project-code

November 10, 2018

In [12]:
```
!pip install -U -q PyDrive
!apt-get install cython
!pip install planarity
!pip install graphviz
!apt-get install graphviz libgraphviz-dev pkg-config
!pip install pygraphviz
```

In [13]:
```
import time
import sys
import networkx as nx
import itertools as it
import planarity
import random
from networkx.algorithms import bipartite
import numpy as np
import networkx as nx
import matplotlib.pyplot as plt
import pygraphviz as pgv
```

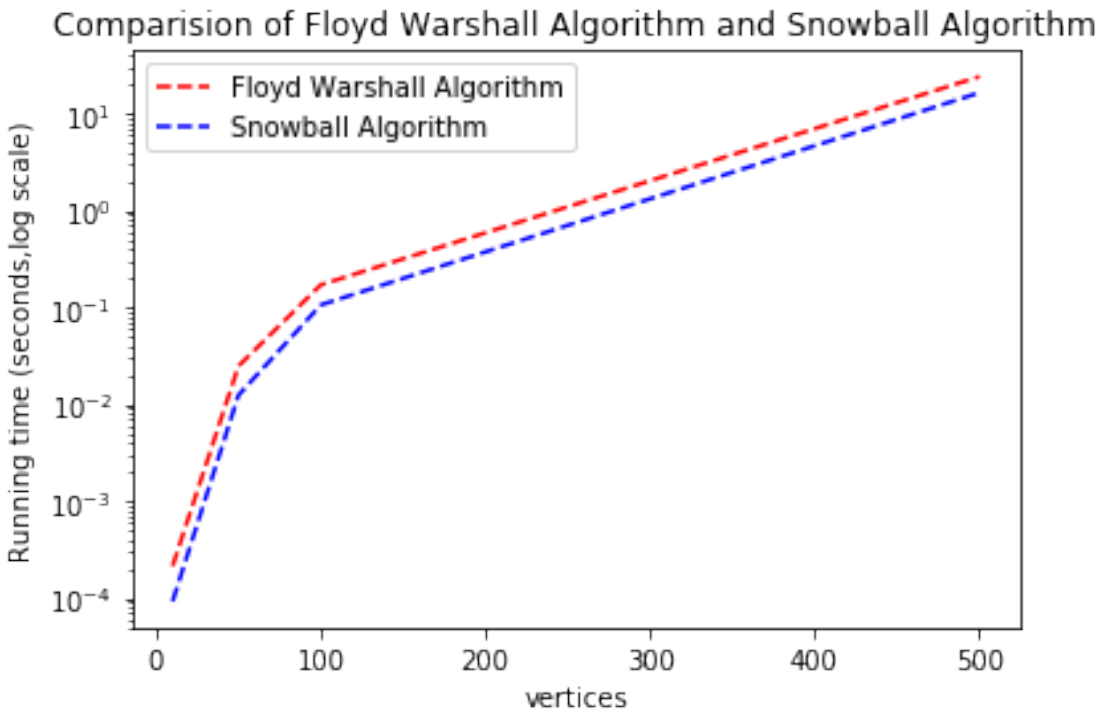
In [14]:
```
def floydWarshall(dist,vertices):
        for k in range(vertices-1):
                for i in range(vertices-1):
                        for j in range(vertices-1):
                                dist[i][j] = min(dist[i][j],dist[i][k]+dist[k][j])
```

In [15]:
```
def DPC(graph,vertices):

    for k in range(vertices-2, -1, -1):
        for j in range(0,k):
            for i in range(0,j):
                if graph[i][k] != float('inf') and graph[k][j] != float('inf'):
                    graph[i][j] = min(graph[i][j], graph[i][k]+graph[k][j])
                if graph[j][k] != float('inf') and graph[k][i] != float('inf'):
                    graph[j][i] = min(graph[j][i], graph[j][k]+graph[k][i])
                if graph[i][j]+graph[j][i] < 0:
                    return False
    return True ,graph
```

```
In [16]: def snowball(dist,vertices):
             graph = dist
             for k in range(vertices-1):
                 for j in range(k-1, 0, -1):
                     for i in range(0, k):
                         dist[i][k] = min(dist[i][k], dist[i][j]+graph[j][k])
                         dist[k][i] = min(dist[k][i], dist[j][i]+graph[k][j])

In [17]: def createMatrix(vertices):

                 ############## Reading from file ######################################

                 filename = 'planar_'+str(vertices)+'_nodes.txt'

                 x,y,z= np.loadtxt(filename, delimiter = "\t", unpack = True)

                 ######################################################################

                 ############ Generating Incident Matrix ##############################

                 G = nx.Graph()
                 G.add_nodes_from([1,vertices])


                 for x1,y1,z1 in zip(x,y,z):
                         x1 = int(x1)
                         y1 = int(y1)
                         z1 = int(z1)
                         G.add_edge(x1,y1,weight = z1)

                 ######################################################################

                 ############ Generating 2D adjacency matric ##########################

                 A = nx.adjacency_matrix(G)
                 b = A.todense()

                 gr = []
                 gr = nx.to_numpy_matrix(G)
                 llist = []
                 graph = []
                 counter = 0
                 c = 0
                 for x in np.nditer(gr):
                         c += 1
                         if counter == vertices:
                                 counter = 0
                                 graph.append(llist)
```

```
                llist = []

            if x == 0:
                llist.append(float('inf'))
                counter += 1
            else:
                llist.append(int(x))
                counter += 1
        return graph

        #*****************************************************************
```

In [22]:
```
vertex = [10,50,100,500,1000] #dataset for vertices 5000, 20000, 50000 are also avail

FTIME = [] #for storing run time for Floyd Warshall Algorithm for different datasets
STIME = [] #for storing run time for Snowball Algorithm for different datasets

for value in vertex:

        graph = createMatrix(value) # to create adjacency matrix

        start = time.time()
        floydWarshall(graph,value) # invoking Floyd Warshall function
        end = time.time()
        FTIME.append(end - start)


        flag, graph = DPC(graph,value)                # preprocessing graph to make i

        if flag == True:
            start = time.time()
            snowball(graph,value) # invoking Snowball function
            end = time.time()
            STIME.append(end - start)


comparisionPlot(STIME,FTIME) # plotting run time comparision of Floyd Warshall and Sn
```




```
In [ ]: def comparisionPlot(STIME,FTIME): # to plot comparision plot

            plt.plot(vertex, FTIME, 'r--', label = 'Floyd Warshall Algorithm')
            plt.plot(vertex, STIME, 'b--', label = 'Snowball Algorithm')
            plt.xlabel('vertices')
            plt.ylabel('Running time (seconds,log scale)')
            plt.title('Comparision of Floyd Warshall Algorithm and Snowball Algorithm')
            plt.legend()
            plt.show()
```

```
In [63]: def plotGraph(graph,vertices): # to plot graph stored in adjacency matrix form
             G = nx.Graph()
             print vertices
             for x in range(0, vertices-1, 1):
                 for y in range(0, vertices-1, 1):
                     if graph[x][y] != float('inf'):
                         x = int(x)
                         y = int(y)
                         G.add_edge(x,y,weight = graph[x][y])

             nx.draw(G, with_labels=True)
```