EuroRoads

January 22, 2018

1 Imports

```
In [1]: import networkx as nx
        import matplotlib.pyplot as plt
        import numpy as np
```

2 Read tsv

2.0.1 Open the tsv

```
In [2]: # Data from http://konect.cc/networks/subelj_euroroad/
        f = open("EuroRoads.tsv","r")
        text = f.readlines()
```

2.0.2 Cleans the data

```
In [3]: clean = lambda x:x.strip("\n").split(" ")
        node_pairs = list(map(clean,text[2:]))
        node_pairs = [(int(x[0]),int(x[1])) for x in node_pairs]
        node_pairs[:4]
```

```
Out[3]: [(1, 2), (2, 3), (2, 17), (3, 4)]
```

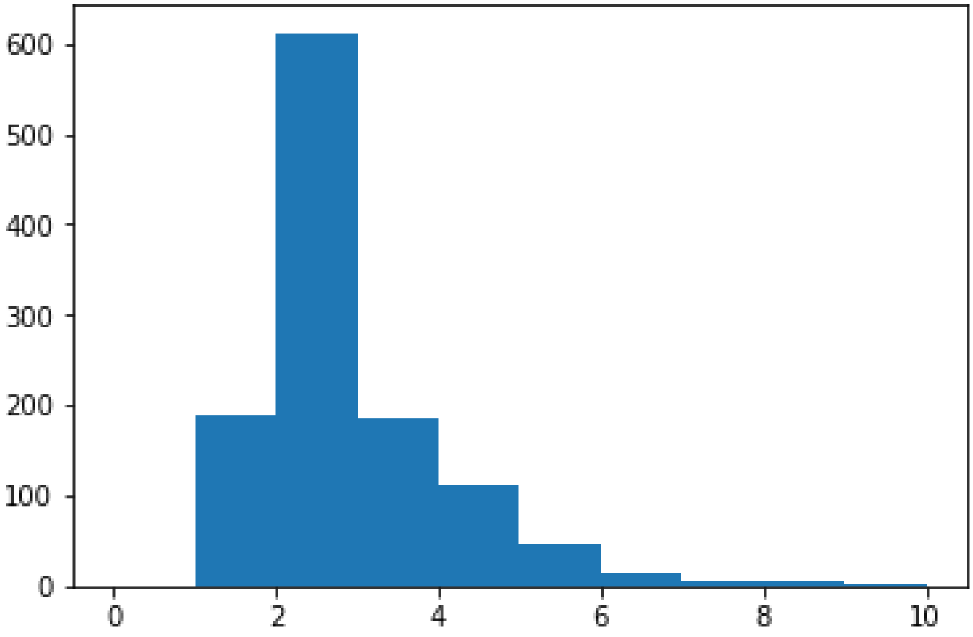
3 Converting edge pairs to NetworkX graph

```
In [4]: G = nx.Graph()
        G.clear()
        G.add_edges_from(node_pairs)
```

4 Degree Distribution

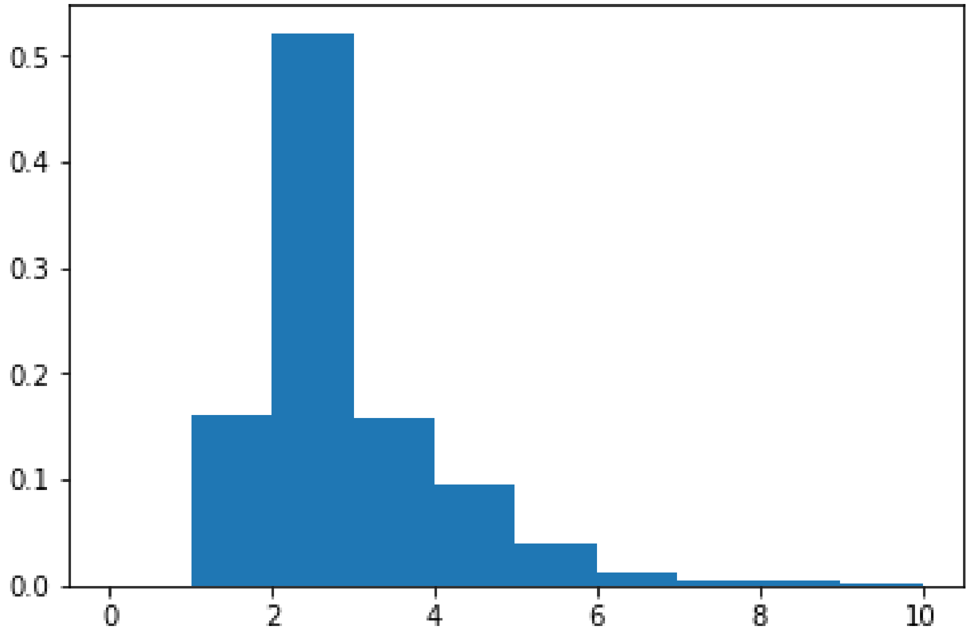
```
In [5]: node_degrees = [x[1] for x in sorted(G.degree())]
        plt.hist(node_degrees, bins = np.linspace(0,10,11))
```

```
Out[5]: (array([   0.,  190.,  612.,  186.,  113.,   47.,   15.,    5.,    5.,    1.]),
         array([  0.,   1.,   2.,   3.,   4.,   5.,   6.,   7.,   8.,   9.,  10.]),
         <a list of 10 Patch objects>)
```



```
In [6]: plt.hist(node_degrees, bins = np.linspace(0,10,11), normed=True)

Out[6]: (array([ 0.        ,  0.16183986,  0.52129472,  0.15843271,  0.09625213,
                 0.04003407,  0.01277683,  0.00425894,  0.00425894,  0.00085179]),
         array([  0.,   1.,   2.,   3.,   4.,   5.,   6.,   7.,   8.,   9.,  10.]),
         <a list of 10 Patch objects>)
```



Conclusions:

The graph is connected (no zero degree nodes), very few cities have a single road connected to them.

Roughly 50% are connected by 2 cities.

A few outliers have up to 10 roads

```
In [7]: nx.draw_random(G)
```

```
In [8]: nx.draw_circular(G)
```

```
In [9]: # This one was supposed to be more pleasant, but it turned out not to be
        # It uses a technqiue called "Force directed Graph Drawing", but the result isn't partic
        nx.draw_spring(G)
```

The above are terrible plots.

Ideally I would use the cities coordinates to plot, but I don’t have them from the initial data set.