

### 3. Data Visualization of Health Breach Dataset using R

breach_report.csv - Microsoft Excel																							
name_of_covered_entity																							
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	
1	name_of_state	covered_individuals	breach_submission_type_of_b	location_of_breach	business_e	web_description																	
2	Brooke Ar TX	Healthcare	1000	21-10-2009	Theft	Paper/Film	FALSE	A binder containing the protected health information (PHI) of up to 1,272 individuals was stolen from a staff member's vehicle. The PHI included names, telephone															
3	Mid Ameri MO	Healthcare	1000	28-10-2009	Theft	Network S	FALSE	Five desktop computers containing unencrypted electronic protected health information (e-PHI) were stolen from the covered entity (CE). Originally, the CE report															
4	Alaska Dej AK	Healthcare	501	30-10-2009	Theft	Other, Oth	FALSE	VN															
5	Health Ser DC	Health Pla	3800	17-11-2009	Loss	Laptop	FALSE	A laptop was lost by an employee while in transit on public transportation. The computer contained the protected health information of 3800 individuals. The pr															
6	Mark D. L CA	Healthcare	5166	20-11-2009	Theft	Desktop C	FALSE	A shared Computer that was used for backup was stolen on 9/27/09 from the reception desk area of the covered entity. The Computer contained certain elect															
7	L. Douglas CA	Healthcare	5257	20-11-2009	Theft	Desktop C	FALSE	A shared Computer that was used for backup was stolen on 9/27/09 from the reception desk area of the covered entity. The Computer contained certain elect															
8	David I. CC CA	Healthcare	857	20-11-2009	Theft	Desktop C	FALSE	A shared Computer that was used for backup was stolen from the reception desk area, behind a locked desk area, probably while a cleaning crew had left the ma															
9	Michael D CA	Healthcare	6145	20-11-2009	Theft	Desktop C	FALSE	A shared Computer that was used for backup was stolen on 9/27/09 from the reception desk area of the covered entity. The Computer contained certain elect															
10	Joseph F. I CA	Healthcare	952	20-11-2009	Theft	Desktop C	FALSE	A shared Computer that was used for backup was stolen on 9/27/09. The Computer contained certain electronic protected health information (ePHI) of 952 patie															
11	City of Ho CA	Healthcare	5900	23-11-2009	Theft	Laptop	FALSE	A laptop computer was stolen from a workforce member's car. The laptop computer contained the protected health information of approximately 5,900 individ															
12	The Childr PA	Healthcare	943	24-11-2009	Theft	Laptop	FALSE	A laptop computer was stolen from a hospital employee's vehicle. The computer contained the protected health information (PHI) of 943 individuals and includ															
13	Cogent He TN	Business A	6400	25-11-2009	Theft	Laptop	TRUE	A laptop was stolen from a locked office at the Aurora St. Lukes Medical Center. The laptop contained protected health information pertaining to 6,400 individ															
14	Democrat VA	Business A	83000	08-12-2009	Other	Paper/Film	TRUE	In its breach report and during the course of OCR's investigation, the covered entity advised that it took various corrective actions to prevent a recurrence of it															
15	Kern Medi CA	Healthcare	596	10-12-2009	Theft	Other	FALSE	VN															
16	Rick Lawst NC	Business A	2000	11-12-2009	Theft	Desktop C	TRUE	The covered entity (CE) changed the business associate (BA) it used as its information technology vendor. During the transition, a workforce member of the outg															

#### R Studio Visualization

```
> data=read.csv(file.choose(),header=T)
> head(data)
      name_of_covered_entity 1
1 Brooke Army Medical Center
2 Mid America Kidney Stone Association, LLC
3 Alaska Department of Health and Social
  Services 4 Health Services for children
  with Special Needs, Inc.
5 Mark D. Lurie, MD 6
6 L. Douglas Carlson, M.D.
  state covered_entity_type individuals_affected 1
TX Healthcare Provider 1000
2 MO Healthcare Provider 1000
3 AK Healthcare Provider 501
4 DC Health Plan 3800
5 CA Healthcare Provider 5166 6 CA
  Healthcare Provider 5257
  breach_submission_date type_of_breach 1
  2009-10-21 Theft
2 2009-10-28 Theft
3 2009-10-30 Theft
4 2009-11-17 Loss
5 2009-11-20 Theft 6
  2009-11-20 Theft
  location_of_breached_information 1
  Paper/Films
2 Network Server
3 Other, Other Portable Electronic Device
4 Laptop
5 Desktop Computer 6 Desktop
Computer business_associate_present 1
false
2 false
3 false
4 false
5 false
6 false
> y=data.frame(data$state, data$type_of_breach)
```

```

> library(igraph)

> net=graph.data.frame(y,directed=T)

> V(net)
+ 81/81 vertices, named, from 6ccd198:
[1] TX
[2] MO
[3] AK
[4] DC
[5] CA
[6] PA
[7] TN
[8] VA
[9] NC
[10] MI
+ ... omitted several vertices

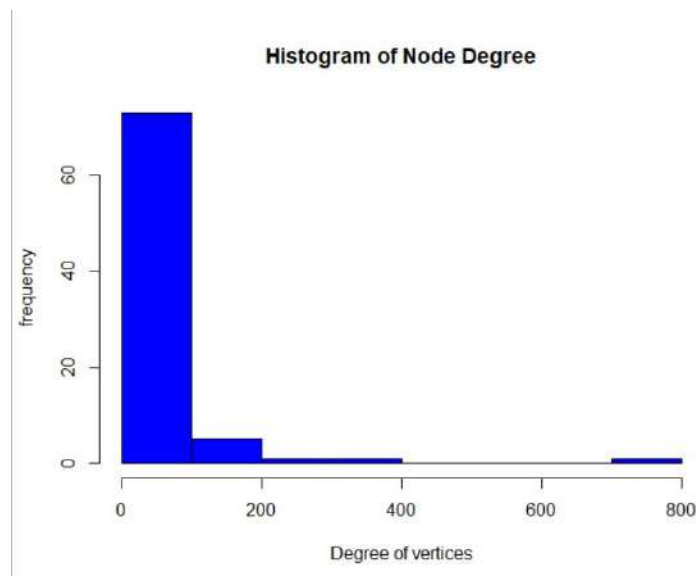
> E(net)
+ 1701/1701 edges from 6ccd198 (vertex names):
[1] TX->Theft MO->Theft AK->Theft DC->Loss CA->Theft
[6] CA->Theft CA->Theft CA->Theft CA->Theft CA->Theft
[11] PA->Theft TN->Theft VA->Other CA->Theft NC->Theft
[16] MI->Theft MI->Theft CA->Other MA->Theft DC->Theft
[21] MA->Theft MD->Theft CA->Theft ID->Theft MI->Theft
[26] TX->Loss MO->Theft TX->Theft IL->Theft TX->Theft
[31] CA->Theft IL->Theft UT->Theft AZ->Theft RI->Other
[36] PR->Theft PR->Theft FL->Theft TN->Theft CA->Other
[41] NM->Other CA->Theft NY->Theft FL->Theft WY->
[46] WI->Theft NC->Theft NY->Theft TX->Theft FL->Other
+ ... omitted several edges

> V(net)$label=V(net)$name

> V(net)$degree=degree(net)

> hist(V(net)$degree,col='blue',main='Histogram of Node Degree',ylab='frequency',xlab='Degree of vertices')

```

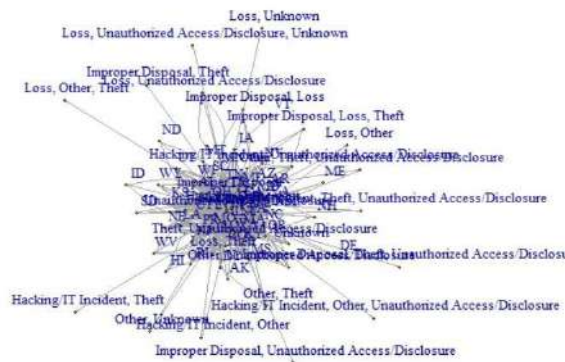


```

> set.seed(222)

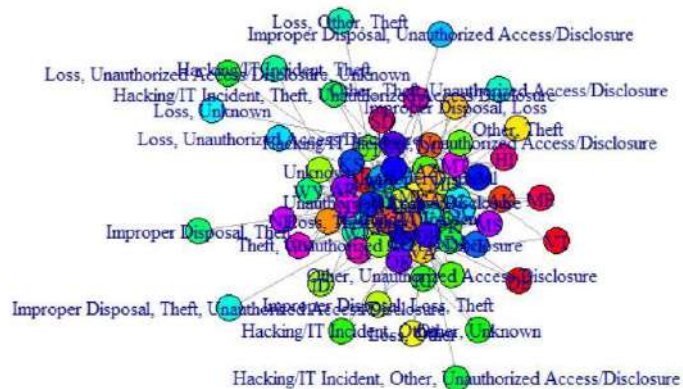
> plot(net,vertex.size=2,vertex.label.dist=1.5,vertex.label.cex=0.8,edge.arrow.size=0.1)

```

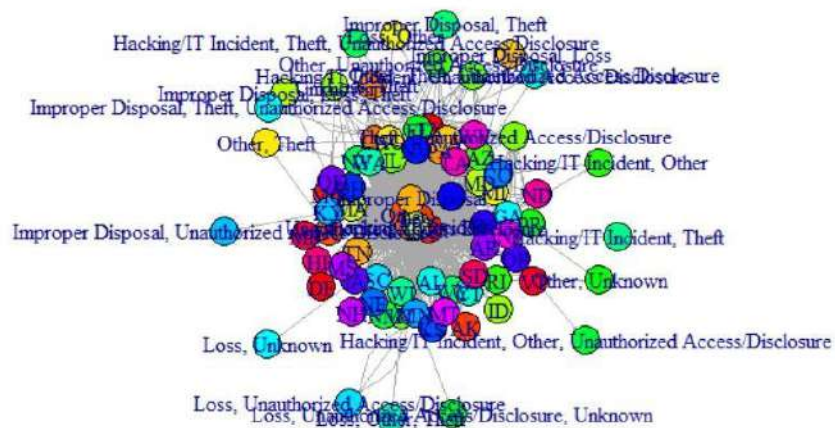


The combination of attractive forces on adjacent vertices, and repulsive forces on all vertices, was first used by Eades(1984), additional pioneering work on this type of force-directed layout was done by Fruchterman & Reingold(1991)

```
> plot(net, vertex.color=rainbow(52), edge.arrow.size=0.1, layout=layout.graphopt)
```



```
> plot(net, vertex.color=rainbow(52), edge.arrow.size=0.1, layout=layout.kamada.kawai) #t
he best form
```



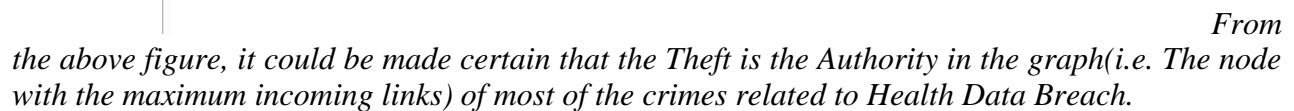
*Kamada Kawai Algorithm is based on the minimisation of the total energy the whole system of springs, which represent the graph*

```
> plot(net,vertex.size=hs*30,main="Hubs",vertex.color=rainbow(52),edge.arrow.size=0,layout
t=layout.kamada.kawai)
```

**Hubs**



```
> plot(net, vertex.size = as*30, main="Authorities", vertex.color = rainbow(52) , edge.ar  
row.size=0 , layout=layout.kamada.kawai)
```



1. Edit / 2. Preview / 3. Text Analysis / 4. Network Analysis / 5. Report

Twitter

YouTube

Google Sheets

Text File

RSS

Reddit

**Twitter API information and limitations**Twitter account linked with Netlytic: **NishthaMalik3****Dataset Name:**  (No Special Characters)**Twitter Search Query:** 

Search terms may be keywords with operators, hashtags, or @usernames. See other search options.

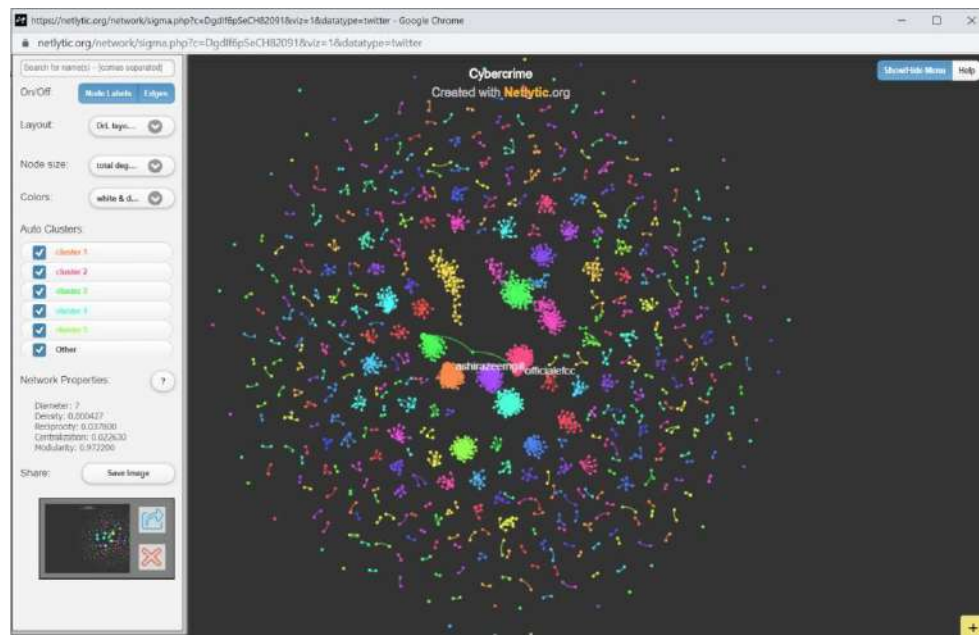
Note: The search query will run once to retrieve up to 2500 most recent tweets. (Tier 3 accounts can set this query to run every 15 min automatically.)

1 2 3 ... 250 NEXT

DATE	USER	POSTS, N = 2500
2021-04-26	treda10	@PascoSheriff @doctorcop While Charlie Brown is already in jail for cyber crime among other things, countless hackers and Linked In supporters are still moving freely. Close your computer network doors. Be aware of the many dangers outside." - Snoopy
2021-04-26	Comwall_Marine	SCAM ALERT: We are aware of scammers sending BEIS headed letters to businesses telling them that, by law, they need to purchase air purifiers to comply with #COVID19 rules. This is not true. If you receive a letter, please report it to @actionfrauduk <a href="https://t.co/jNZ8PBdjq9">https://t.co/jNZ8PBdjq9</a>
2021-04-26	Vikasaz1	After my RTI, @DelhiPolice issues statement blaming "vested interests" & saying no volunteers have been coerced I got off the phone with multiple volunteers who got calls from the Cyber Crime Cell landline at Chandni Chowk Kotwali PS Nevertheless, good that they're backing off! <a href="https://t.co/ASS7eiVxUg">https://t.co/ASS7eiVxUg</a>
2021-04-26	2emkay	After my RTI, @DelhiPolice issues statement blaming "vested interests" & saying no volunteers have been coerced I got off the phone with multiple volunteers who got calls from the Cyber Crime Cell landline at Chandni Chowk Kotwali PS Nevertheless, good that they're backing off! <a href="https://t.co/ASS7eiVxUg">https://t.co/ASS7eiVxUg</a>
2021-04-26	born_mumbaikar	After my RTI, @DelhiPolice issues statement blaming "vested interests" & saying no volunteers have been coerced I got off the phone with multiple volunteers who got calls from the Cyber Crime Cell landline at Chandni Chowk Kotwali PS Nevertheless, good that they're backing off! <a href="https://t.co/ASS7eiVxUg">https://t.co/ASS7eiVxUg</a>
2021-04-26	sgloscouncil	SCAM ALERT: We are aware of scammers sending BEIS headed letters to businesses telling them that, by law, they need to purchase air purifiers to comply with #COVID19 rules. This is not true. If you receive a letter, please report it to @actionfrauduk <a href="https://t.co/jNZ8PBdjq9">https://t.co/jNZ8PBdjq9</a>



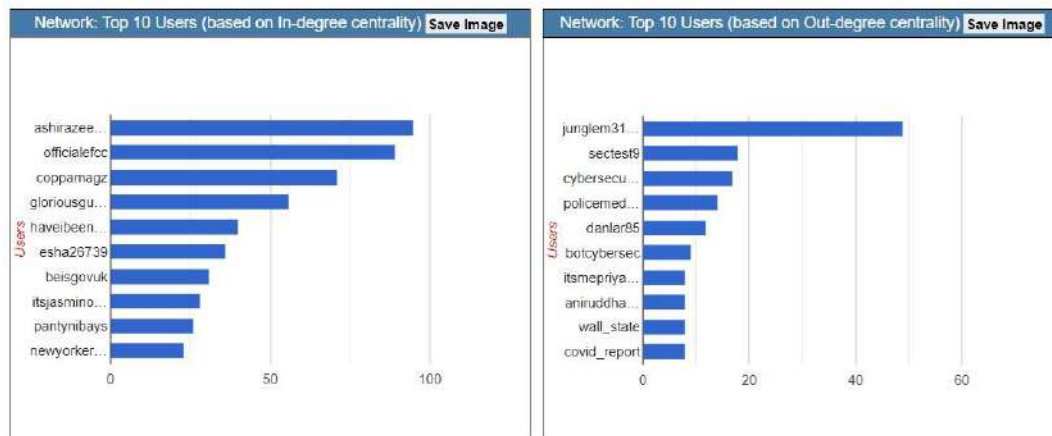
@alygonx @delhipolicex arrestedx backingx blamingx callsx cellx chandnix chowkx coercedx courtx  
**crime**x **cyber**x efccx fansx goodx interestsx issuesx kotwalix landlinex multiplex  
 phonex psx reportx rti socialx statementx vestedx volunteersx woojoox







## BREACH REPORT DATA VISUALIZATION



access/disclosure disposal hacking/it improper   
incident loss theft unauthorized unknown

