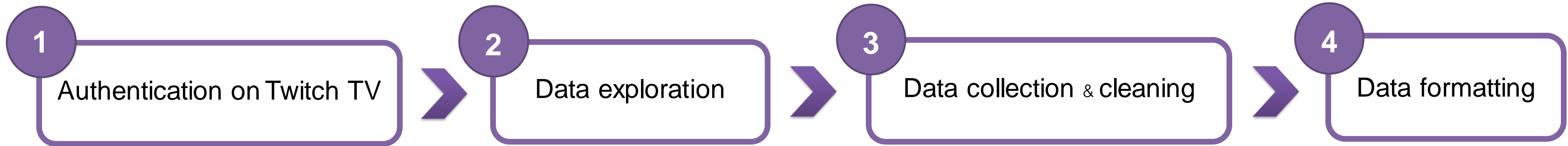
## Objective

To find and suggest influencer that can distribute item,game,product,promotion, etc.





# Data Preparation and Collection





# Data Preparation and Collection

1 Authentication on Twitch TV



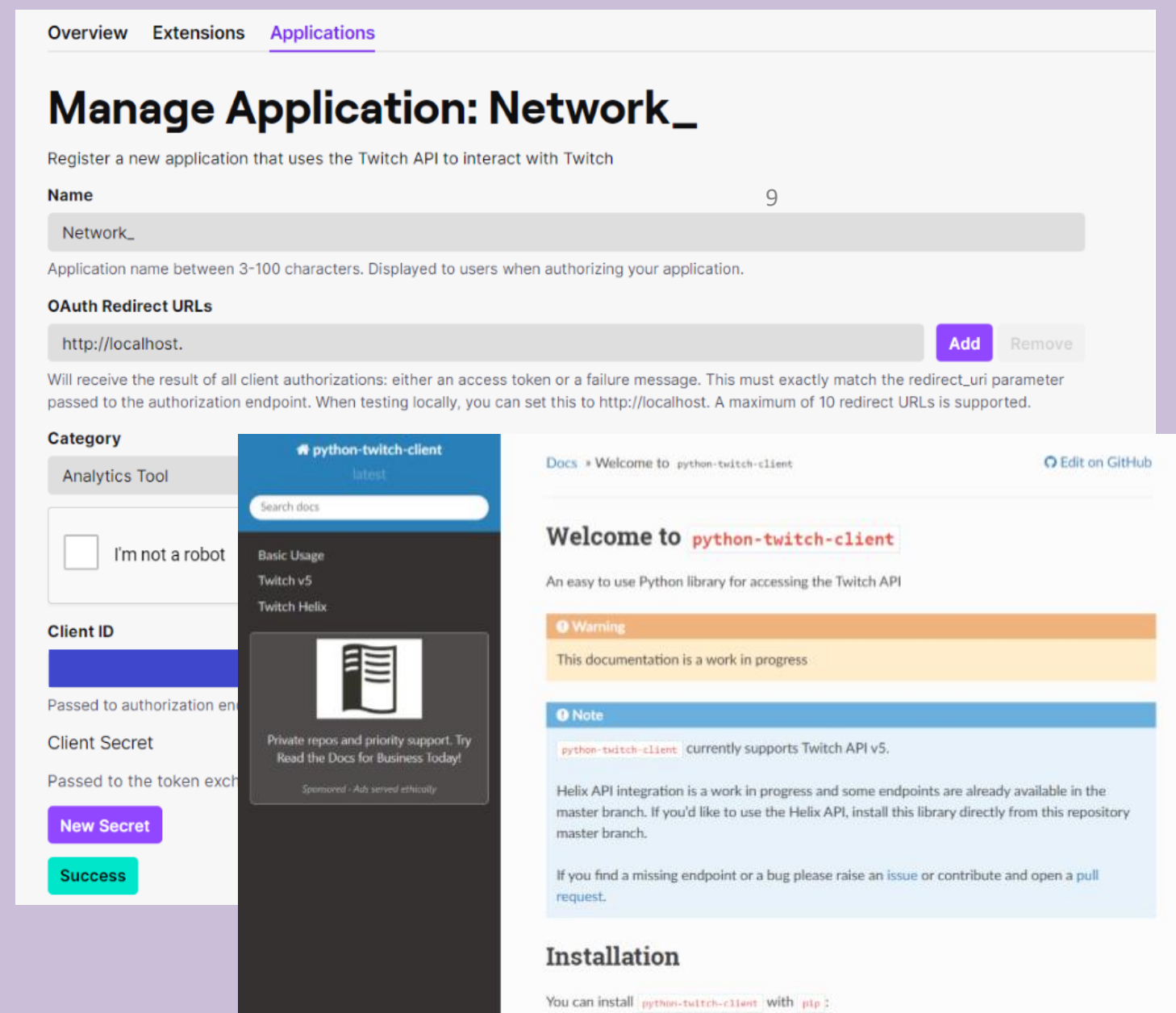
2 Data exploration



3 Data collection & cleaning



4 Data formatting



The screenshot shows two side-by-side web pages. The left page is the Twitch 'Manage Application' interface for an application named 'Network\_'. It includes fields for Name, OAuth Redirect URLs (with 'http://localhost' entered), Category (Analytics Tool), and Client ID/Secret. A 'Success' message is visible at the bottom. The right page is the 'python-twitch-client' documentation, featuring a 'Welcome' message, a warning about work-in-progress documentation, a note about Twitch API v5 support, and an 'Installation' section.

- Register for a Twitch developer account through <http://dev.twitch.tv/>
- Create an application for getting the client key to access the database.
- Connect to data through module
- **python-twitch-client** on python.

# Data Preparation and Collection

1 Authentication on Twitch TV

2 Data exploration

3 Data collection & cleaning

4 Data formatting

## Channel details

This returns the object for channel 44322889.

```
curl -H 'Accept: application/vnd.twitchtv.v5+json' \
-H 'Client-ID: uo6dggoyb8d6soh92zknwmi5ej1q2' \
-X GET 'https://api.twitch.tv/kraken/channels/44322889'
```

### Example Response

```
{
  "_id": 44322889,
  "broadcaster_language": "en",
  "created_at": "2013-06-03T19:12:02Z",
  "display_name": "dallas",
  "followers": 40,
  "game": "Final Fantasy XV",
  "language": "en",
  "logo": "https://static-cdn.jtvnw.net/jtv_user_pictures/dallas-pro",
  "mature": true,
  "name": "dallas",
  "partner": false,
  "profile_banner": null,
  "profile_banner_background_color": null,
  "status": "The Finalest of Fantasies",
  "updated_at": "2016-12-06T22:02:05Z",
  "url": "https://www.twitch.tv/dallas",
  "video_banner": null,
  "views": 232
}
```

## Channel followers

This gets a list of up to 25 users who have followed channel 44322889 most recently.

```
bash curl -H 'Accept: application/vnd.twitchtv.v5+json' -H 'Client-ID:
uo6dggoyb8d6soh92zknwmi5ej1q2' -X GET
'https://api.twitch.tv/kraken/channels/44322889/follows'
```

### Example Response

```
### Example Response
'''json
{
  "_cursor": "1481675542963907000",
  "_total": 41,
  "follows": [
    {
      "created_at": "2016-12-14T00:32:22.963907Z",
      "notifications": false,
      "user": {
        "_id": "129454141",
        "bio": null,
        "created_at": "2016-07-13T14:40:42.398257Z",
        "display_name": "dallaschains",
        "logo": null,
        "name": "dallaschains",
        "type": "user",
        "updated_at": "2016-12-14T00:32:16.263122Z"
      }
    },
    ...
  ]
}
```

## User details

Example Request

This returns the object for user 44322889.

```
curl -H 'Accept: application/vnd.twitchtv.v5+json'
-H 'Client-ID: uo6dggoyb8d6soh92zknwmi5ej1q2' \
-X GET 'https://api.twitch.tv/kraken/users/44322889'
```

### Example Response

```
{
  "_id": "44322889",
  "bio": "Just a gamer playing games and chattin",
  "created_at": "2013-06-03T19:12:02.580593Z",
  "display_name": "dallas",
  "logo": "https://static-cdn.jtvnw.net/jtv_user",
  "name": "dallas",
  "type": "staff",
  "updated_at": "2016-12-13T16:31:55.958584Z"
}
```

## User followers

```
curl -H 'Accept: application/vnd.twitchtv.v5+json' \
-H 'Client-ID: uo6dggoyb8d6soh92zknwmi5ej1q2' \
-X GET 'https://api.twitch.tv/kraken/users/44322889/follows/channels'
```

### Example Response

```
{
  "_total": 27,
  "follows": [
    {
      "created_at": "2016-09-16T20:37:39Z",
      "notifications": false,
      "channel": {
        "_id": 12826,
        "background": null,
        "banner": null,
        "broadcaster_language": "en",
        "created_at": "2007-05-22T10:39:54Z",
        "delay": null,
        "display_name": "Twitch",
        "followers": 530641,
        "game": "Gaming Talk Shows",
        "language": "en",
        "logo": "https://static-cdn.jtvnw.net/jtv_user_pictures/tv",
        "mature": false,
        "name": "twitch",
        "partner": true,
        "profile_banner": "https://static-cdn.jtvnw.net/jtv_user_p",
        "profile_banner_background_color": null,
        "status": "Twitch Weekly",
        "updated_at": "2016-12-13T18:35:28Z",
        "url": "https://www.twitch.tv/twitch",
        "video_banner": "https://static-cdn.jtvnw.net/jtv_user_pic",
        "views": 109064987
      }
    },
    ...
  ]
}
```



# Data Preparation and Collection

1

Authentication on Twitch TV

2

Data exploration

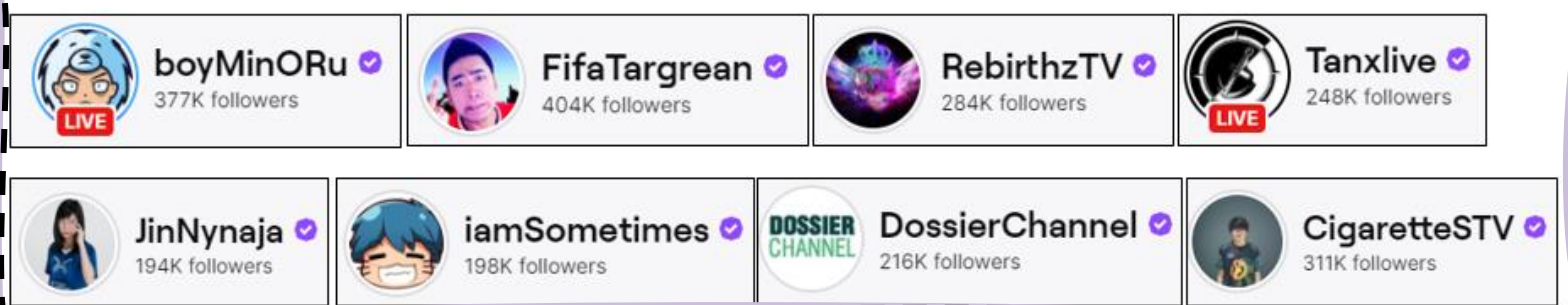
3

Data collection & cleaning

4

Data formatting

TOP 50 Streamers > 2,000,000+ Users



display_name	id	name	type	bio	created_at	updated_at	logo	channel_name	channel_id
Nuttanannnn	186747904	nuttanannnn	user		12/22/2017 2:19	10/20/2020 8:36	https://s1.CigaretteSTV	127856461	
shyziii	597614616	shyziii	user		10/19/2020 19:43	10/19/2020 19:44	https://s1.CigaretteSTV	127856461	
natpon69	434479117	natpon69	user		5/7/2019 23:42	10/20/2020 2:18	https://s1.CigaretteSTV	127856461	
fskyy	549450492	fskyy	user		6/30/2020 10:21	6/30/2020 10:24	https://s1.CigaretteSTV	127856461	
zunbet	529605329	zunbet	user		5/12/2020 21:50	10/20/2020 0:10	https://s1.CigaretteSTV	127856461	
warawuthnut	171954548	warawuthnut	user		8/29/2017 17:21	10/20/2020 0:07	https://s1.CigaretteSTV	127856461	
soyeongk	545132688	soyeongk	user		6/18/2020 18:12	8/14/2020 21:10	https://s1.CigaretteSTV	127856461	
p_beluga	503133084	p_beluga	user		3/24/2020 18:02	10/18/2020 19:08	https://s1.CigaretteSTV	127856461	
nongpapear	597661234	nongpapear	user		10/19/2020 23:04	10/19/2020 23:05	https://s1.CigaretteSTV	127856461	
doremoo	549761375	doremoo	user		7/1/2020 8:01	7/1/2020 8:01	https://s1.CigaretteSTV	127856461	
ehganaing	597659339	ehganaing	user		10/19/2020 22:57	10/19/2020 22:57	https://s1.CigaretteSTV	127856461	
fern3r	491308193	fern3r	user		2/9/2020 12:26	10/17/2020 23:31	https://s1.CigaretteSTV	127856461	
Nornut18	163290150	nornut18	user		7/7/2017 22:25	6/8/2020 0:57	https://s1.CigaretteSTV	127856461	
pongpat_non	597652543	pongpat_non	user		10/19/2020 22:31	10/19/2020 22:31	https://s1.CigaretteSTV	127856461	
blackzanderz	596510801	blackzanderz	user		10/16/2020 22:44	10/16/2020 22:44	https://s1.CigaretteSTV	127856461	

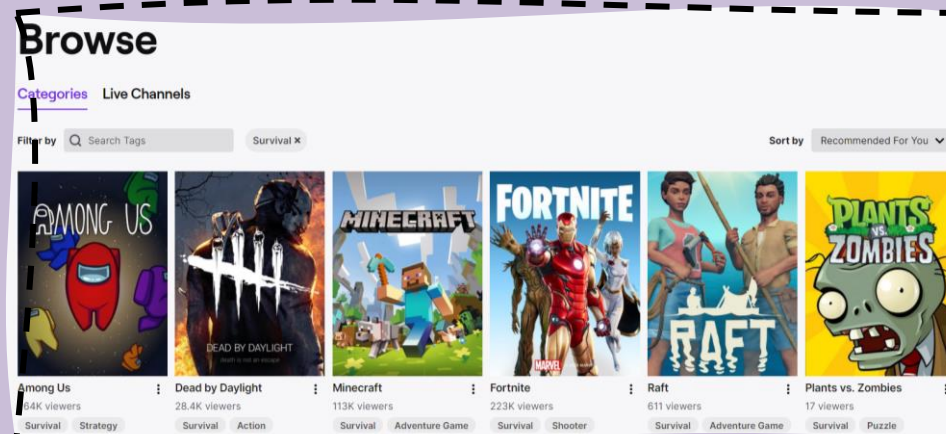
TH Followers

Sort Active time

200,000 sample users

Select 200,000 users > 4,500,000+ edges

name	total_fol	follow_name	follow_id	broadcaster_language	language	game
155404844 ch4ba_tw	34	UDIETv	145843667	th	th	Fortnite
173199563 tea007xx	27	Ffamelive	179784533	th	th	Among Us
209049839 dekchaifolk	62	MrYearn	44272049	th	en	Among Us
566643186 nnnnnnam	6	MrYearn	44272049	th	en	Among Us
159290606 jokernonar	88	MrYearn	44272049	th	en	Among Us
159290606 jokernonar	88	artyraprap	183316258	th	th	Fortnite
159290606 jokernonar	88	YuzuruCh	177955619	th	th	Among Us
460655064 timzaxd	59	Majolica	56891649	th	en	Among Us
190446236 Olang	126	MrYearn	44272049	th	en	Among Us
190446236 Olang	126	Pynpinmook	470864575	th	th	Among Us
190446236 Olang	126	SannnJi	423833406	th	th	Among Us
190446236 Olang	126	haneyoo	136846562	th	de	Fall Guys
190446236 Olang	126	MAGGIBOYZ	194111065	th	th	among us
155937621 fu2iously	239	CTkzSama	121452130	th	en	Among Us
135677774 bas_sriyab	74	YuzuruCh	177955619	th	th	Among Us
115127433 megarockd	46	appatwn	181647389	th	th	Among Us
115127433 megarockd	46	YuzuruCh	177955619	th	th	Among Us
115127433 megarockd	46	CoolRin_CH	174298139	th	th	Fortnite
239441132 goodguych	175	DewzDuGDIGz	138721915	th	th	Among Us
239441132 goodguych	175	khungkhing07	523192101	th	th	Among Us



TH Following

39,000+ Nodes  
96,000+ Edges

Spreadsheet (CSV)...

General CSV options (1 of 2)

CSV file to import:

/Users/nueng/Desktop/Twitch\_Detail\_TH\_Survival.csv

Separator:

Comma

Import as:

Edges table

Charset:

UTF-8

Preview:

Source	Target	Label	Follow_date
chanamei	znebtv	Among Us	2020-06...
crazypzeiei	znebtv	Among Us	2020-06...
misterdon...	znebtv	Among Us	2020-05...
xblastn	znebtv	Among Us	2020-04...
noeyny1710	znebtv	Among Us	2020-08...
pobsanza...	znebtv	Among Us	2020-04...
mewtakkh...	znebtv	Among Us	2020-03...
piromrakz	znebtv	Among Us	2020-03...
milkkkx	znebtv	Among Us	2020-06...
yind2000	znebtv	Among Us	2020-04...
teely4k	znebtv	Among Us	2020-05...
sakkarin0...	znebtv	Among Us	2020-04...
mazethail...	znebtv	Among Us	2020-05...
nonnoiii	znebtv	Among Us	2019-04...
guyyyyy7	znebtv	Among Us	2020-04...

Help

< Back

Next >



# Graph analysis with Gephi







# Graph analysis with Gephi

1 นำเข้าข้อมูลสำหรับ  
วิเคราะห์ด้วย Gephi

2 คำนวณหา Graph Modularity  
และ Clustering Coefficient

3 หา Average Clustering  
Coefficient ของแต่ละ  
กลุ่ม

4 หา PageRank

User A<sup>13</sup>  
Node

Survival  
(Outlast)

User B  
Node

Survival  
(Dead by Daylight)

Streamer  
Node





# Graph analysis with Gephi

1

นำเข้าข้อมูลสำหรับ  
วิเคราะห์ด้วย Gephi

2

คำนวณหา Graph Modularity  
และ Clustering Coefficient

3

หา Average Clustering Coefficient  
ของแต่ละกลุ่ม

4

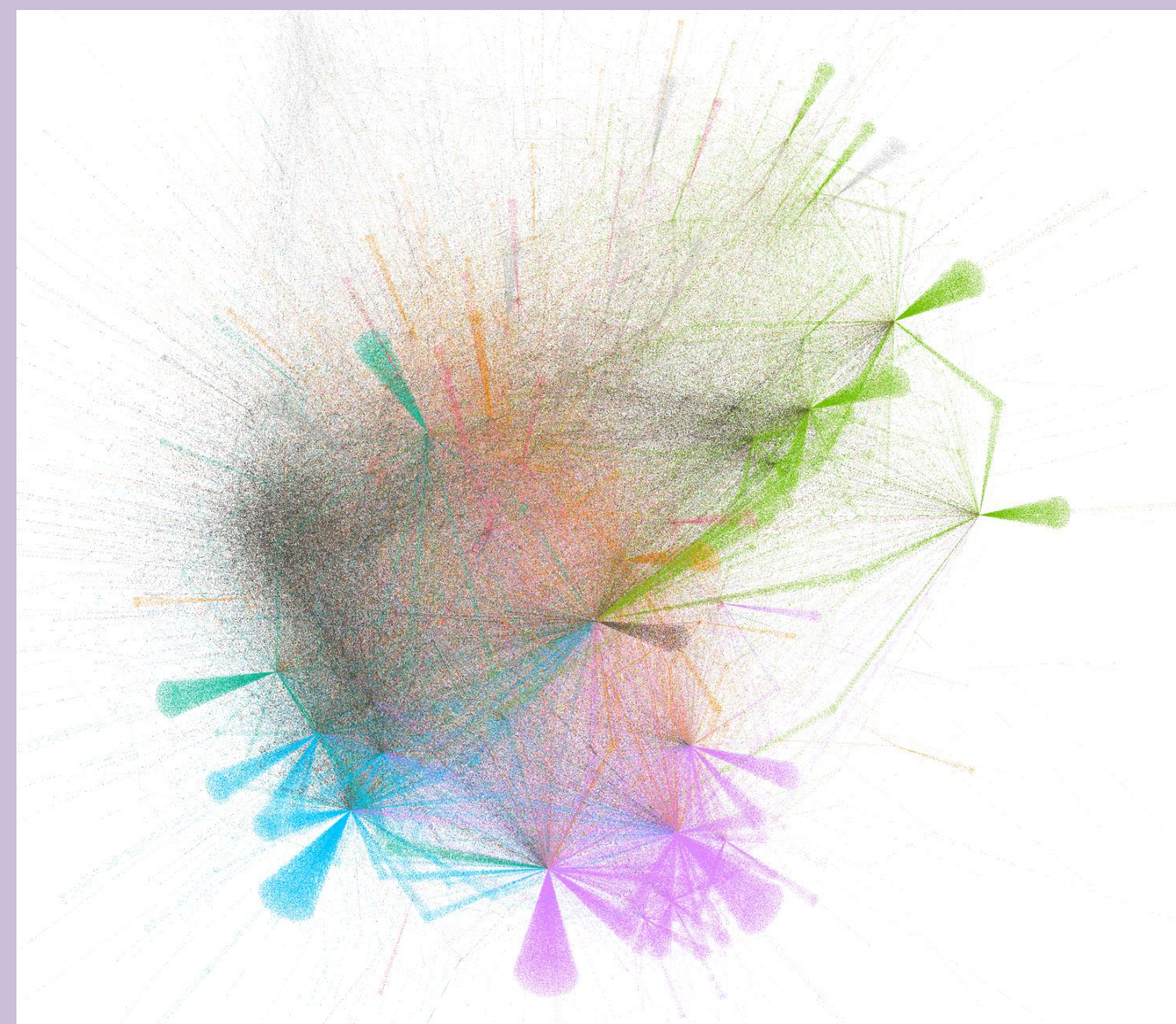
หา PageRank

## จุดประสงค์

- เพื่อทำการแบ่ง Node ในกราฟออกเป็นกลุ่มๆ

## ผลที่ได้

- ค่า Modularity ของ Network เท่ากับ 0.492
- จำนวนกลุ่ม เท่ากับ 168 กลุ่ม







# Graph analysis with Gephi

1

นำเข้าข้อมูลสำหรับ  
วิเคราะห์ด้วย Gephi

2

คำนวณหา Graph Modularity  
และ Clustering Coefficient

3

หา Average Clustering Coefficient  
ของแต่ละกลุ่ม

4

หา PageRank

## จุดประสงค์

- เป็นค่าที่วัดการเกาะกลุ่มกันของ Node ที่อยู่ใน Cluster ถ้ามีค่าสูง แสดงว่า เพื่อนบ้านของ Node นั้นมีความสัมพันธ์ระหว่างกันสูง นั่นคือ มีความเป็น Cluster สูงนั่นเอง



# Graph analysis with Gephi



นำแต่ละกลุ่มที่ได้มาหา Average Clustering Coefficient ของแต่ละกลุ่ม





# Graph analysis with Gephi

1

นำเข้าข้อมูลสำหรับ  
วิเคราะห์ด้วย Gephi

2

คำนวณหา Graph Modularity และ Clustering  
Coefficient

3

หา Average Clustering Coeffi  
cient ของแต่ละกลุ่ม

4

หา PageRank

นำแต่ละกลุ่มที่ได้มาหา Average Clustering Coefficient ของแต่ละ  
กลุ่ม

17

Community Ranking			
Community		Number of Nodes	Average Clustering Coefficient
1		7,727	0.0319
2		6,958	0.2111
3		4,504	0.0206
4		3,407	0.0582
5		3,141	0.0853



# Graph analysis with Gephi

1

นำเข้าข้อมูลสำหรับ  
วิเคราะห์ด้วย Gephi

2

คำนวณหา Graph Modularity และ Clustering  
Coefficient

3

หา Average Clustering Coefficient  
ของแต่ละกลุ่ม

4

หา PageRank

- นำกลุ่มที่เราเลือกมาคำนวณหา PageRank ของแต่ละ Node
- หลักการของ PageRank คือ Node แต่ละ Node มีความสำคัญไม่เท่ากัน Node ที่มีความสำคัญสูง หรือมีค่า PageRank สูง ก็จะเป็น Node ที่มีอิทธิพลต่อ Node รอบข้างสูง นั่นคือเราสามารถใช้ Node นี้เป็นผู้ที่จ่ายข้อมูลไปยัง Node อื่น ๆ ได้ดีนั่นเอง





# Graph analysis with Gephi

1

นำเข้าข้อมูลสำหรับ  
วิเคราะห์ด้วย Gephi

2

คำนวณหา Graph Modularity และ Clustering  
Coefficient

3

หา Average Clustering Coefficient  
ของแต่ละกลุ่ม

4

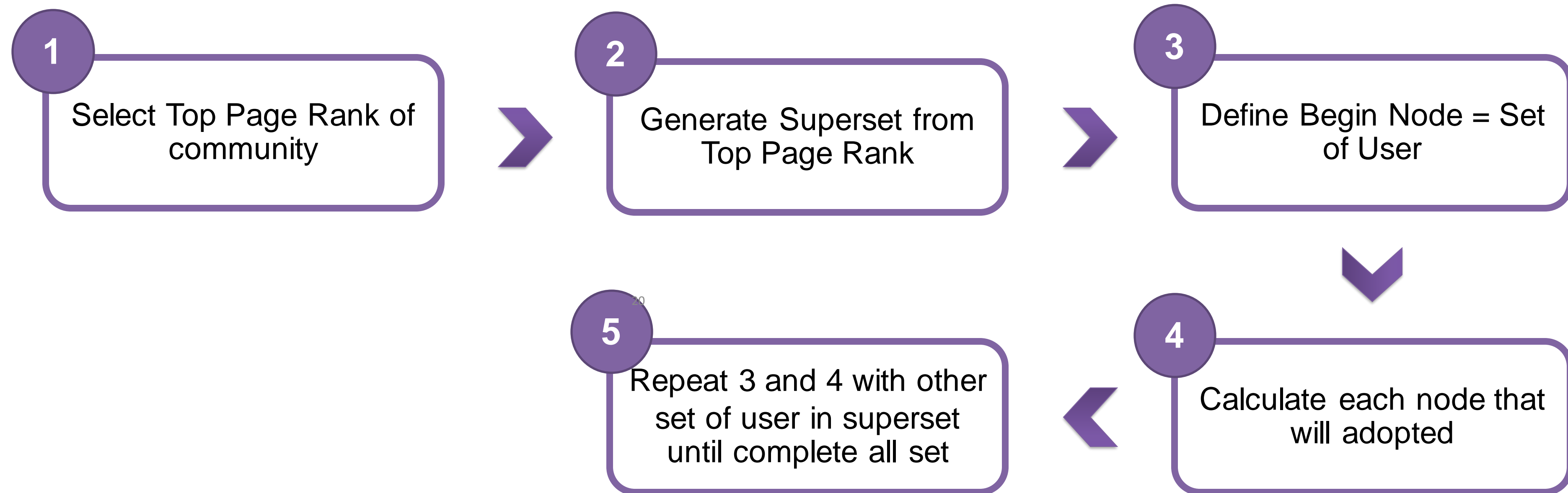
หา PageRank

ลักษณะของ PageRank ที่คำนวณได้

Top 10 Page Rank	
User	PageRank
alictetvz	0.2034
znebtv	0.1027
sohowtf	0.0895
martiex	0.0599
staynarosz	0.0449
capta1njackz	0.0445
sohowtf_jr	0.0139
bestzasp	0.0034
t0ffylive	0.001
systemz77	0.0004



# Cascade Modelling







# Cascade Modelling

1

Select Top Page Rank of community

2

Generate Superset from Top Page Rank

3

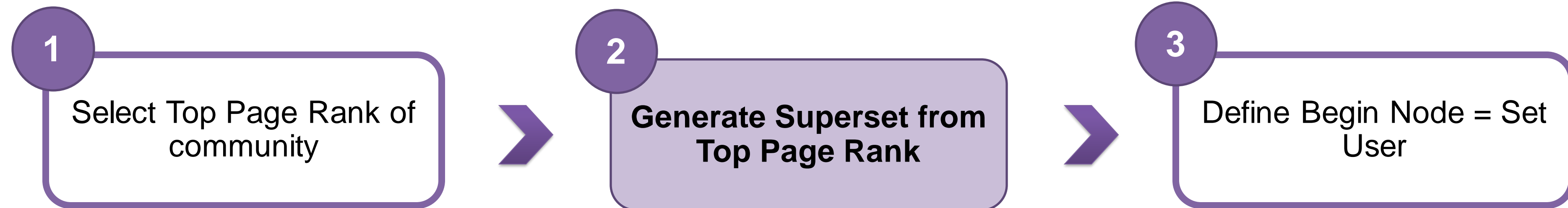
Define Begin Node = Set of User



- Export network of community from gephi (High Node & High Clustering Coefficient )
- Import network into networkX
- Select top 5 page rank in community (Gephi) insert to list



# Cascade Modelling



- List of user top 5 page rank >> Generate superset

```
lst_set=[list(itertools.combinations(user, i)) for i in range(1, len(user)+1)]
```

- Example

List of user top 5 page rank = ['alicetvz','znebtv','sohowtf','martiex','staynarosz']

Set 1 Node : {alicetvz},{znebtv},{sohowtf}, ...

Set 2 Node : {alicetvz, znebtv},{znebtv, sohowtf},{sohowtf, alicetvz}, ...

Set 3 Node : {alicetvz, znebtv, sohowtf}, {alicetvz, znebtv, staynarosz}, ...

Set 4 Node : {alicetvz, znebtv, sohowtf, martiex}, {alicetvz, znebtv, staynarosz, martiex},

...

Set 5 Node : {alicetvz, znebtv, sohowtf, martiex, staynarosz}





# Cascade Modelling

1

Select Top Page Rank of community

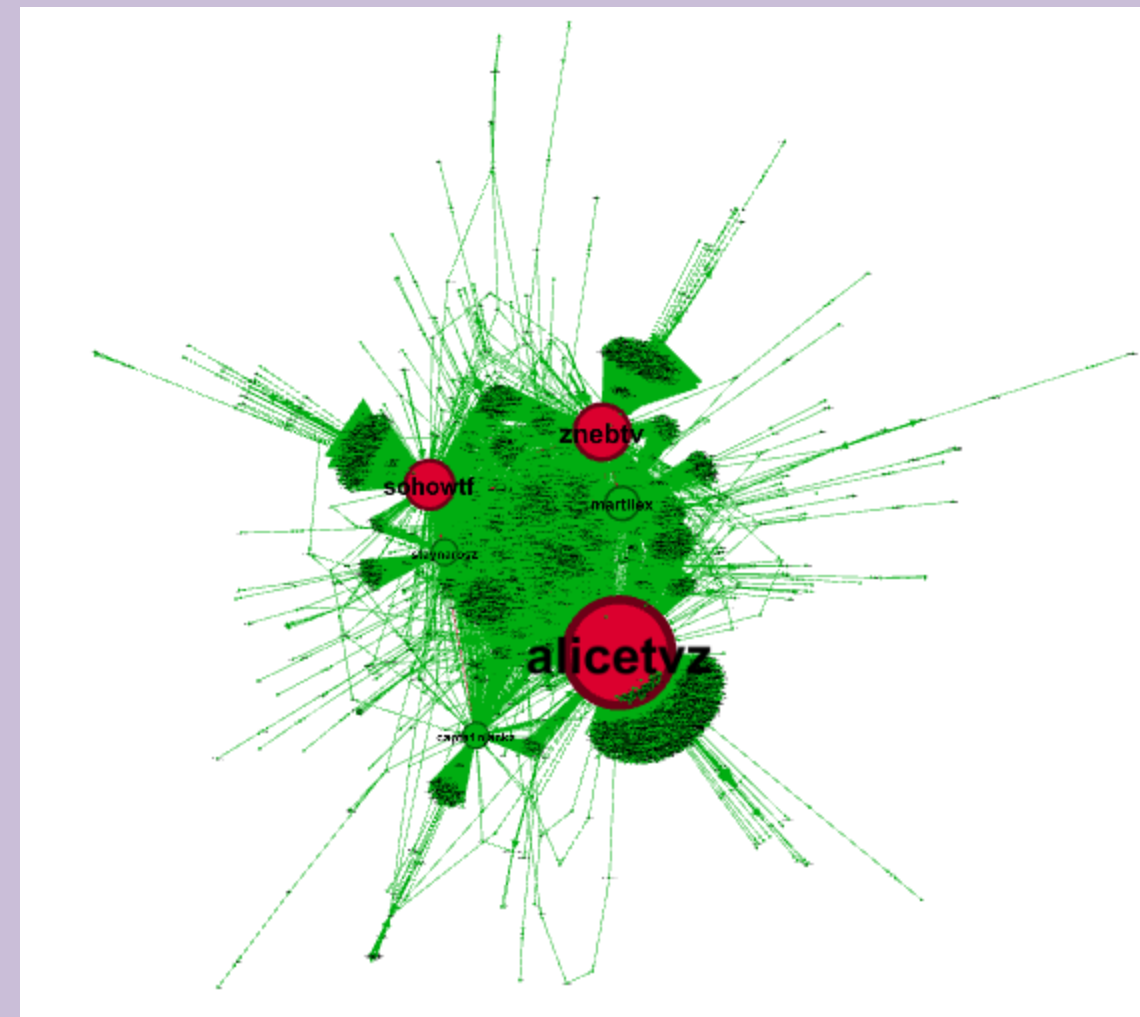
2

Generate Superset from Top Page Rank

3

Define Begin Node = Set of User

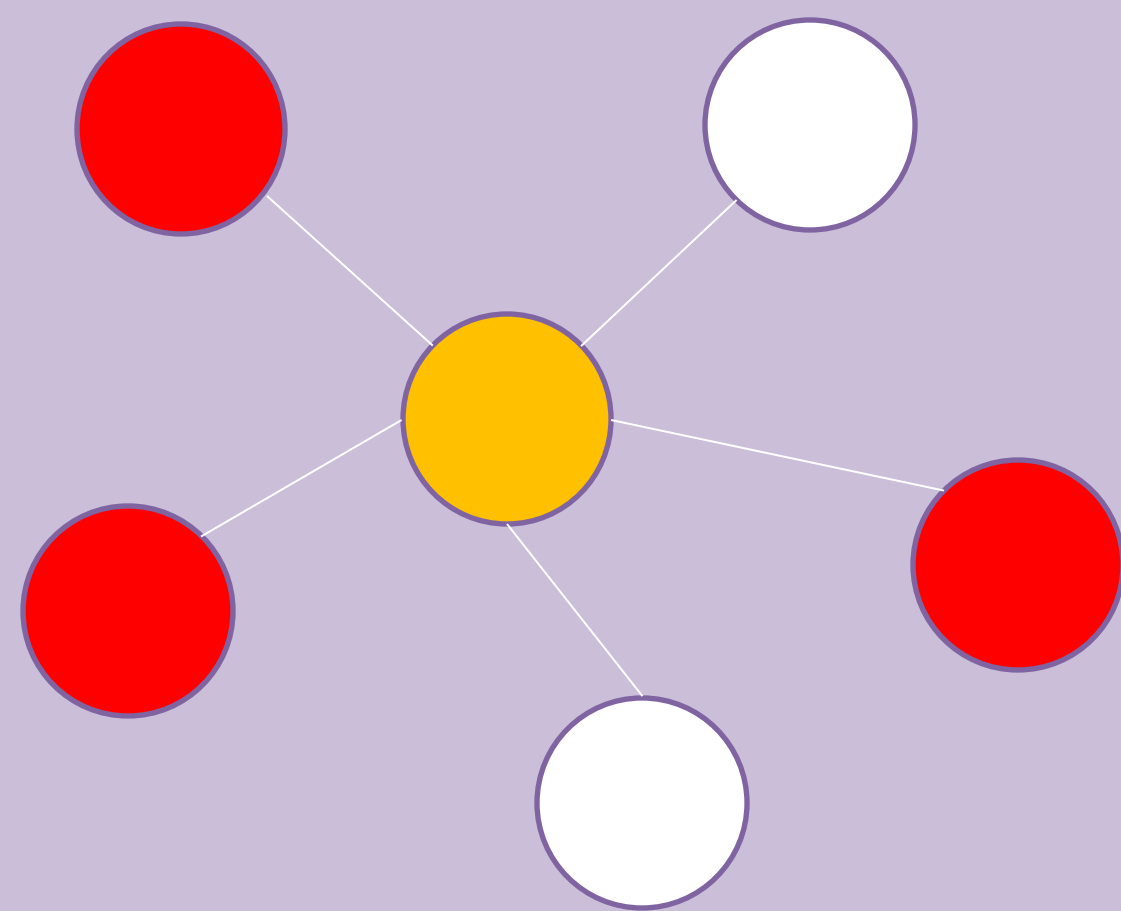
- **Select a set from superset**
- **Define begin node = selected set**
- **Change begin node to game which you want to promote**



Calculate each node that will adopted



# Cascade Modelling



● Target Node

● a = Neighbor Node who changed

○ b = Neighbor Node who unchanged

Target node (●) Will adopted a (●) if  $p > b/(a+b)$

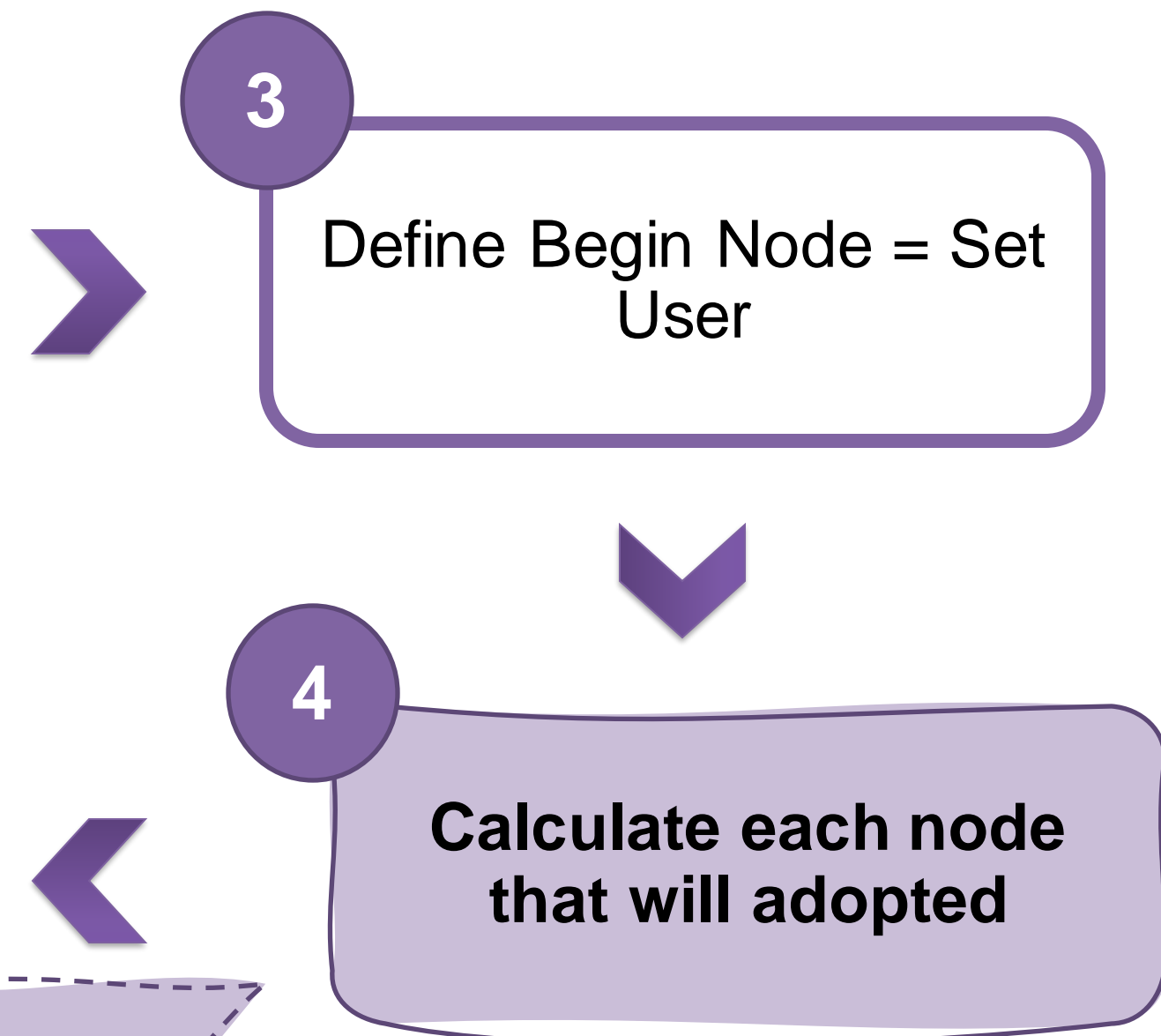
Else Target node change to b (○)

- $p$  = fraction of Neighbor Node who changed /all Neighbor Node

Calculate all Node

start at layer 1 until coverage all network

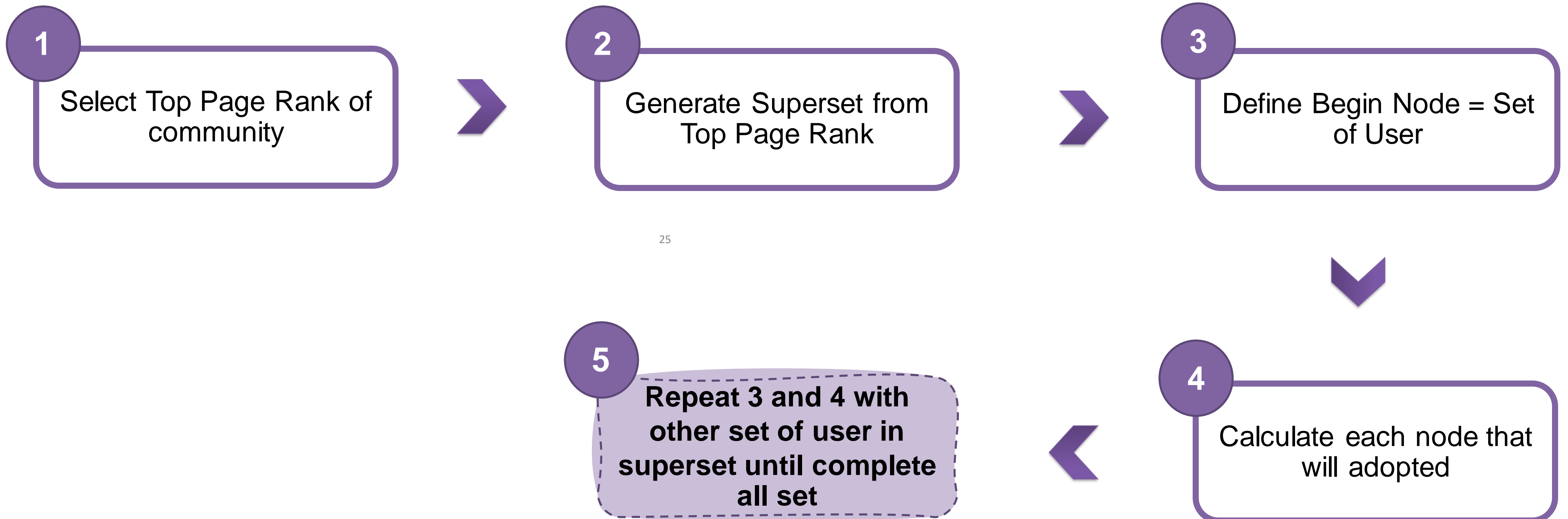
At last we will have result is number of node who changed to new game







# Cascade Modelling

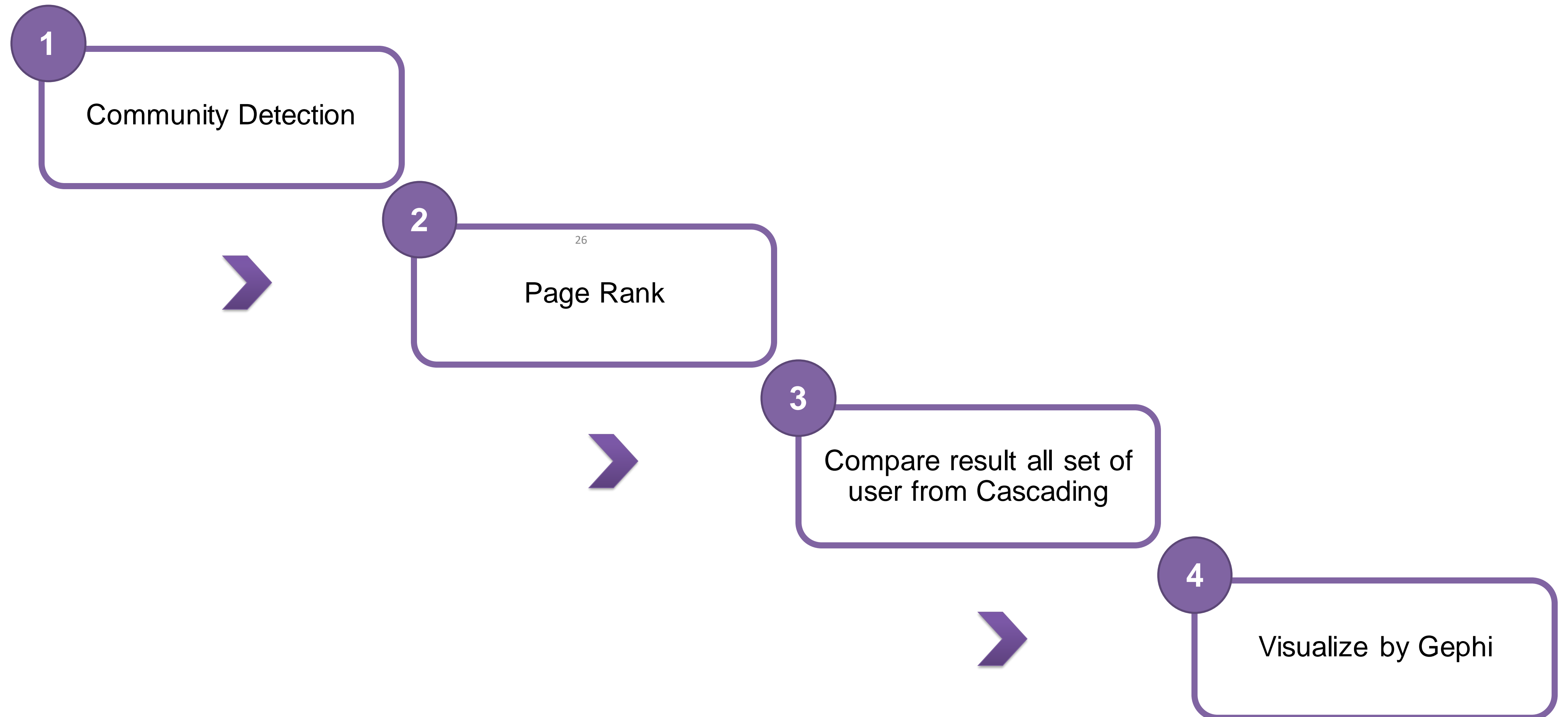


25



# Result and Conclusion

We study in case all user in network interest in survival game then we will start spread game “Among us” into network





# Result and Conclusion

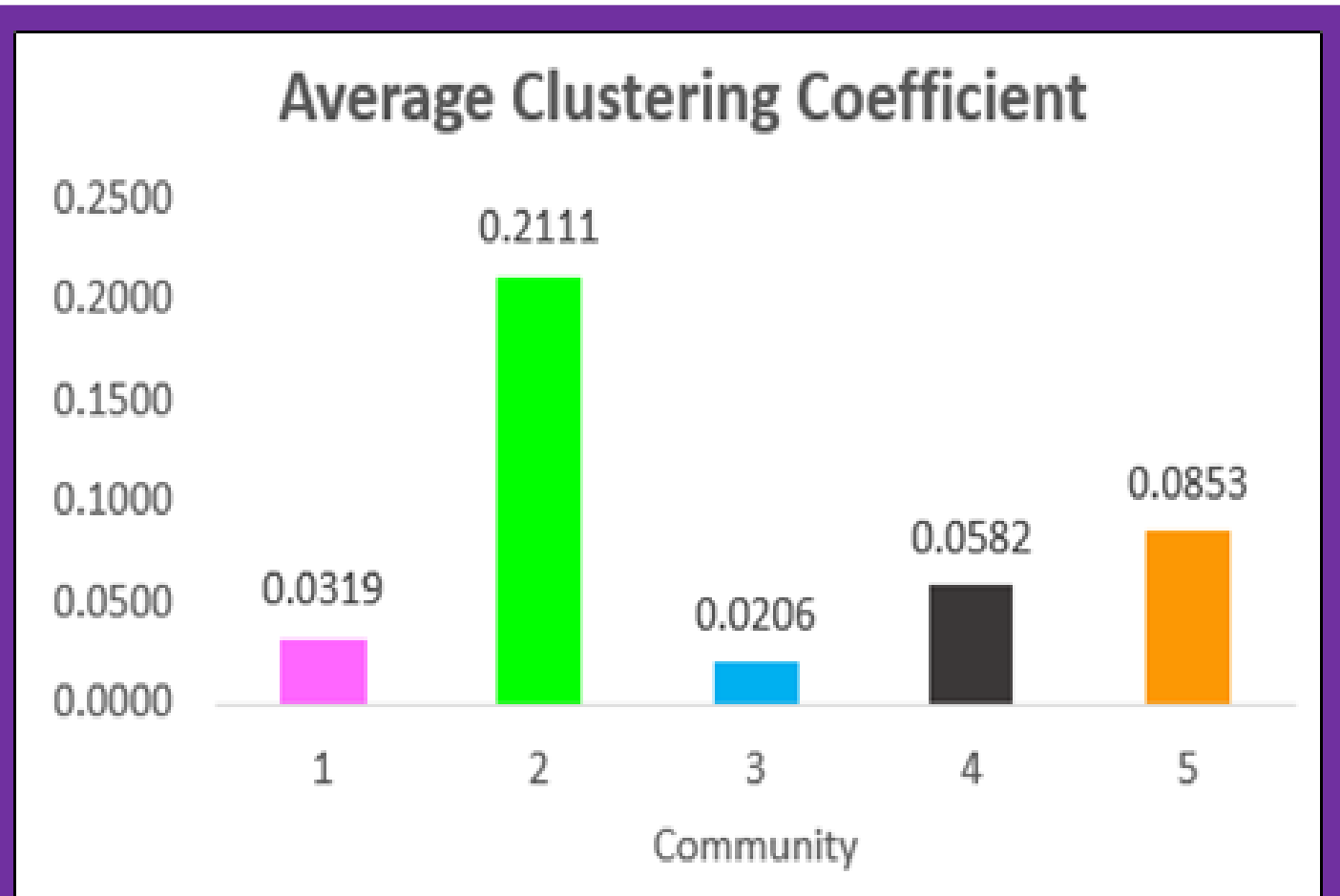
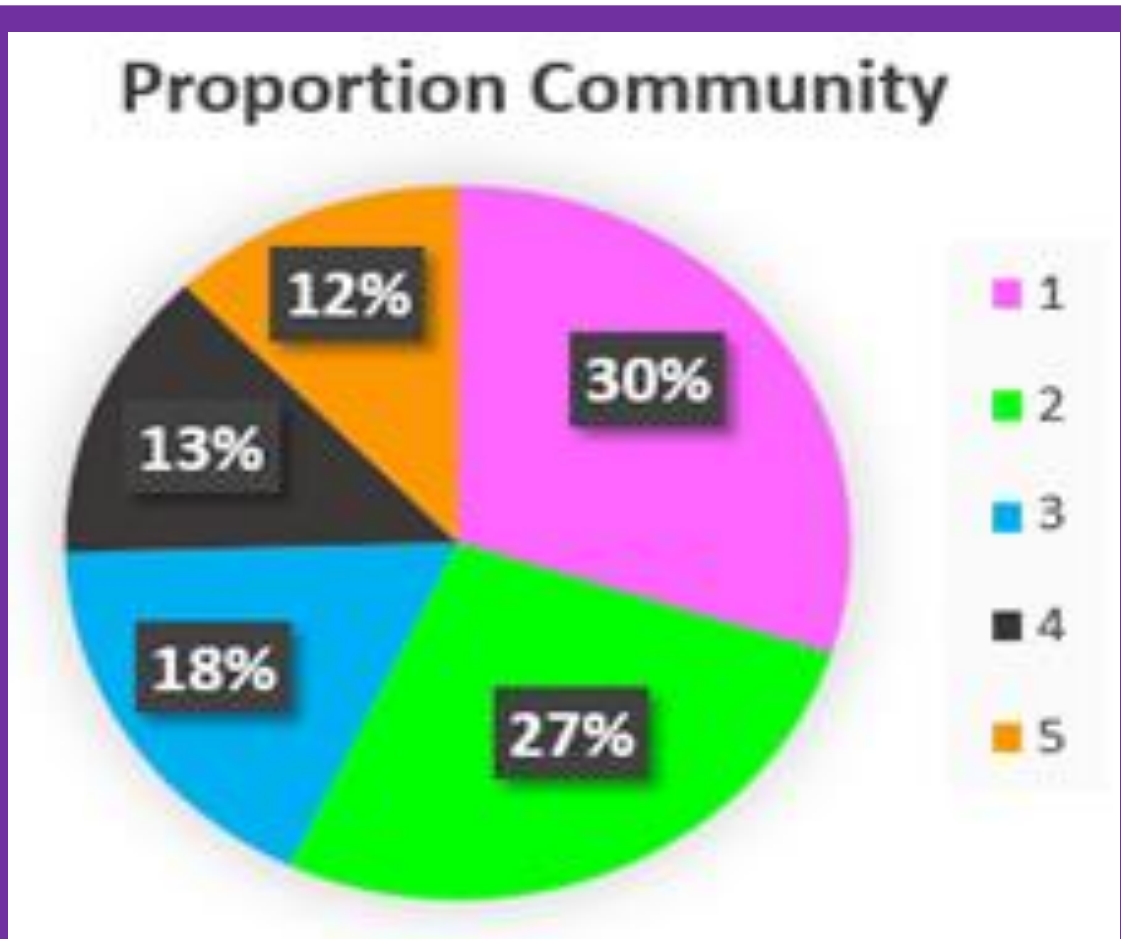
## 1 Community Detection



168 Communities

Modularity  $Q = 0.492$

Community Ranking			
Community		Number of Nodes	Average Clustering Coefficient
1		7,727	0.0319
2		6,958	0.2111
3		4,504	0.0206
4		3,407	0.0582
5		3,141	0.0853



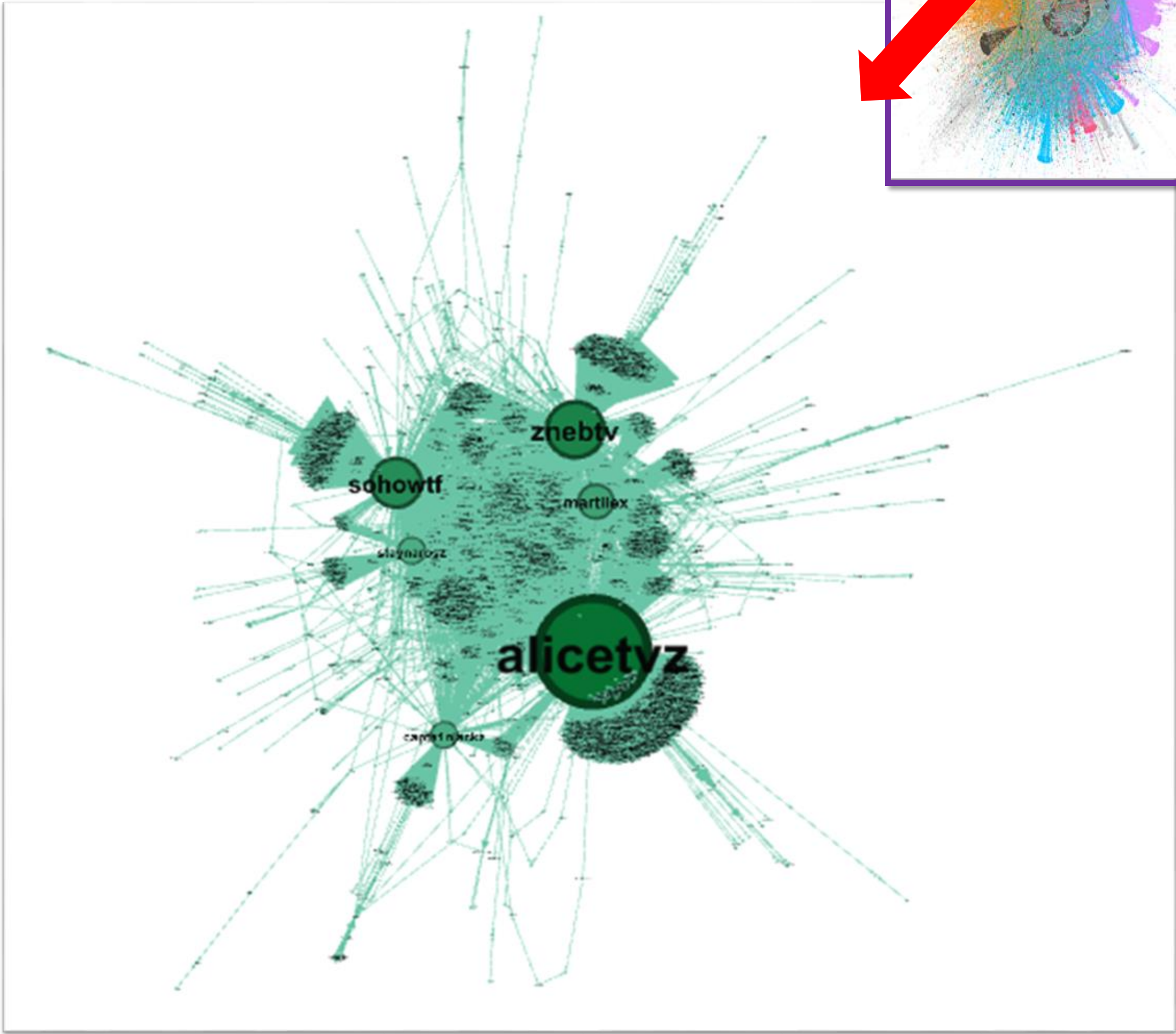


# Result and Conclusion

2

## Page Rank

Top 10 Page Rank	
User	PageRank
alictvz	0.2034
znebtv	0.1027
sohowtf	0.0895
martiex	0.0599
staynarosz	0.0449
capta1njackz	0.0445
sohowtf_jr	0.0139
bestzasp	0.0034
t0ffy1ive	0.001
systemz77	0.0004



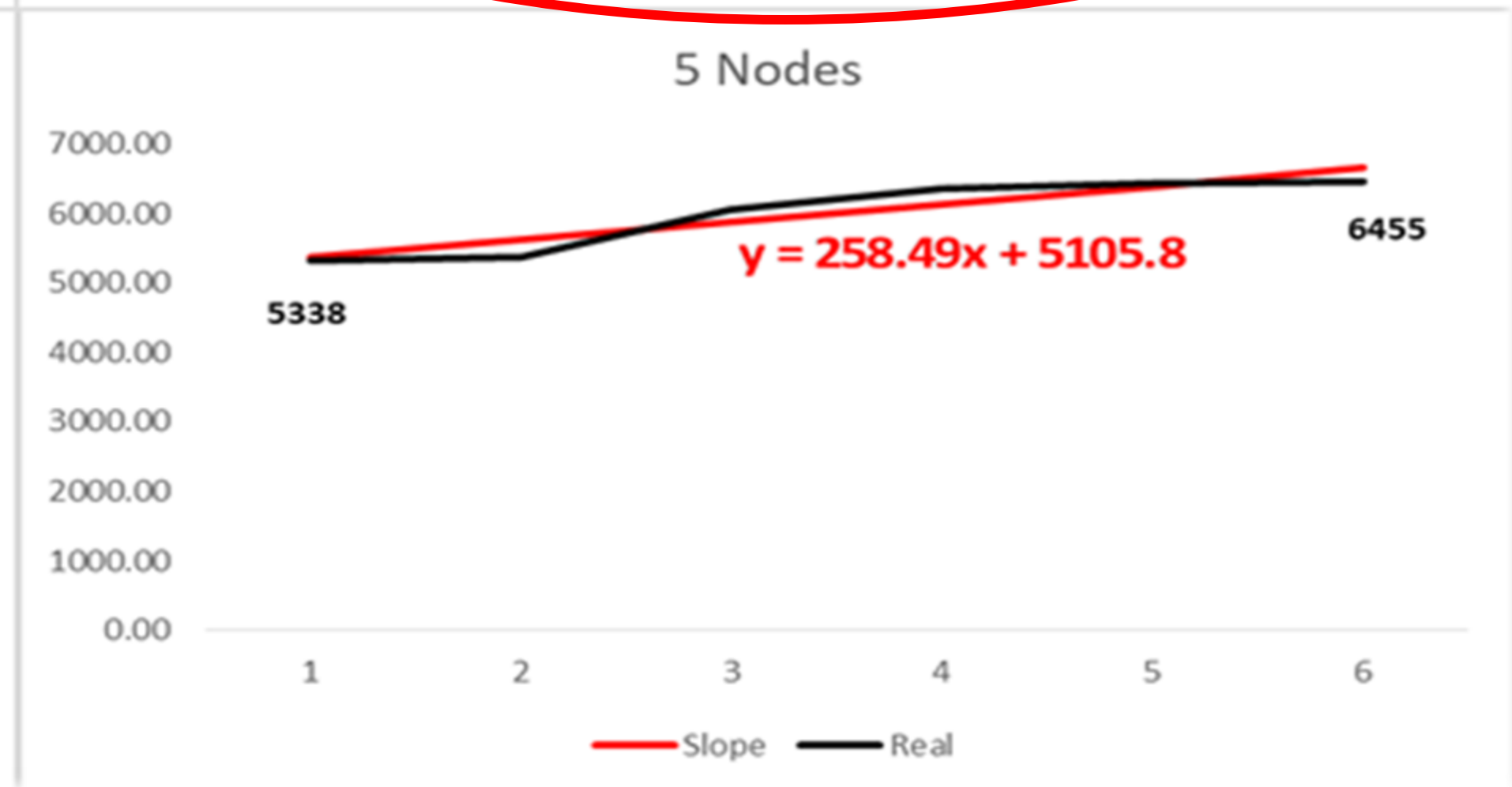
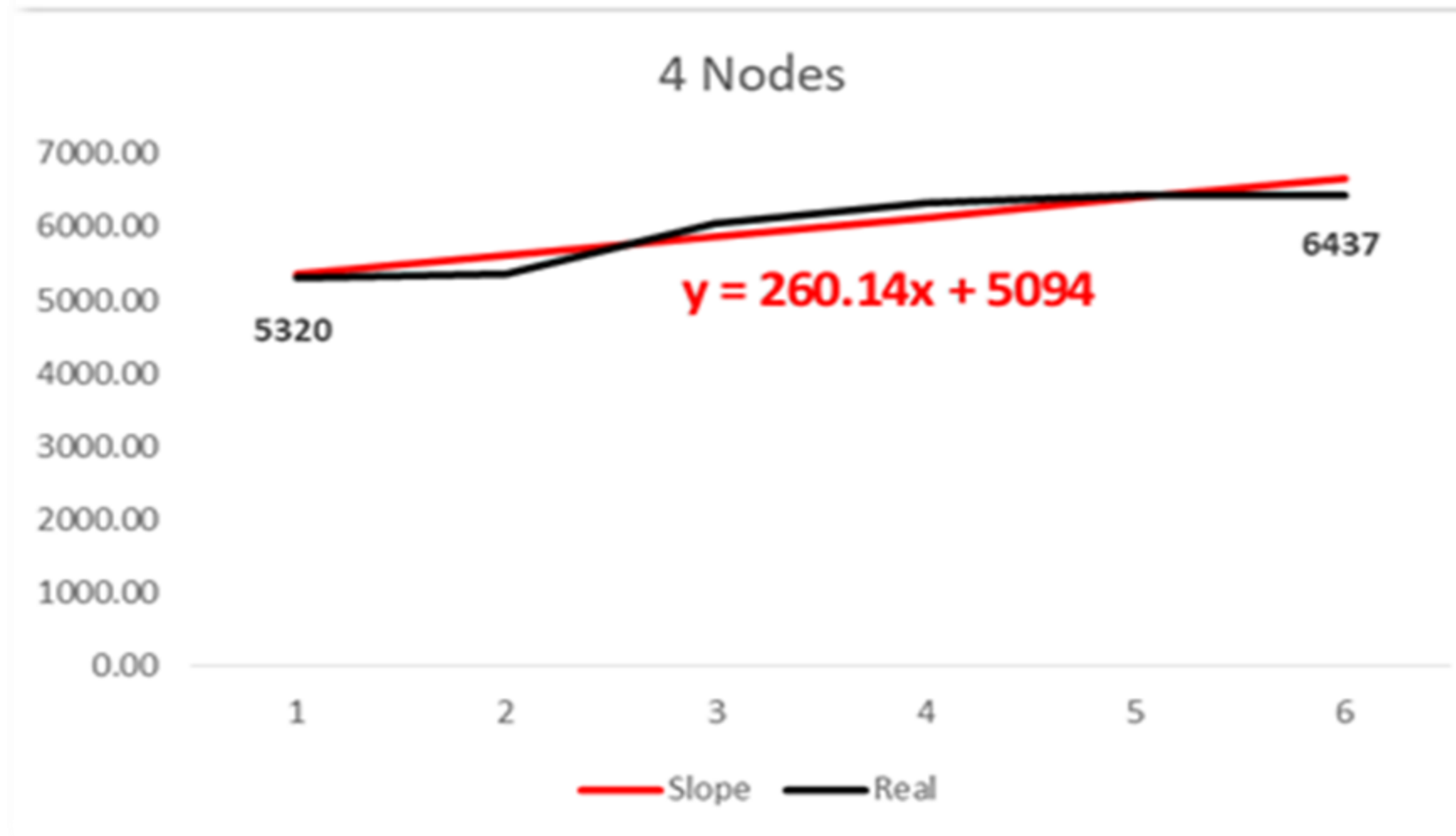
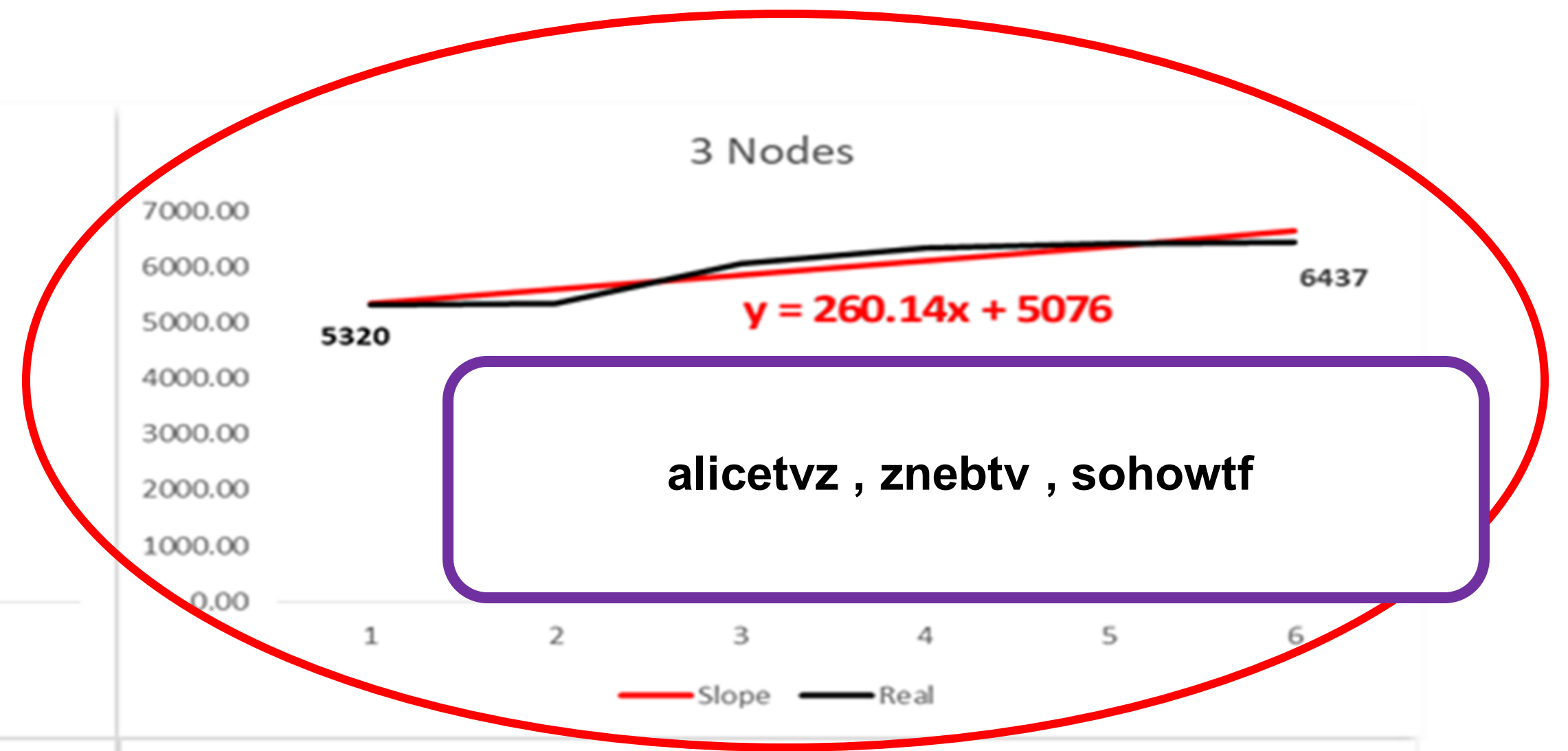
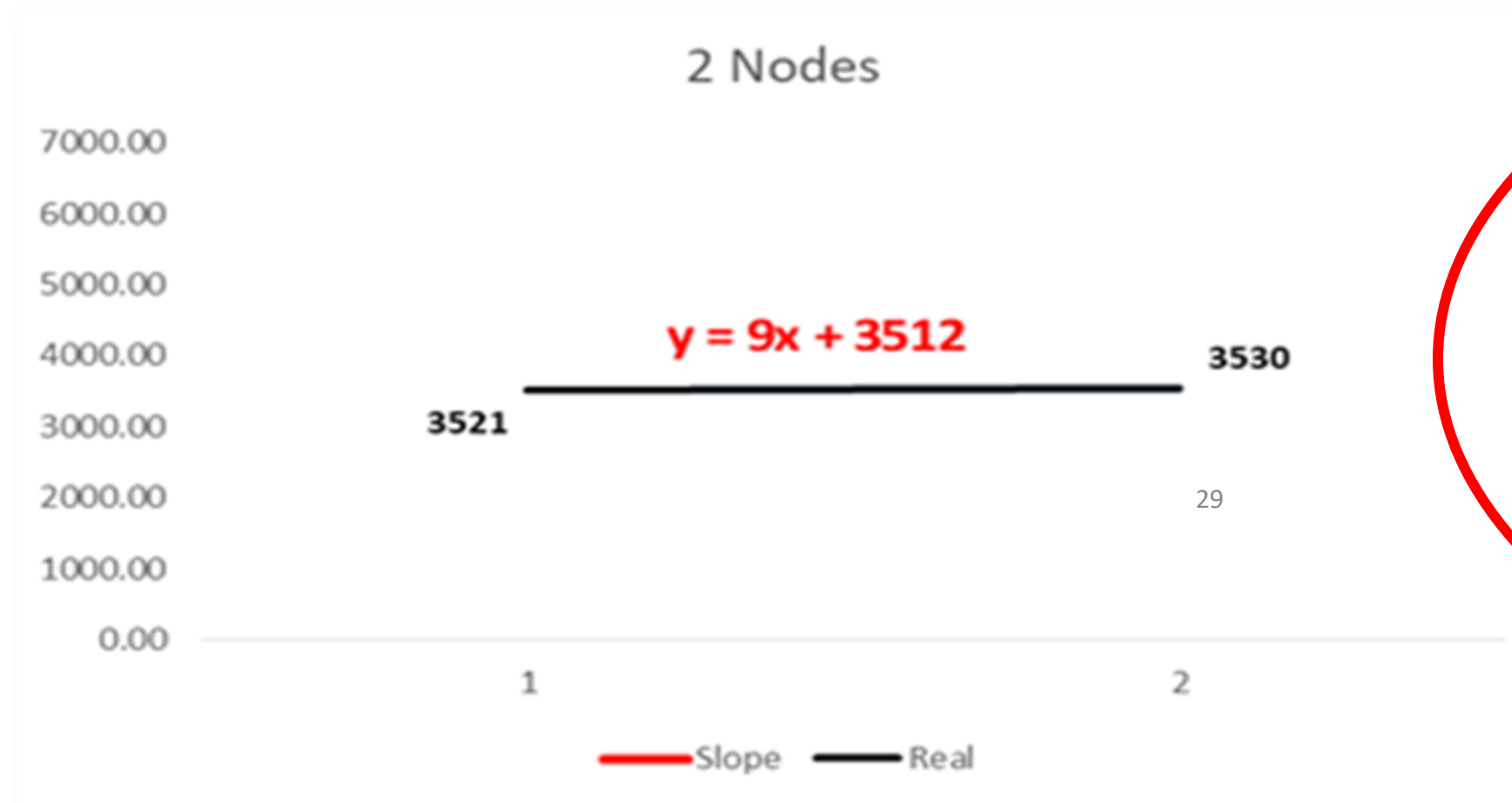




# Result and Conclusion

3

Compare cascading



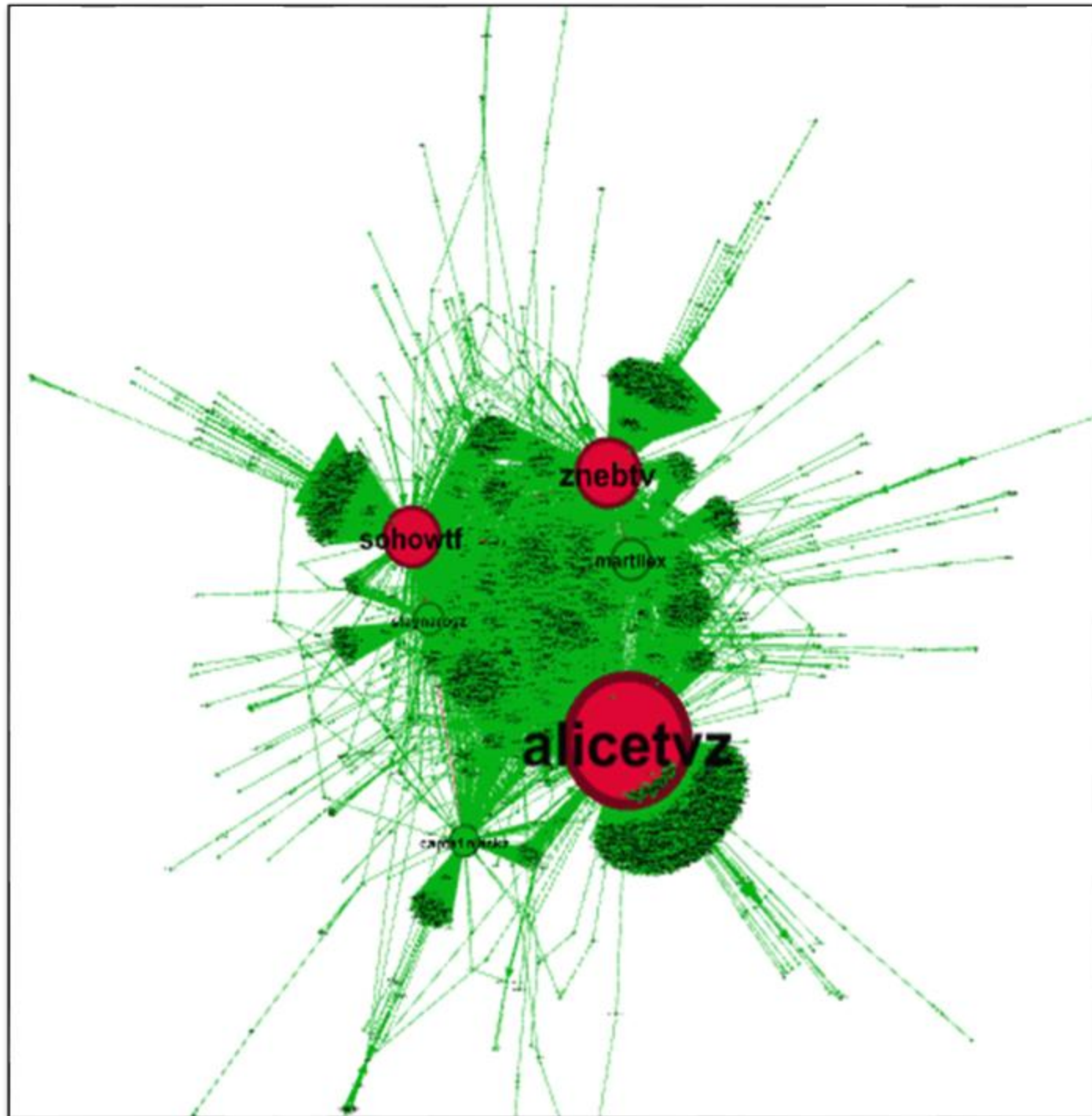




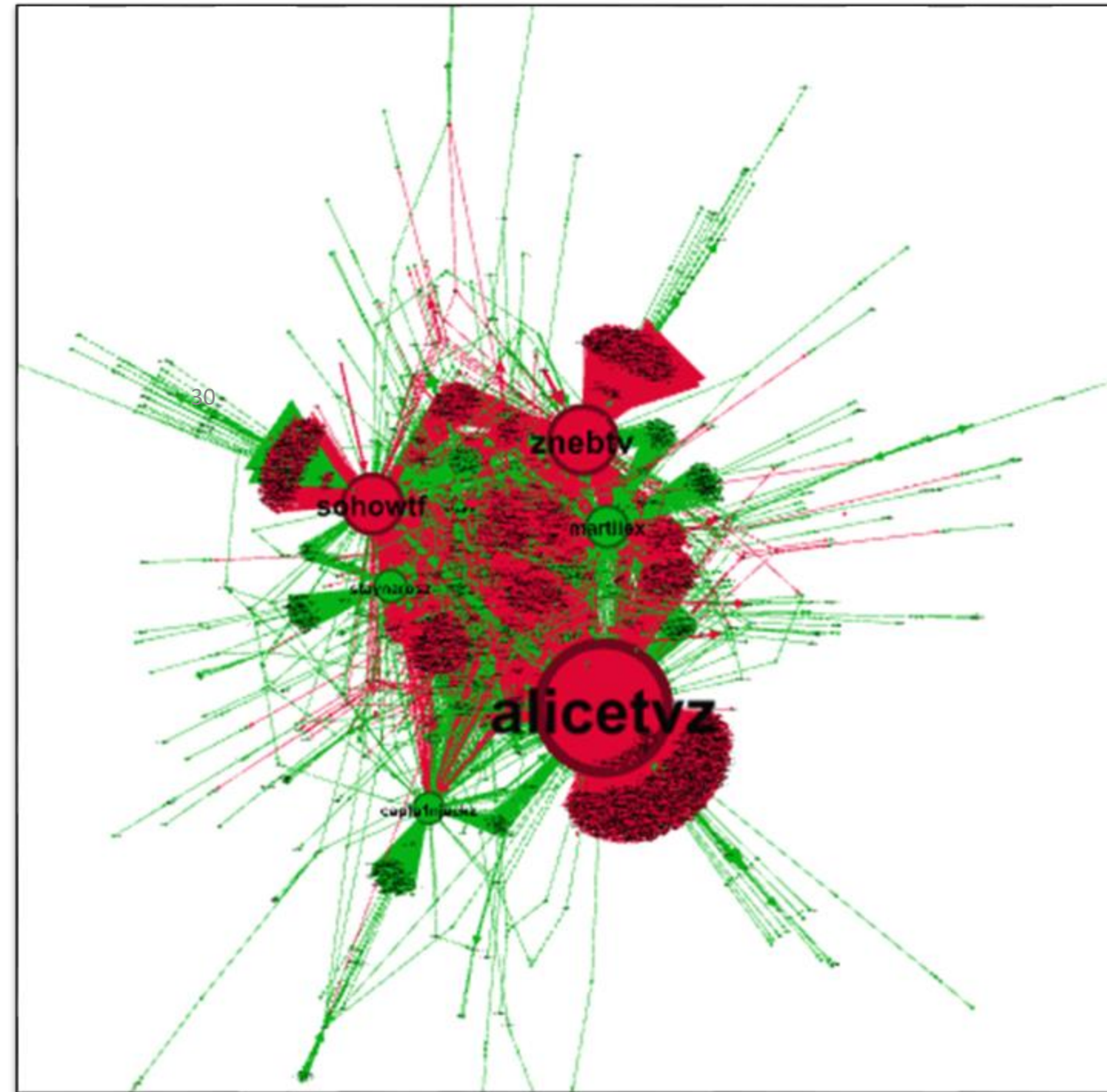
# Result and Conclusion

4

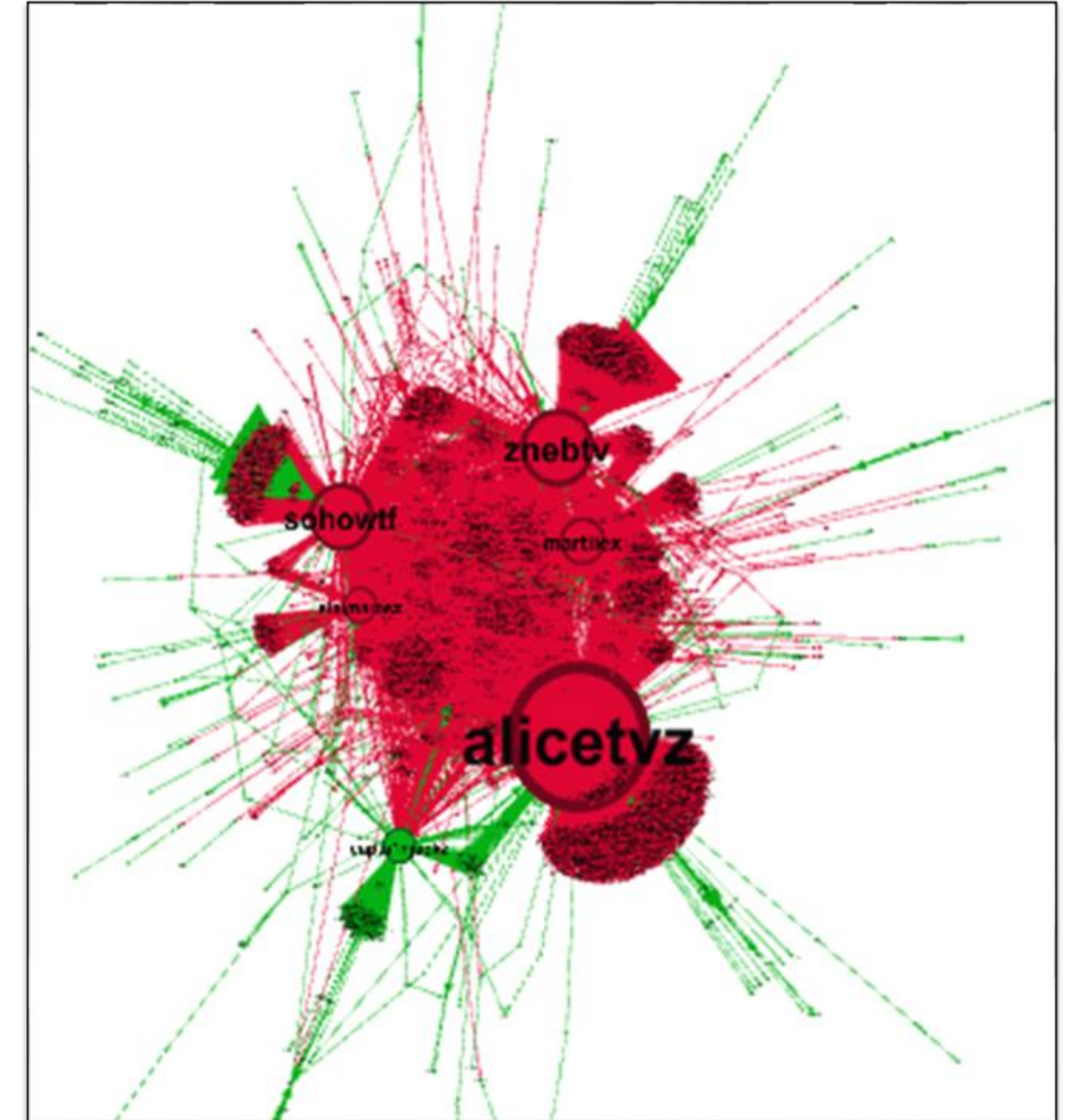
Visualize



Begin Viral



Spread One Time



Spread Until Converge



Thank you

