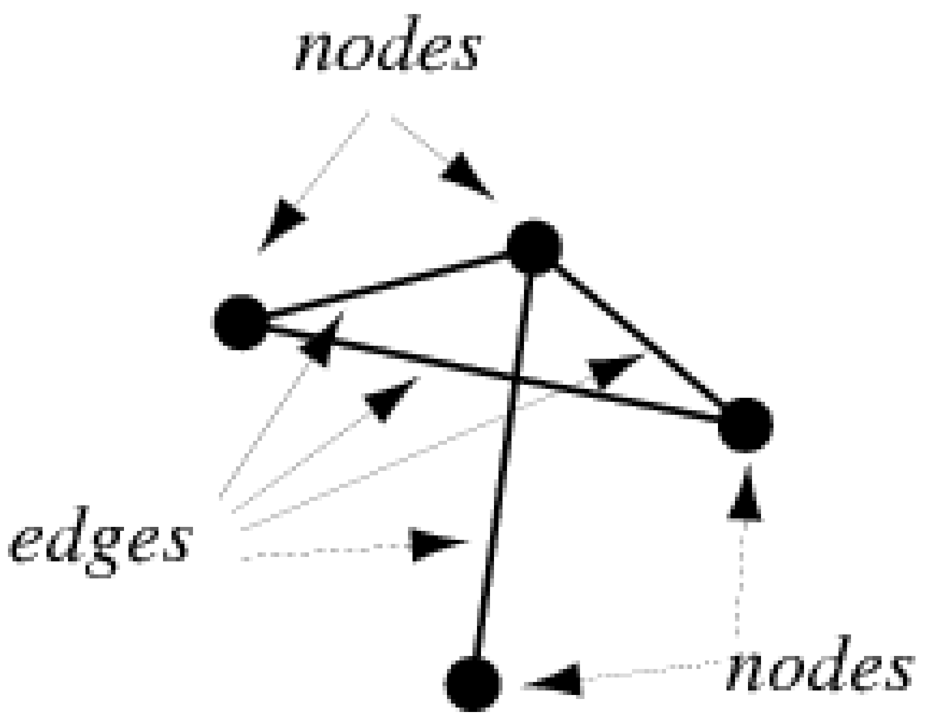
ANALYZING SOCIAL MEDIA DATA IN PYTHON

Twitter Networks

Alex Hanna
Computational Social Scientist

Source: AP

Network analysis: terms



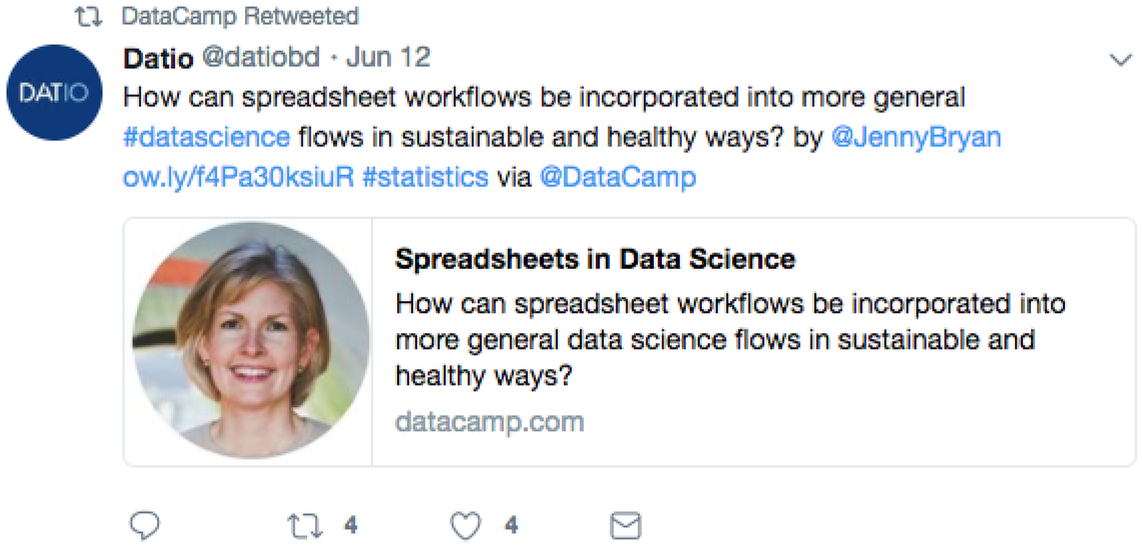
- Directed networks
  - Relationships are not mutual
- Source node
  - Where the arrow starts
- Target node
  - Where the arrow edges

Source:
http://mathworld.wolfram.com/GraphEdge.html

Types of Twitter network ties

- Twitter networks
  - Retweets
  - Quotes
  - Replies

Retweet networks



DataCamp Retweeted

Datio @datiobd · Jun 12

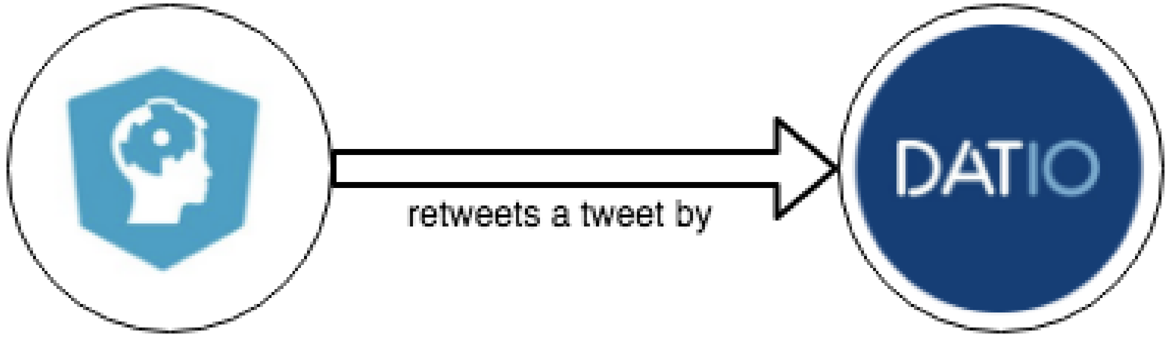
How can spreadsheet workflows be incorporated into more general #datascience flows in sustainable and healthy ways? by @JennyBryan ow.ly/f4Pa30ksiuR #statistics via @DataCamp

Spreadsheets in Data Science

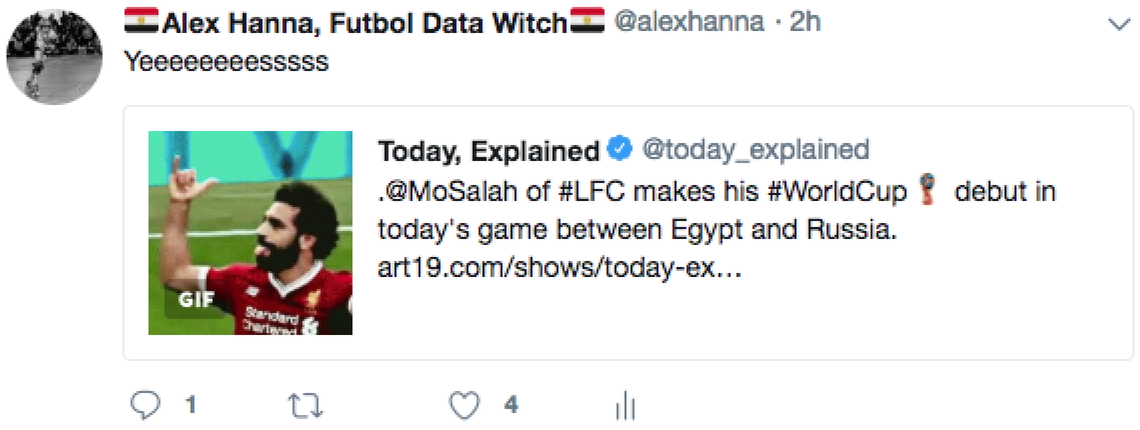
How can spreadsheet workflows be incorporated into more general data science flows in sustainable and healthy ways?

datacamp.com

4 4



Quote networks

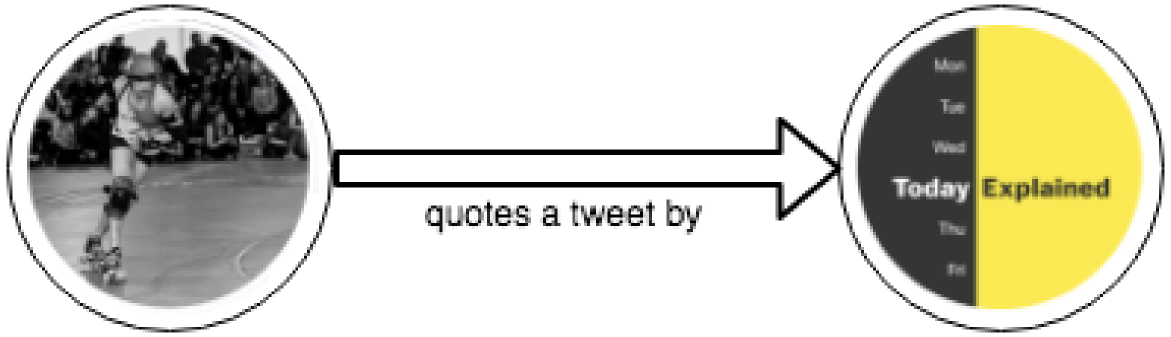


🇪🇬Alex Hanna, Futbol Data Witch🇪🇬 @alexhanna · 2h

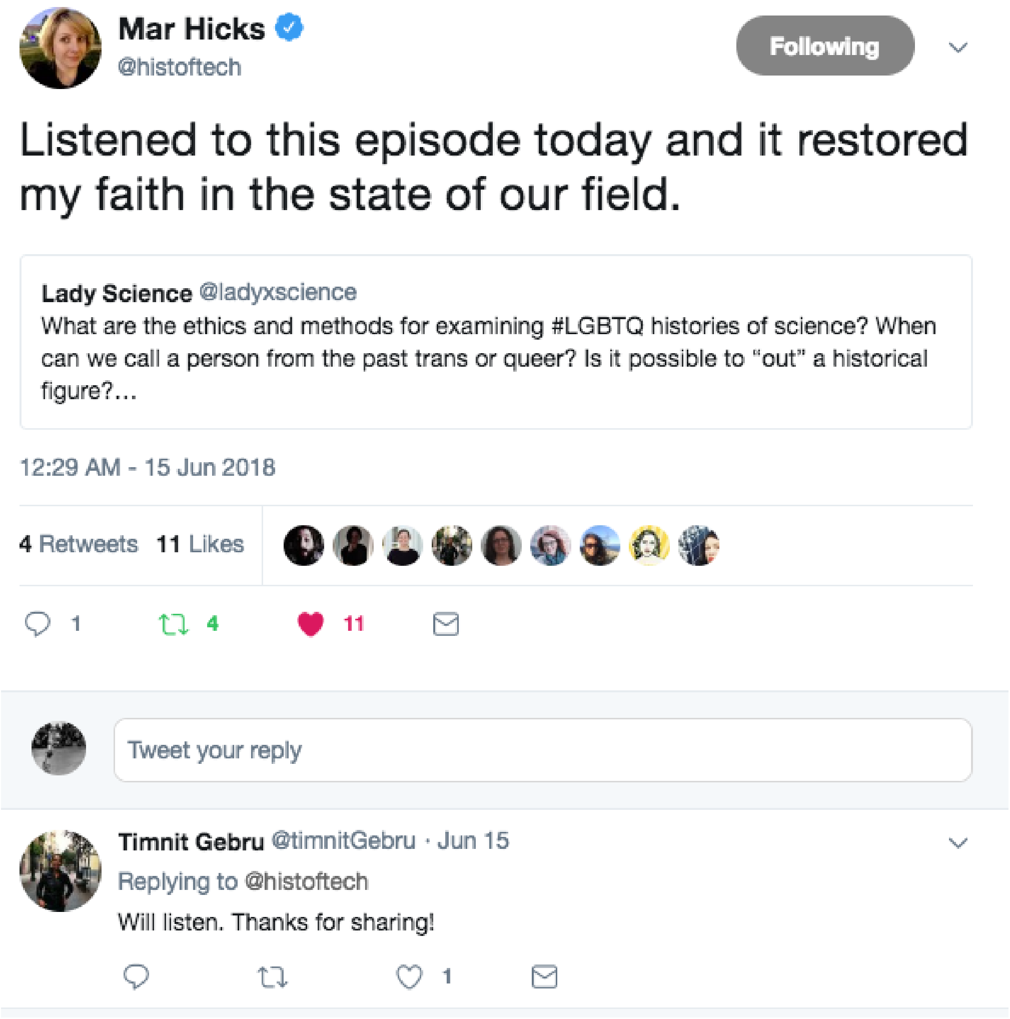
Yeeeeeeeesssss

Today, Explained @today_explained

.@MoSalah of #LFC makes his #WorldCup 🏆 debut in today's game between Egypt and Russia. art19.com/shows/today-ex...



Reply networks



Mar Hicks @histoftech

Following

Listened to this episode today and it restored my faith in the state of our field.

Lady Science @ladyxscience
What are the ethics and methods for examining #LGBTQ histories of science? When can we call a person from the past trans or queer? Is it possible to "out" a historical figure?...

12:29 AM - 15 Jun 2018

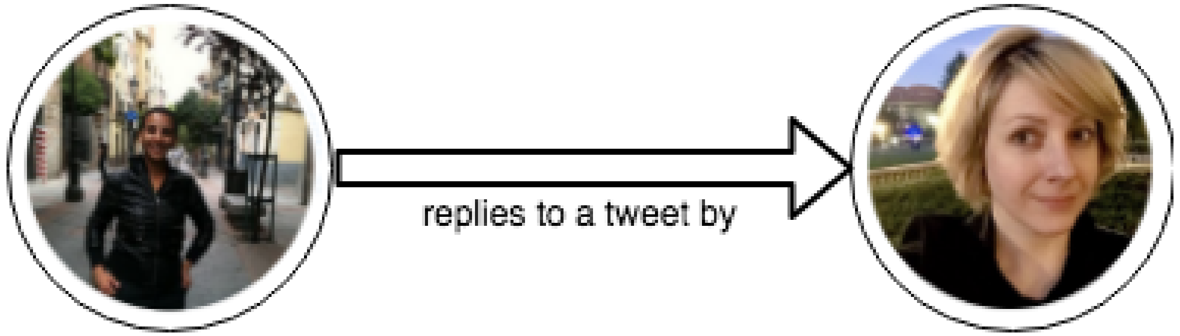
4 Retweets 11 Likes

1 4 11

Tweet your reply

Timnit Gebru @timnitGebru · Jun 15
Replying to @histoftech
Will listen. Thanks for sharing!

1



ANALYZING SOCIAL MEDIA DATA IN PYTHON

Let's practice!

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Importing and visualizing Twitter networks

Alex Hanna
Computational Social Scientist

Edge Lists

```
       BethMohn           ChristianMohn
         ASilNY         LarrySchweikart
       mattg444              WhiteHouse
  hlthiskrieger                aravosis
        Herky86          SenJeffMerkley
PatrickParsons9              TwitterGov
  New_Narrative                 CFR_org
         dddlor               roywoodjr
    scrivener50          michaelscherer
ChiefsHeadCoach           johnpavlovitz
```

Importing a retweet network

```
import networkx as nx

## ... flatten and convert JSON

G_rt = nx.from_pandas_edgelist(
                        tweets,
                        source = 'user-screen_name',
                        target = 'retweeted_status-user-screen_name',
                        create_using = nx.DiGraph())
```

Importing a quoted network

```
import networkx as nx

## ... flatten and convert JSON

G_quote = nx.from_pandas_edgelist(
                           tweets,
                           source = 'user-screen_name',
                           target = 'quoted_status-user-screen_name',
                           create_using = nx.DiGraph())
```

Importing a reply network

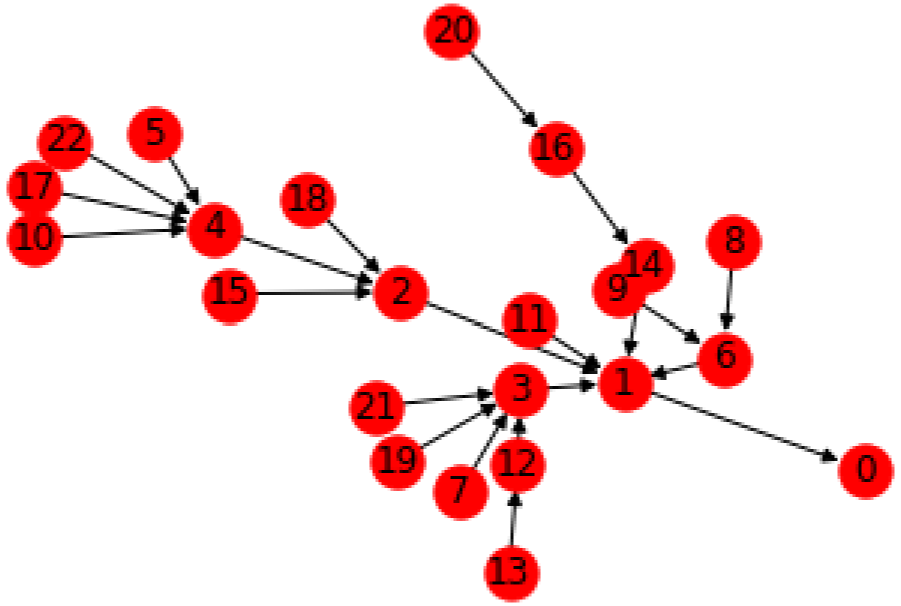
```
import networkx as nx

## ... flatten and convert JSON

G_reply = nx.from_pandas_edgelist(
                           tweets,
                           source = 'user-screen_name',
                           target = 'in_reply_to_screen_name'
                           create_using = nx.DiGraph())
```

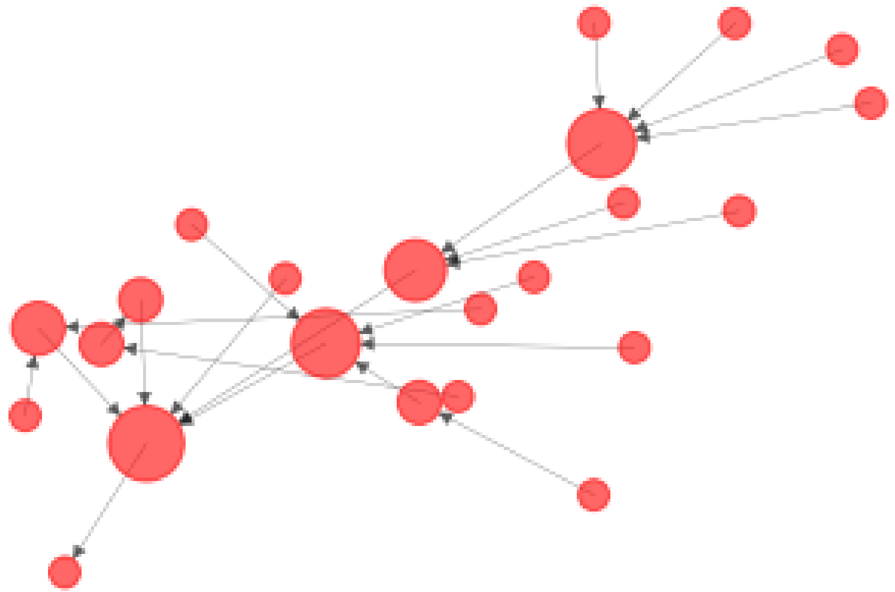
Visualization

```
nx.draw_networkx(T)
plt.axis('off')
```



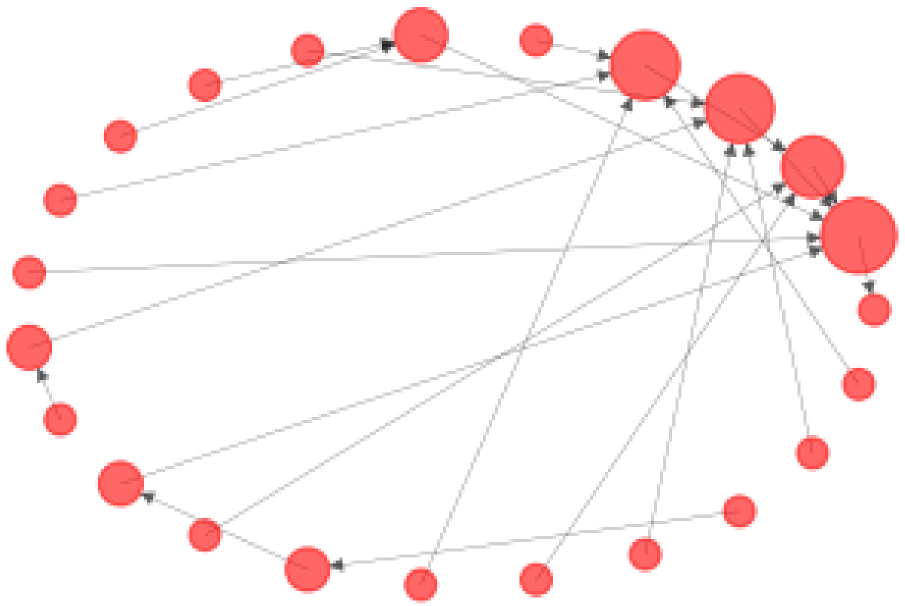
Visualization options

```
sizes =
    [x[1]*100 for x in T.degree()]
nx.draw_networkx(T,
                node_size = sizes,
                with_labels = False,
                alpha = 0.6,
                width = 0.3)
plt.axis('off')
```



Circular layout

```
circle_pos =
nx.circular_layout(T)
nx.draw_networkx(T,
                pos = circle_pos,
                node_size = sizes,
                with_labels = False,
                alpha = 0.6,
                width = 0.3)
plt.axis('off')
```



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Node-level metrics

Alex Hanna
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Centrality: node importance

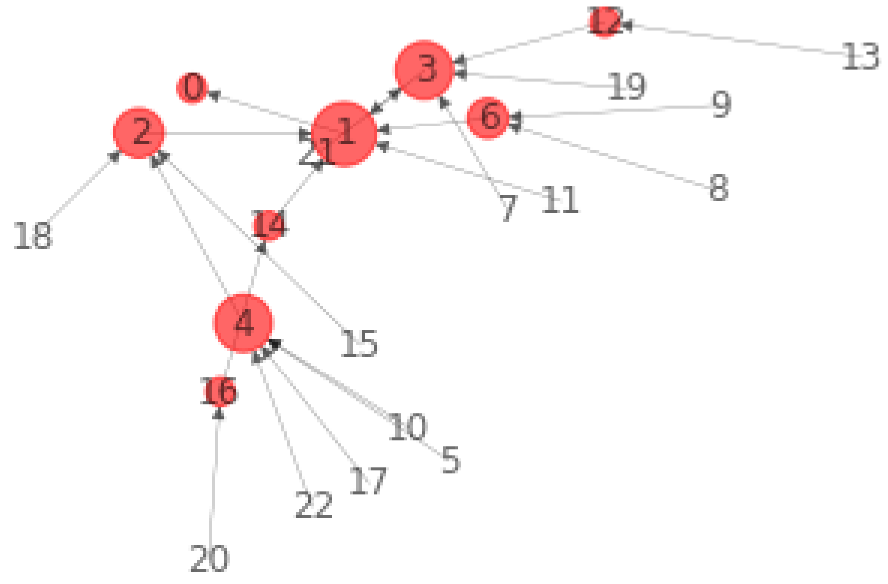
- Centrality
  - Measures of importance of a node in a network
  - Several different ideas of "importance"

Degree Centrality

Degree

- Number of edges that are connected to node
- Two types of degrees in a directed network
  - In-degree - edge going **into** node
  - Out-degree - edge going **out of** a node

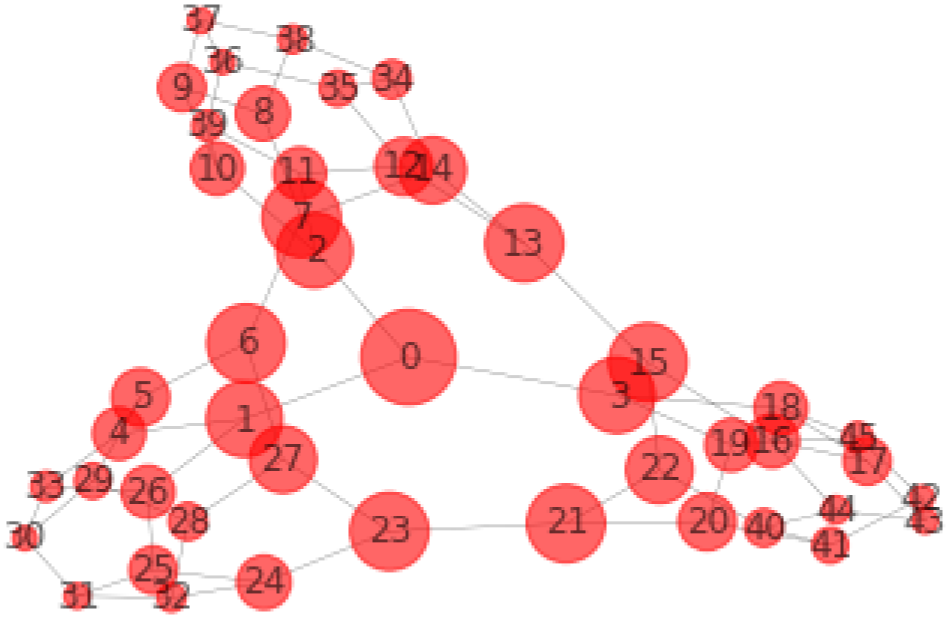
```
nx.in_degree_centrality(T)
nx.out_degree_centrality(T)
```



Betweenness Centrality

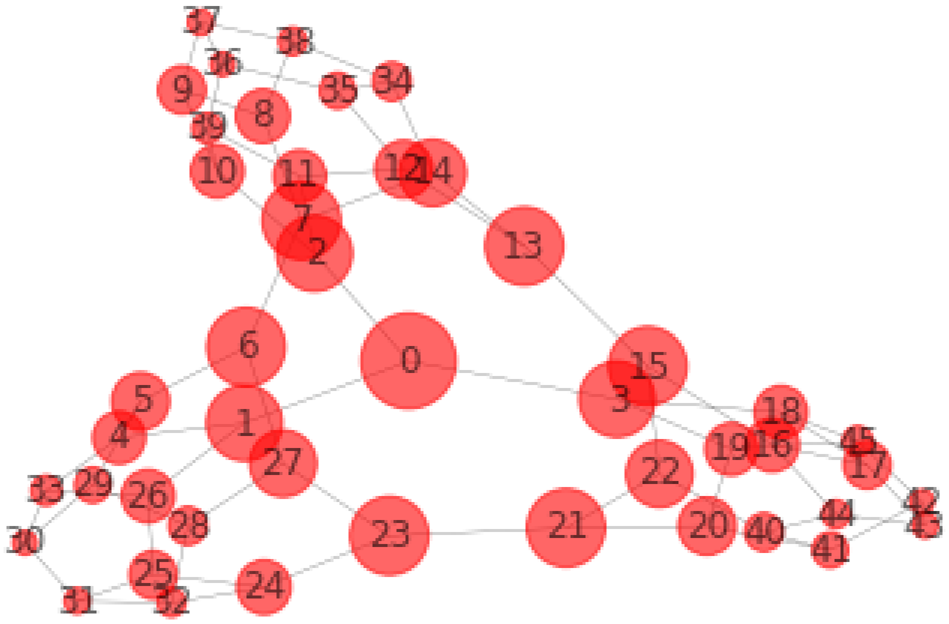
- How many shortest paths between two nodes pass through this node
- Importance as a network broker

```
nx.betweenness_centrality(T)
```

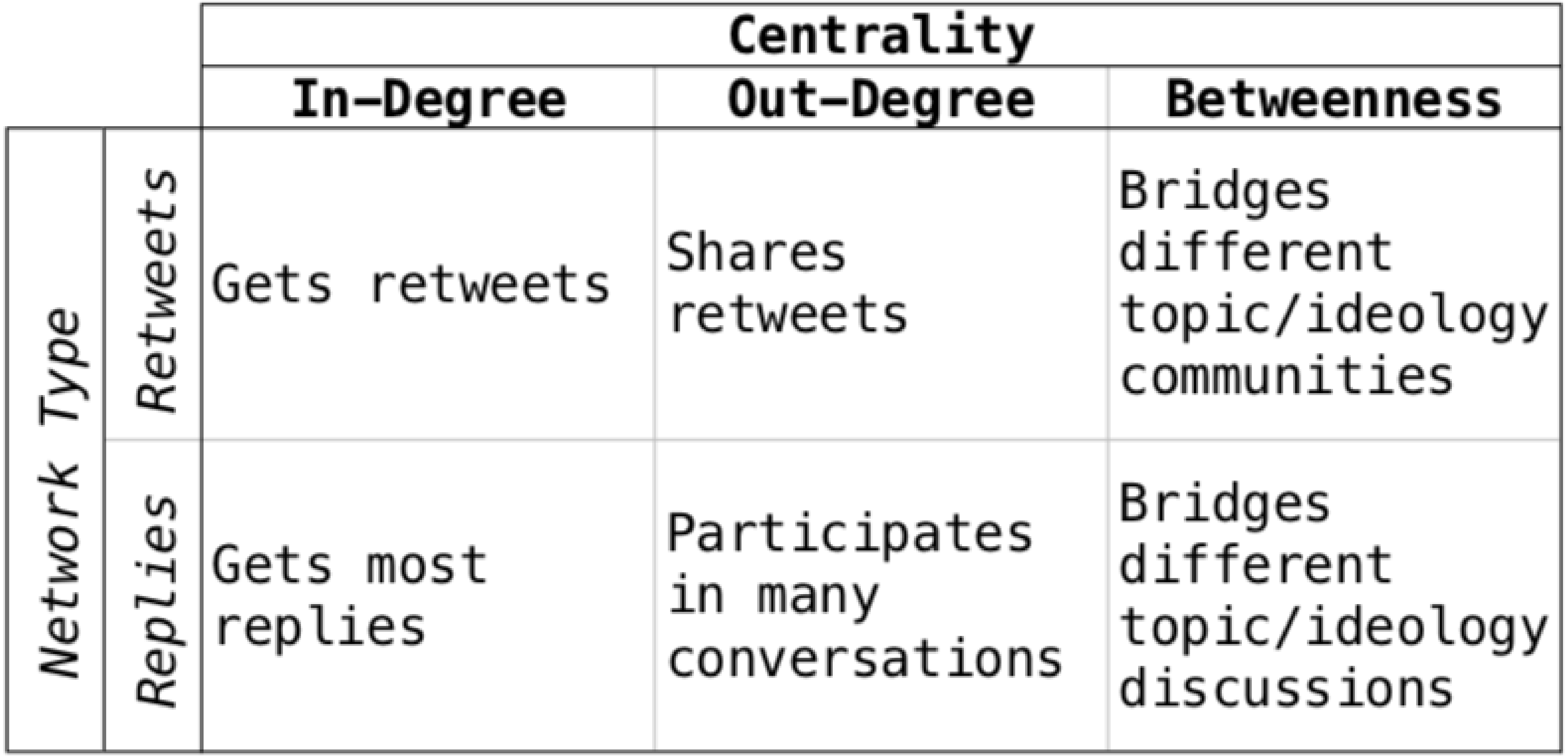


Printing highest centrality

```
bc = nx.betweenness_centrality(T)

betweenness = pd.DataFrame(
         list(bc.items()),
         columns = ['Name', 'Cent'])

print(betweenness.sort_values(
         'Cent',
         ascending = False).head())

    Name  Centrality
0      0    0.232540
23    23    0.158514
7      7    0.158514
15    15    0.158514
21    21    0.157588
```



Centrality in different networks



		Centrality		
		In-Degree	Out-Degree	Betweenness
Network Type	Retweets	Gets retweets	Shares retweets	Bridges different topic/ideology communities
	Replies	Gets most replies	Participates in many conversations	Bridges different topic/ideology discussions

The Ratio

```
degree_rt = pd.DataFrame(list(G_rt.in_degree()),
                         columns = ['screen_name', 'degree'])
degree_reply = pd.DataFrame(list(G_reply.in_degree()),
                            columns = ['screen_name', 'degree'])

ratio = degree_rt.merge(degree_reply,
                        on = 'screen_name',
                        suffixes = ('_rt', '_reply'))

ratio['ratio'] = ratio['degree_reply'] / ratio['degree_rt']
```

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