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1 #CECS274 Lab Sec 07 Larry Delgado
2 import AdjacencyList
3 import DLList
4 import random
5 import matplotlib.pyplot as matplotlib
6
7 class Person: #node
8     def __init__(self) -> bool:
9         #CLEAN=0, INFECTED=1, DEAD=2, RECOVERED=3
10        self.state = 0
11        self.recover = 0
12 class covid19_Simulation:
13     def __init__(self):
14        self.people = 10000 #number of people 100000
15        self.alpha = 0.01
16        self.recovDays = 4
17        self.fatalityR = 0.03
18        self.initialSet = 0.01
19        self.tr = 0.015
20        self.clean = 0
21        self.infected = 0
22        #graph with n nodes(people)
23    def getInteractionGraph(self, g, plist):
24        for j in range(self.people):
25            i = plist.get( random.randint(0,j) )
26            if random.randint(0,1) < self.alpha:
27                g.add_edge(j,i)
28            else:
29                k = plist.get( random.randint(0, random.randint(0,j)) ) #random node that node i points
30                g.add_edge(j,k)
31        return g
32
33    def simulation(self, graph, day,plist):
34        dead = 0
35        recovered = 0
36
37        while day <= 30:
38            print("DAY: " + str(day) + " CLEAN: " + str(self.clean) + " INFECTED: " + str(self.infected)) #+"
39            for v in range(plist.size()): #v nodes
40                infectedPerson = plist.get(v)
41                if infectedPerson.state == 1:
42                    neighbors = graph.out_edges(0) #list
43                    for n in range(neighbors.size()):
44
45                        neighbor = neighbors.get(n)
46                        if random.randint(0,1) < self.tr:
47                            neighbor.state = 1
48                            self.infected += 1
49                            self.clean -= 1
50                            neighbor.recover = self.recovDays
51                infectedPerson.recover = infectedPerson.recover -1
52                if infectedPerson.recover == 0:
53                    if 0 < self.fatalityR:
54                        infectedPerson.state = 2 #dead
55                        dead += 1
56                        self.infected -= 1

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58             infectedPerson.state = 3 #recovered
59             recovered += 1
60             self.infected -= 1
61
62         day += 1
63         matplotlib.pyplot.plot(day, self.infected)
64
65     def initialInfectedNodes(self, graph, plist):
66         for v in range(plist.size()):
67             x = plist.get(v)
68             neighbors = graph.out_edges(v)
69             if random.randint(0,20) < self.initialSet:
70                 x.state = 1
71                 self.infected += 1
72                 for neighbor in range(neighbors.size()):
73                     if graph.has_edge(v, int(neighbor)):
74                         neighbor.recover = recovDays
75             else:
76                 x.state = 0 #clean
77                 self.clean += 1
78
79 def main():
80     covid19 = covid19.Simulation()
81     al = DLList.DLList()
82     for population in range(covid19.people):
83         person = Person()
84         al.append(person)
85     #With lockdown
86     g1 = AdjacencyList.AdjacencyList(covid19.people)
87     #Without lockdown
88     g2 = AdjacencyList.AdjacencyList(covid19.people)
89
90     covid19.getInteractionGraph(g1,al)
91     covid19.initialInfectedNodes(g1,al)
92     covid19.simulation(g1,0,al)
93     matplotlib.show()
94
95 main()
96

```

>>>

= RESTART: /Users/berry/Desktop/GitHub/School-Programs/CECS274/skeleton/covid19.py

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DAY: 0 CLEAN: 9520 INFECTED: 480
DAY: 1 CLEAN: 9273 INFECTED: 727
DAY: 2 CLEAN: 9042 INFECTED: 958
DAY: 3 CLEAN: 8803 INFECTED: 1197
DAY: 4 CLEAN: 8558 INFECTED: 1442
DAY: 5 CLEAN: 8314 INFECTED: 1686
DAY: 6 CLEAN: 8079 INFECTED: 1921
DAY: 7 CLEAN: 7826 INFECTED: 2174
DAY: 8 CLEAN: 7579 INFECTED: 2421
DAY: 9 CLEAN: 7326 INFECTED: 2674
DAY: 10 CLEAN: 7098 INFECTED: 2902
DAY: 11 CLEAN: 6877 INFECTED: 3123
DAY: 12 CLEAN: 6649 INFECTED: 3351
DAY: 13 CLEAN: 6431 INFECTED: 3569
DAY: 14 CLEAN: 6169 INFECTED: 3831
DAY: 15 CLEAN: 5918 INFECTED: 4082
DAY: 16 CLEAN: 5685 INFECTED: 4315
DAY: 17 CLEAN: 5465 INFECTED: 4535
DAY: 18 CLEAN: 5232 INFECTED: 4768
DAY: 19 CLEAN: 4995 INFECTED: 5005
DAY: 20 CLEAN: 4762 INFECTED: 5238
DAY: 21 CLEAN: 4515 INFECTED: 5485
DAY: 22 CLEAN: 4269 INFECTED: 5731
DAY: 23 CLEAN: 4019 INFECTED: 5981
DAY: 24 CLEAN: 3781 INFECTED: 6219
DAY: 25 CLEAN: 3550 INFECTED: 6450
DAY: 26 CLEAN: 3291 INFECTED: 6709
DAY: 27 CLEAN: 3055 INFECTED: 6945
DAY: 28 CLEAN: 2827 INFECTED: 7173
DAY: 29 CLEAN: 2593 INFECTED: 7407
DAY: 30 CLEAN: 2338 INFECTED: 7662

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