

```
In [1]: !pip install plotly==4.7.1
!wget https://github.com/plotly/orca/releases/download/v1.2.1/orca-1.2.1-x86_64.AppImage -O /usr/local/bin/orca
!chmod +x /usr/local/bin/orca
!apt-get install xvfb libgtk2.0-0 libgconf-2-4
```

Collecting plotly==4.7.1

Downloading <https://files.pythonhosted.org/packages/d7/78/eb6cbe96c8379c54819592bb228c58ed7386fcc60a55eca7db99432fd14/plotly-4.7.1-py2.py3-none-any.whl> (11.5MB)

|██| 11.5MB 4.0MB/s

Requirement already satisfied: six in /usr/local/lib/python3.7/dist-packages (from plotly==4.7.1) (1.15.0)

Requirement already satisfied: retrying>=1.3.3 in /usr/local/lib/python3.7/dist-packages (from plotly==4.7.1) (1.3.3)

Installing collected packages: plotly

Found existing installation: plotly 4.4.1

Uninstalling plotly-4.4.1:

Successfully uninstalled plotly-4.4.1

Successfully installed plotly-4.7.1

--2021-04-12 16:41:11-- [https://github.com/plotly/orca/releases/download/v1.2.1/orca-1.2.1-x86\\_64.AppImage](https://github.com/plotly/orca/releases/download/v1.2.1/orca-1.2.1-x86_64.AppImage)

Resolving github.com (github.com)... 140.82.112.4

Connecting to github.com (github.com)|140.82.112.4|:443... connected.

HTTP request sent, awaiting response... 302 Found

Location: [https://github-releases.githubusercontent.com/99037241/9dc3a580-286a-11e9-8a21-4312b7c8a512?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWNJYAX4CSVEH53A%2F20210412%2Fus-east-1%2Fs3%2Faws4\\_request&X-Amz-Date=20210412T164112Z&X-Amz-Expires=300&X-Amz-Signature=427e3b9891f52525d451b777753a0e5d12292163da6a1836a6015718d98f3020&X-Amz-SignedHeaders=host&actor\\_id=0&key\\_id=0&repo\\_id=99037241&response-content-disposition=attachment%3B%20filename%3Dorca-1.2.1-x86\\_64.AppImage&response-content-type=application%2Foctet-stream](https://github-releases.githubusercontent.com/99037241/9dc3a580-286a-11e9-8a21-4312b7c8a512?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWNJYAX4CSVEH53A%2F20210412%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20210412T164112Z&X-Amz-Expires=300&X-Amz-Signature=427e3b9891f52525d451b777753a0e5d12292163da6a1836a6015718d98f3020&X-Amz-SignedHeaders=host&actor_id=0&key_id=0&repo_id=99037241&response-content-disposition=attachment%3B%20filename%3Dorca-1.2.1-x86_64.AppImage&response-content-type=application%2Foctet-stream) [following]

--2021-04-12 16:41:11-- [https://github-releases.githubusercontent.com/99037241/9dc3a580-286a-11e9-8a21-4312b7c8a512?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWNJYAX4CSVEH53A%2F20210412%2Fus-east-1%2Fs3%2Faws4\\_request&X-Amz-Date=20210412T164112Z&X-Amz-Expires=300&X-Amz-Signature=427e3b9891f52525d451b777753a0e5d12292163da6a1836a6015718d98f3020&X-Amz-SignedHeaders=host&actor\\_id=0&key\\_id=0&repo\\_id=99037241&response-content-disposition=attachment%3B%20filename%3Dorca-1.2.1-x86\\_64.AppImage&response-content-type=application%2Foctet-stream](https://github-releases.githubusercontent.com/99037241/9dc3a580-286a-11e9-8a21-4312b7c8a512?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWNJYAX4CSVEH53A%2F20210412%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20210412T164112Z&X-Amz-Expires=300&X-Amz-Signature=427e3b9891f52525d451b777753a0e5d12292163da6a1836a6015718d98f3020&X-Amz-SignedHeaders=host&actor_id=0&key_id=0&repo_id=99037241&response-content-disposition=attachment%3B%20filename%3Dorca-1.2.1-x86_64.AppImage&response-content-type=application%2Foctet-stream)

Resolving github-releases.githubusercontent.com (github-releases.githubusercontent.com)... 185.199.110.154, 185.199.109.154, 185.199.108.154, ...

Connecting to github-releases.githubusercontent.com (github-releases.githubusercontent.com)|185.199.110.154|:443... connected.

HTTP request sent, awaiting response... 200 OK

Length: 51607939 (49M) [application/octet-stream]

Saving to: '/usr/local/bin/orca'

/usr/local/bin/orca 100%[=====>] 49.22M 74.6MB/s in 0.7s

2021-04-12 16:41:12 (74.6 MB/s) - '/usr/local/bin/orca' saved [51607939/51607939]

Reading package lists... Done

Building dependency tree

Reading state information... Done

The following additional packages will be installed:

```
gconf-service gconf-service-backend gconf2-common libdbus-glib-1-2
libgail-common libgail18 libgtk2.0-bin libgtk2.0-common
Suggested packages:
gvfs
The following NEW packages will be installed:
gconf-service gconf-service-backend gconf2-common libdbus-glib-1-2
libgail-common libgail18 libgconf-2-4 libgtk2.0-0 libgtk2.0-bin
libgtk2.0-common xvfb
0 upgraded, 11 newly installed, 0 to remove and 31 not upgraded.
Need to get 3,715 kB of archives.
After this operation, 17.2 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu bionic/main amd64 libdbus-glib-1-2 amd64 0.110-2 [58.3 kB]
Get:2 http://archive.ubuntu.com/ubuntu bionic/universe amd64 gconf2-common all 3.2.6-4ubuntu1 [700 kB]
Get:3 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libgconf-2-4 amd64 3.2.6-4ubuntu1 [84.8 kB]
Get:4 http://archive.ubuntu.com/ubuntu bionic/universe amd64 gconf-service-backend amd64 3.2.6-4ubuntu1 [58.1 kB]
Get:5 http://archive.ubuntu.com/ubuntu bionic/universe amd64 gconf-service amd64 3.2.6-4ubuntu1 [2,036 B]
Get:6 http://archive.ubuntu.com/ubuntu bionic/main amd64 libgtk2.0-common all 2.24.32-1ubuntu1 [125 kB]
Get:7 http://archive.ubuntu.com/ubuntu bionic/main amd64 libgtk2.0-0 amd64 2.24.32-1ubuntu1 [1,769 kB]
Get:8 http://archive.ubuntu.com/ubuntu bionic/main amd64 libgail18 amd64 2.24.32-1ubuntu1 [14.2 kB]
Get:9 http://archive.ubuntu.com/ubuntu bionic/main amd64 libgail-common amd64 2.24.32-1ubuntu1 [112 kB]
Get:10 http://archive.ubuntu.com/ubuntu bionic/main amd64 libgtk2.0-bin amd64 2.24.32-1ubuntu1 [7,536 B]
Get:11 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 xvfb amd64 2:1.19.6-1ubuntu4.8 [784 kB]
Fetched 3,715 kB in 1s (3,274 kB/s)
Selecting previously unselected package libdbus-glib-1-2:amd64.
(Reading database ... 160983 files and directories currently installed.)
Preparing to unpack .../00-libdbus-glib-1-2_0.110-2_amd64.deb ...
Unpacking libdbus-glib-1-2:amd64 (0.110-2) ...
Selecting previously unselected package gconf2-common.
Preparing to unpack .../01-gconf2-common_3.2.6-4ubuntu1_all.deb ...
Unpacking gconf2-common (3.2.6-4ubuntu1) ...
Selecting previously unselected package libgconf-2-4:amd64.
Preparing to unpack .../02-libgconf-2-4_3.2.6-4ubuntu1_amd64.deb ...
Unpacking libgconf-2-4:amd64 (3.2.6-4ubuntu1) ...
Selecting previously unselected package gconf-service-backend.
Preparing to unpack .../03-gconf-service-backend_3.2.6-4ubuntu1_amd64.deb ...
Unpacking gconf-service-backend (3.2.6-4ubuntu1) ...
Selecting previously unselected package gconf-service.
Preparing to unpack .../04-gconf-service_3.2.6-4ubuntu1_amd64.deb ...
Unpacking gconf-service (3.2.6-4ubuntu1) ...
Selecting previously unselected package libgtk2.0-common.
Preparing to unpack .../05-libgtk2.0-common_2.24.32-1ubuntu1_all.deb ...
Unpacking libgtk2.0-common (2.24.32-1ubuntu1) ...
```

```
Selecting previously unselected package libgtk2.0-0:amd64.
Preparing to unpack .../06-libgtk2.0-0_2.24.32-1ubuntu1_amd64.deb ...
Unpacking libgtk2.0-0:amd64 (2.24.32-1ubuntu1) ...
Selecting previously unselected package libgail18:amd64.
Preparing to unpack .../07-libgail18_2.24.32-1ubuntu1_amd64.deb ...
Unpacking libgail18:amd64 (2.24.32-1ubuntu1) ...
Selecting previously unselected package libgail-common:amd64.
Preparing to unpack .../08-libgail-common_2.24.32-1ubuntu1_amd64.deb ...
Unpacking libgail-common:amd64 (2.24.32-1ubuntu1) ...
Selecting previously unselected package libgtk2.0-bin.
Preparing to unpack .../09-libgtk2.0-bin_2.24.32-1ubuntu1_amd64.deb ...
Unpacking libgtk2.0-bin (2.24.32-1ubuntu1) ...
Selecting previously unselected package xvfb.
Preparing to unpack .../10-xvfb_2%3a1.19.6-1ubuntu4.8_amd64.deb ...
Unpacking xvfb (2:1.19.6-1ubuntu4.8) ...
Setting up gconf2-common (3.2.6-4ubuntu1) ...

Creating config file /etc/gconf/2/path with new version
Setting up libgtk2.0-common (2.24.32-1ubuntu1) ...
Setting up libdbus-glib-1-2:amd64 (0.110-2) ...
Setting up xvfb (2:1.19.6-1ubuntu4.8) ...
Setting up libgconf-2-4:amd64 (3.2.6-4ubuntu1) ...
Setting up libgtk2.0-0:amd64 (2.24.32-1ubuntu1) ...
Setting up libgail18:amd64 (2.24.32-1ubuntu1) ...
Setting up libgail-common:amd64 (2.24.32-1ubuntu1) ...
Setting up libgtk2.0-bin (2.24.32-1ubuntu1) ...
Setting up gconf-service-backend (3.2.6-4ubuntu1) ...
Setting up gconf-service (3.2.6-4ubuntu1) ...
Processing triggers for libc-bin (2.27-3ubuntu1.2) ...
/sbin/ldconfig.real: /usr/local/lib/python3.7/dist-packages/ideep4py/lib/libmkldnn.so.0 is not a symbolic link

Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
```

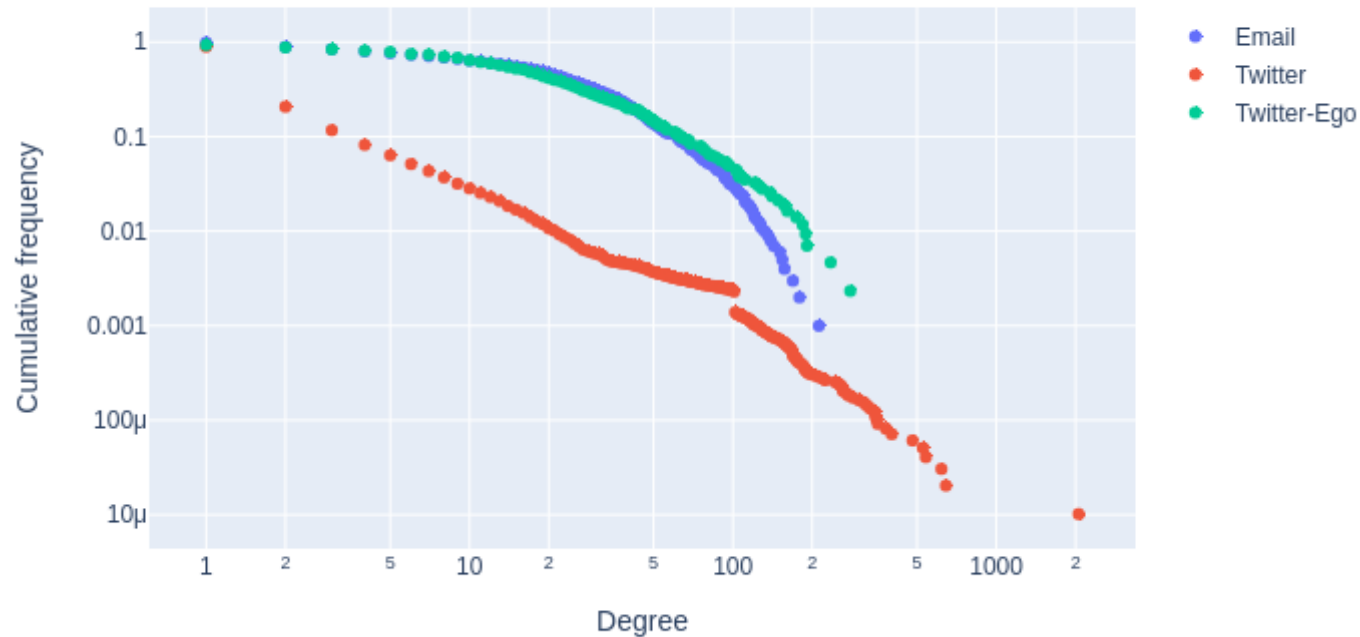
```
In [2]: from os import listdir
        from os.path import isfile, join
        import pickle
        import plotly.graph_objects as go
```

```
In [3]: path = "/content/drive/My Drive/"
project_name="2_TwitterFollowGraph"
complete_path=path+project_name+"/Cumulative Degree Distribution"
pickle_files = [f for f in listdir(complete_path) if isfile(join(complete_path, f))]
```

```
In [4]: indegree_directed_dict={}
outdegree_directed_dict={}
undirected_dict={}
for pickle_file in pickle_files:
    file=open("{} / {}".format(complete_path,pickle_file), "rb")
    if "indegree" in pickle_file:
        indegree_directed_dict[pickle_file]=pickle.load(file)
    elif "outdegree" in pickle_file:
        outdegree_directed_dict[pickle_file]=pickle.load(file)
    else:
        undirected_dict[pickle_file]=pickle.load(file)
    file.close()
```

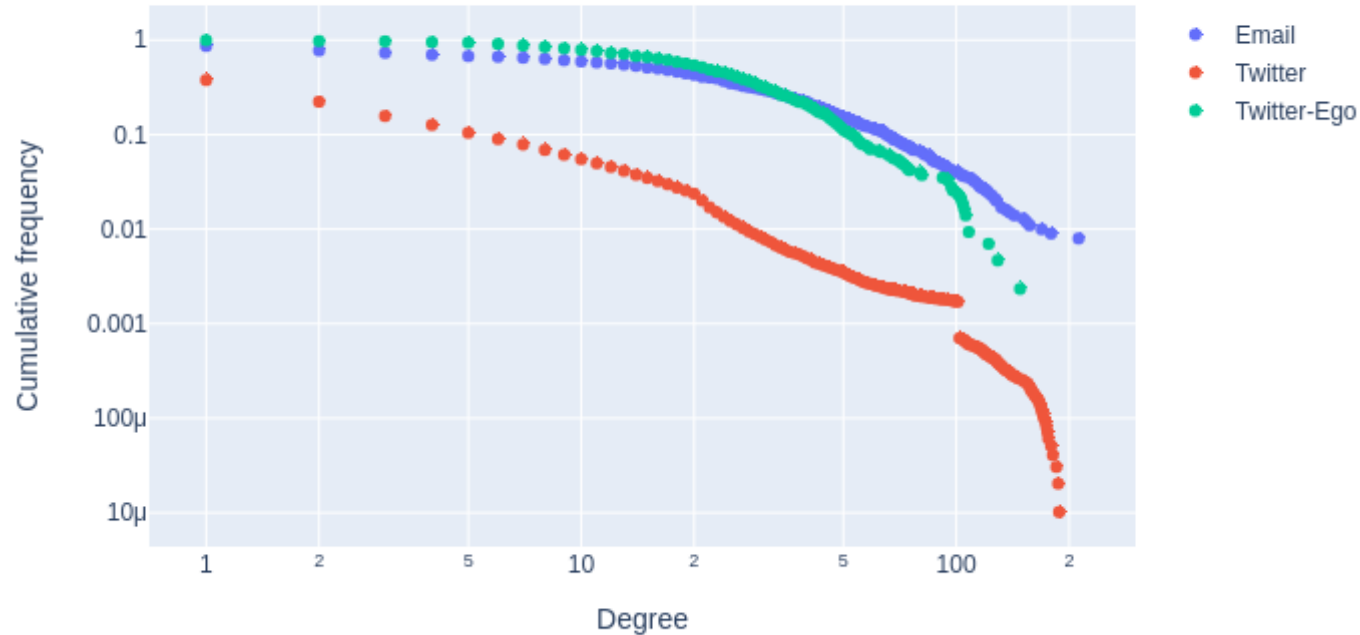
```
In [5]: figure = go.Figure()
for title, indegree_dict in indegree_directed_dict.items():
    figure.add_trace(go.Scatter(x=list(indegree_dict), y=list(indegree_dict.values()), mode='markers', name=title.replace(
        "cumulative_indegree_distribution_", "")))
figure.update_xaxes(type="log", title_text="Degree")
figure.update_yaxes(type="log", title_text="Cumulative frequency")
figure.update_layout(title="Cumulative indegree distribution on log-log scale")
figure.show(renderer="png")
```

Cumulative indegree distribution on log-log scale

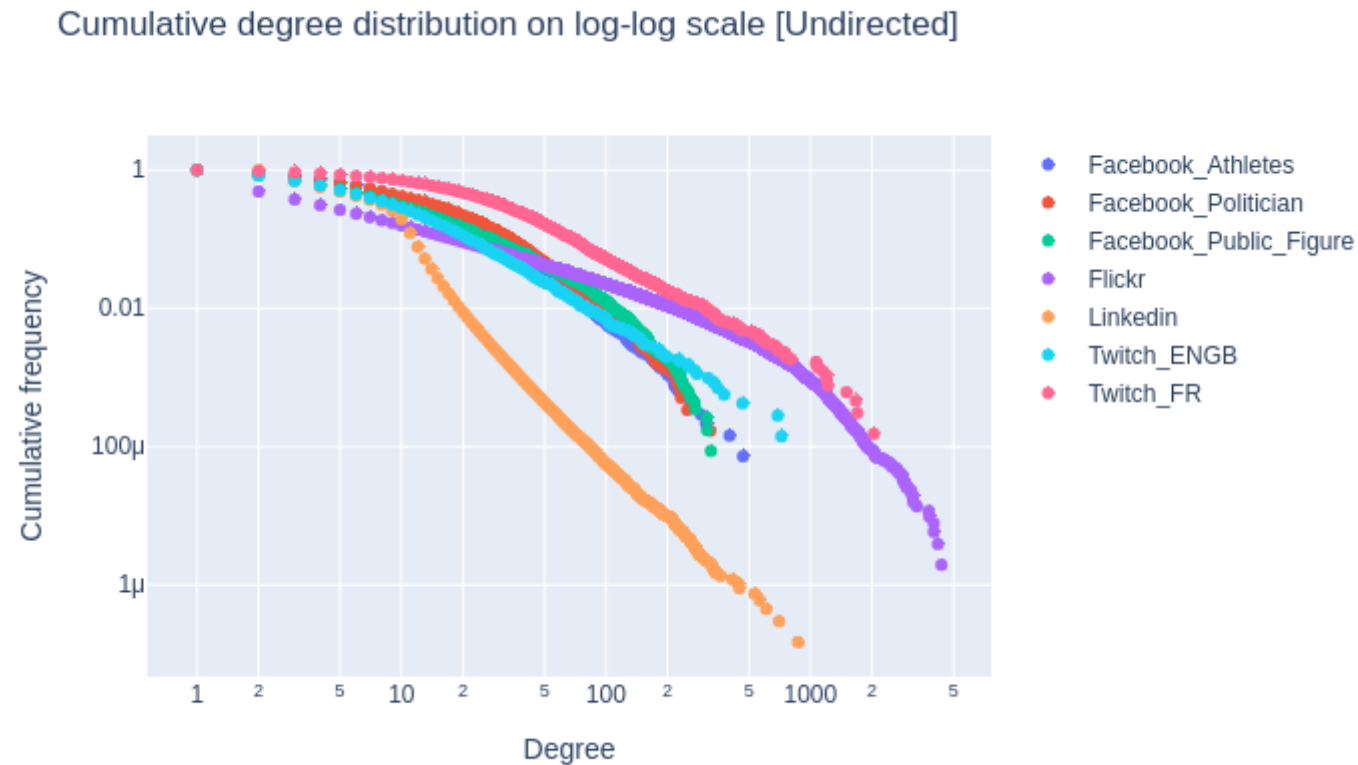


```
In [6]: figure = go.Figure()
for title,outdegree_dict in outdegree_directed_dict.items():
    figure.add_trace(go.Scatter(x=list(outdegree_dict),y=list(outdegree_dict.values()),mode='markers',name=title.replace(
        "cumulative_outdegree_distribution_", "")))
figure.update_xaxes(type="log",title_text="Degree")
figure.update_yaxes(type="log",title_text="Cumulative frequency")
figure.update_layout(title="Cumulative outdegree distribution on log-log scale")
figure.show(renderer="png")
```

Cumulative outdegree distribution on log-log scale



```
In [7]: figure = go.Figure()
for title, undirected_dict_final in undirected_dict.items():
    figure.add_trace(go.Scatter(x=list(undirected_dict_final), y=list(undirected_dict_final.values()), mode='markers', name=title.replace("cumulative_degree_distribution_", "")))
figure.update_xaxes(type="log", title_text="Degree")
figure.update_yaxes(type="log", title_text="Cumulative frequency")
figure.update_layout(title="Cumulative degree distribution on log-log scale [Undirected]")
figure.show(renderer="png")
```



```
In [ ]: filename = open(path+project_name+"/PickleFiles/overall_directed_indegree.pkl", "wb")
pickle.dump(indegree_directed_dict, filename)
filename.close()
```



```
In [ ]: filename = open(path+project_name+"/PickleFiles/overall_directed_outdegree.pkl","wb")
pickle.dump(outdegree_directed_dict, filename)
filename.close()
```

```
In [ ]: filename = open(path+project_name+"/PickleFiles/overall_undirected_degree.pkl","wb")
pickle.dump(undirected_dict, filename)
filename.close()
```