Assignment 8

December 8, 2015

In [1]:
```
import networkx as nx
from random import choice
import random
import matplotlib.pyplot as plt
```

In [2]:
```
num_edges = 25000
edges = float(2*num_edges)/float(10000**2)
G = nx.erdos_renyi_graph(10000,edges)
```

In [9]:
```
# MODEL

periods = 100

susceptible = [ node for node in G.nodes()]
infected = []
recovered = []
psi = 0.4

susceptible_hist = []
infected_hist = []
recovered_hist = []


patient_zero = choice(G.nodes())
susceptible.remove(patient_zero)
infected.append(patient_zero)

for t in range(1,periods):

    susceptible_hist.append(len(susceptible))
    infected_hist.append(len(infected))
    recovered_hist.append(len(recovered))


    for vertex in infected:
        for neighbor in G.neighbors(vertex):

            if (random.random() < psi):
                if (neighbor in susceptible):
                    susceptible.remove(neighbor)
                    infected.append(neighbor)

        infected.remove(vertex)
        recovered.append(vertex)
```

In [10]:
```
# Plot

time = [t for t in range(1,periods)]

plt.figure()
plt.plot(time,susceptible_hist,'bv-')
plt.plot(time,infected_hist,'ro-')
plt.plot(time,recovered_hist,'gp-') # degree
plt.legend(['Susceptible','Infected','Recovered'])
plt.xlabel('Time')
plt.ylabel('Number of nodes')
plt.title('SIR Model')
plt.savefig('SIR Model.pdf')
plt.close()
```

In [ ]: