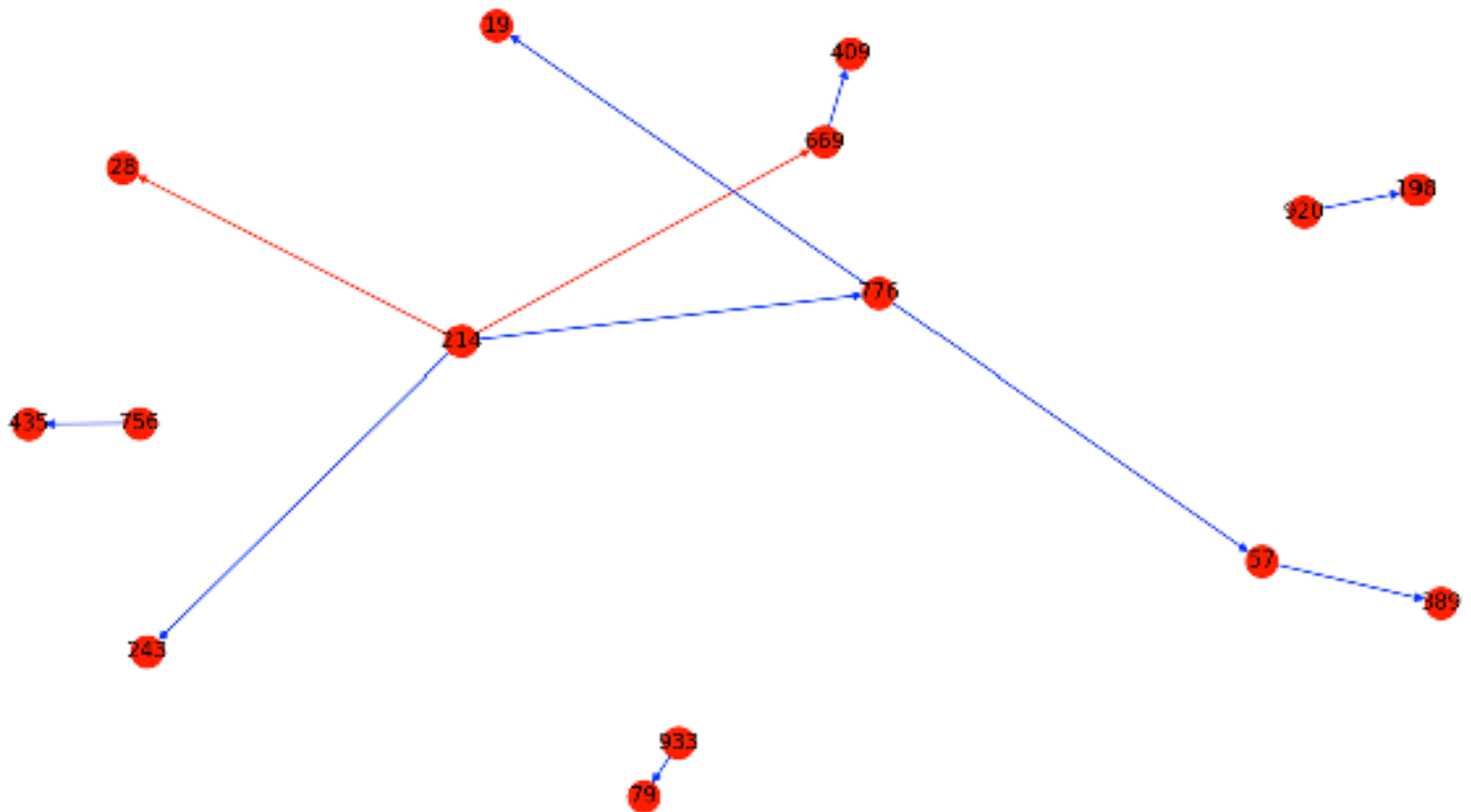


I implemented the algorithm of Graph printing. As an input the data set from file graph\_printing.csv is given. The columns contain the following informations: time, srcIp, protocol, dstIp, sPort, dPort, toBytes.

First of all i build the graphlet H(directed, weighted multigraph with coloured edges) for different time windows. I suppose that each of them lasts 29s, therefor it will give the time windows as follow: 0-29,30-59, 60-89 etc. Here we have the edges of example graphlet H fo the time window of 0-29s:

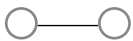
```
edges of graphH
[('214', '776', {'weight': '100', 'color': 'blue'}), ('214', '776', {'weight': '40', 'color': 'blue'}), ('214', '243', {'weight': '40', 'color': 'blue'}), ('214', '669', {'weight': '40', 'color': 'red'}), ('214', '28', {'weight': '50', 'color': 'red'}), ('214', '28', {'weight': '18', 'color': 'blue'}), ('776', '19', {'weight': '18', 'color': 'blue'}), ('776', '57', {'weight': '70', 'color': 'blue'}), ('933', '79', {'weight': '20', 'color': 'blue'}), ('920', '198', {'weight': '10', 'color': 'blue'}), ('669', '489', {'weight': '20', 'color': 'blue'}), ('756', '435', {'weight': '30', 'color': 'blue'}), ('57', '389', {'weight': '58', 'color': 'blue'})]
```

After, i transform graphlet H into graphlet G which is directed, unweighted graph with coloured edges. Here is the example of the graphlet G for the time window of 0-29s:



Once we have got this we can pass to graphlet and orbit counting. I implemented graphlet counting only for following subgraphs:

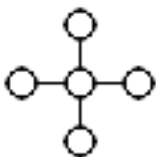
-1 path :



- 2 path :



-4 star



I obtained those results for the graphlet G in time window 0-29s:

```
graphlet count
  1_path  : 11
  2_path  :  4
  4_star  :  1
```

Then, for orbit counting i implemented following subgraphs:

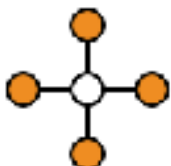
- interior



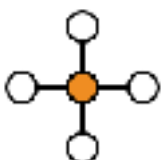
- terminal



- 4 star leaf



- 4 star center



```

orbit count for node 776
  path_interior : 2
  path_terminal : 1
  4_star_center : 0
  4_star_leaf : 0
orbit count for node 933
  path_interior : 0
  path_terminal : 0
  4_star_center : 0
  4_star_leaf : 0
orbit count for node 79
  path_interior : 0
  path_terminal : 0
  4_star_center : 0
  4_star_leaf : 0
orbit count for node 243
  path_interior : 0
  path_terminal : 0
  4_star_center : 0
  4_star_leaf : 0
orbit count for node 920
  path_interior : 0
  path_terminal : 0
  4_star_center : 0
  4_star_leaf : 0
orbit count for node 193
  path_interior : 0
  path_terminal : 0
  4_star_center : 0
  4_star_leaf : 0
orbit count for node 669
  path_interior : 1
  path_terminal : 0
  4_star_center : 0
  4_star_leaf : 0
orbit count for node 756
  path_interior : 0
  path_terminal : 0
  4_star_center : 0
  4_star_leaf : 0
orbit count for node 435
  path_interior : 0
  path_terminal : 0
  4_star_center : 0
  4_star_leaf : 0
orbit count for node 409
  path_interior : 0
  path_terminal : 1
  4_star_center : 0
  4_star_leaf : 0
orbit count for node 28
  path_interior : 0
  path_terminal : 0
  4_star_center : 0
  4_star_leaf : 0
orbit count for node 19
  path_interior : 0
  path_terminal : 1
  4_star_center : 0
  4_star_leaf : 0
orbit count for node 57
  path_interior : 1
  path_terminal : 1
  4_star_center : 0
  4_star_leaf : 0

```

And those are the results of orbit counting for graphlet G in time window 0-29s