

HoP101: Session 4

More building

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```
import random

# A B C D E

# 0 -> susceptible
# 1 -> infected
# 2 -> recovered

# T = 0

state = [0, 0, 0, 1, 0]

# If you are susceptible, and have a infected neighbour, you have a 50% chance of being infect
k = 0.5 # chance of infection

# If you are recovered, you have a ___ % of recovery given that it takes 10 days to recover of d = 10 # days to recover
r = 1/d # chance of recovery

print(0, [4, 1, 0])
```

0 [4, 1, 0]

```
T = 1 # Time instance
while T < 100:
    new_state = state.copy()

if state[0] == 0:
    if state[1] == 1:
        if random.random() < k:
            new_state[0] = 1

if state[len(state) - 1] == 0:
    if state[len(state) - 2] == 1:
        if random.random() < k:
            new_state[len(state) - 1] = 1</pre>
```

```
while i < len(state) - 1:</pre>
    if state[i] == 0:
        prob = 1 - (1 - k * (state[i-1] == 1)) * (1 - k * (state[i + 1] == 1)) # probabil
        if random.random() < prob:</pre>
            new_state[i] = 1
    i = i + 1
i = 0
while i < len(state):</pre>
    if state[i] == 1:
        if random.random() < r:</pre>
            new_state[i] = 2
    i = i + 1
state = new_state.copy()
i = 0
nums = [0, 0, 0]
while i < len(state):</pre>
    nums[state[i]] += 1
    i += 1
print(nums[0], nums[1], nums[2], sep=", ")
T = T + 1
```

- 3, 2, 0
- 2, 2, 1 1, 3, 1
- 0, 4, 1 0, 4, 1
- 0, 4, 1
- 0, 3, 2 0, 1, 4

- 0, 1, 4
- 0, 1, 4 0, 1, 4

- 0, 1, 4 0, 1, 4 0, 1, 4

```
0, 0, 5
0, 0, 5
0, 0, 5
0, 0, 5
0, 0, 5
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0, 0, 5
# FULL CODE (main.py)
import random
import math # for making the plot log-scaled (we also add 1 to values as we cannot put 0 insi
# 0 -> susceptible
# 1 -> infected
# 2 -> recovered
#T = 0
state = [0] * 1000
state[250] = 1
state[750] = 1
# If you are susceptible, and have a infected neighbour, you have a 50% chance of being infec
k = 0.8 # chance of infection
# If you are recovered, you have a ___ % of recovery given that it takes 10 days to recover o
d = 5 # days to recover
r = 1/d # chance of recovery
print(math.log(998 + 1), math.log(2 + 1), 0, sep=", ")
T = 1 # Time instance
```

0, 0, 5 0, 0, 5

while T < 100:

new_state = state.copy()

```
if state[0] == 0:
        if state[1] == 1:
            if random.random() < k:</pre>
                 new_state[0] = 1
    if state[len(state) - 1] == 0:
        if state[len(state) - 2] == 1:
            if random.random() < k:</pre>
                new_state[len(state) - 1] = 1
    i = 1
    while i < len(state) - 1:</pre>
        if state[i] == 0:
            prob = 1 - (1 - k * (state[i-1] == 1)) * (1 - k * (state[i + 1] == 1)) # probabil
            if random.random() < prob:</pre>
                 new_state[i] = 1
        i = i + 1
    i = 0
    while i < len(state):</pre>
        if state[i] == 1:
            if random.random() < r:</pre>
                new_state[i] = 2
        i = i + 1
    state = new_state.copy()
    i = 0
    nums = [0, 0, 0]
    while i < len(state):</pre>
        nums[state[i]] += 1
        i += 1
    print(math.log(nums[0] + 1), math.log(nums[1] + 1), math.log(nums[2] + 1), sep=", ")
    T = T + 1
# Run in the command prompt/terminal:
# python main.py > data.csv
# and open data.csv in Excel to plot the data and observe the curve!
```