Dynamics of Networks

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`cdlib` is a python library designed to provide support for extracting, analyzing and comparing network clusterings. `cdlib` is mostly developed and maintained by Giulio Rossetti (ISTI-CNR, Italy) and Remy Cazabet (Univ. Lyon 1, France). You can install it using pip

```
$pip install cdlib
```

This requires at least python 3.7. The library offers 90+ community discovery algorithms organized into four families:

- Crisp (non-overlapping) communities

- Overlapping communities

- Fuzzy communities

- Node-attributed communities

- Communities on bipartite networks

- Link Communities

- Temporal communities

The library is well documented. Take a look in case you don't know how to proceed. https://cdlib.readthedocs.io/en/latest/reference/reference.html.

1 Identifying Communities in dynamic networks

1. Download data about co-acting relations during the first three seasons of Game of Thrones

```
$wget https://andreafailla.github.io/uploads/data/got-s1-edges.csv
$wget https://andreafailla.github.io/uploads/data/got-s2-edges.csv
$wget https://andreafailla.github.io/uploads/data/got-s2-edges.csv
```

2. Read each network with the following function. Save all networks in a list called **gs**.

```
def read_net_w(filename):
    g = nx.Graph()
    with open(filename) as f:
        f.readline()
        for l in f:
            l = l.split(",")
            g.add_edge(l[0], l[1], weight=int(l[2]))
    return g
```

3. Use an algorithm of your choice to detect communities at each snapshot (identify & match approach). Please refer to `https://cdlib.readthedocs.io/en/latest/reference/temporal_clustering.html#instant-optimal`

4. Find the number of communities and their sizes at each snapshot

5. compute the stability trend in terms of Normalized F1 score (use the code below). Then, plot it over time.

```
tc.clustering_stability_trend(method=evaluation.nf1)
```

6. Detect events using the Greene method (again, check the documentation if you are unsure how to proceed).