Homework 7

RBE595

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Grid : 5X5

For 4 neighbors:

At p = 0.012, R = 22

Number of iterations = 816

Estimated size = 23

```
all 25 nodes set to done at iter 816
done
23,23,23,23,23,

23,23,23,23,23,

23,23,23,23,23,

23,23,23,23,23,

23,23,23,23,23,
```

At p = 0.05, R = 50

Number of iteration = 898

Estimated size = 16

```
all 25 nodes set to done at iter 898
Size estimation done with initiation probability, p= 0.05 and refractory timer, R= 50 for 4 neighbors
16,16,16,16,16,

16,16,16,16,16,

16,16,16,16,16,

16,16,16,16,16,

16,16,16,16,16,
```

Grid : 5X5
For 8 neighbors:
At p = 0.02, R = 22
Number of iteration = 553
Estimated size = 25

```
all 25 nodes set to done at iter 553
Size estimation done with initiation probability, p= 0.02 and refractory timer, R= 8 for 8 neighbors
25,25,25,25,25,

25,25,25,25,25,

25,25,25,25,25,

25,25,25,25,25,

25,25,25,25,25,
```

At p = 0.05, R = 50
Number of iteration = 792
Estimated size = 15

```
all 25 nodes set to done at iter 792
Size estimation done with initiation probability, p= 0.05 and refractory timer, R= 50 for 8 neighbors
15,15,15,15,15,

15,15,15,15,15,

15,15,15,15,15,

15,15,15,15,15,

15,15,15,15,15,
```

Grid : 10X10
For 8 neighbors:
At p = 0.02, R = 10
Number of iterations to determine size = 1052
Estimated size = 56

```
all 100 nodes set to done at iter 1052
done with initiation probability, p= 0.02 and refractory timer, R= 10
56,56,56,56,56,56,56,56,56,56,

56,56,56,56,56,56,56,56,56,56,

56,56,56,56,56,56,56,56,56,56,

56,56,56,56,56,56,56,56,56,56,

56,56,56,56,56,56,56,56,56,56,

56,56,56,56,56,56,56,56,56,56,

56,56,56,56,56,56,56,56,56,56,

56,56,56,56,56,56,56,56,56,56,

56,56,56,56,56,56,56,56,56,56,
```

At p = 0.05, R = 50
Number of iterations to determine size = 1566
Estimated size = 29

```
all 100 nodes set to done at iter 1566
Size estimation done with initiation probability, p= 0.05 and refractory timer, R= 50 for 8 neighbors
29,29,29,29,29,29,29,29,29,29,

29,29,29,29,29,29,29,29,29,29,

29,29,29,29,29,29,29,29,29,29,
```

Grid: 10X10:
For 4 neighbors:
At p = 0.02, R = 8
Number of iterations to determine size = 981
Estimated size = 46

```
all 100 nodes set to done at iter 981
Size estimation done with initiation probability, p= 0.02 and refractory timer, R= 8 for 4 neighbors
46,46,46,46,46,46,46,46,46,46,

46,46,46,46,46,46,46,46,46,46,

46,46,46,46,46,46,46,46,46,46,

46,46,46,46,46,46,46,46,46,46,

46,46,46,46,46,46,46,46,46,46,

46,46,46,46,46,46,46,46,46,46,

46,46,46,46,46,46,46,46,46,46,

46,46,46,46,46,46,46,46,46,46,

46,46,46,46,46,46,46,46,46,46,

46,46,46,46,46,46,46,46,46,46,
```

At p = 0.05, R = 50
Number of iterations to determine size = 1333
Estimated size = 24

```
all 100 nodes set to done at iter 1333
Size estimation done with initiation probability, p= 0.05 and refractory timer, R= 50 for 4 neighbors
24,24,24,24,24,24,24,24,24,24,

24,24,24,24,24,24,24,24,24,24,

24,24,24,24,24,24,24,24,24,24,
```

Grid: 20X20
For 4 neighbors
P = 0.015, R = 8
Number of iterations = 1066

```
all 400 nodes set to done at iter 1066
Size estimation done with initiation probability, p= 0.015 and refractory timer, R= 8 for 4 neighbors
60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,

60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,

60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,60,
```

P = 0.015, R = 50
Number of iterations = 3267

```
all 400 nodes set to done at iter 3267
Size estimation done with initiation probability, p= 0.015 and refractory timer, R= 50 for 4 neighbors
52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,

52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,

52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,52,
```

P = 0.05, R = 50
Number of iterations = 1735

```
all 400 nodes set to done at iter 1735
Size estimation done with initiation probability, p= 0.05 and refractory timer, R= 50 for 4 neighbors
31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,

31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,

31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,31,
```

Grid: 20X20
For 8 neighbors:
P = 0.015, R = 8
Number of iteration = 1321

```
all 400 nodes set to done at iter 1321
Size estimation done with initiation probability, p= 0.015 and refractory timer, R= 8 for 8 neighbors
72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,

72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,

72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,

72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,

72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,72,
```

P = 0.015, R = 50
Number of iteration = 4147

```
all 400 nodes set to done at iter 4147
Size estimation done with initiation probability, p= 0.015 and refractory timer, R= 50 for 8 neighbors
73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,

73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,

73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,

73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,

73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,73,
```

P = 0.05, R = 50
Number of iterations = 2209

```
all 400 nodes set to done at iter 2229
Size estimation done with initiation probability, p= 0.05 and refractory timer, R= 50 for 8 neighbors
41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,

41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,

41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,

41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,

41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,41,
```

Q3) As shown above for different results of grid sizes, if we use 8 neighbors, we can get a relatively better estimate of the group size. Also we can get convergence in less number of iterations.

Q4) We can keep different p values (p_1, p_2) for initiation and termination check. We can use different number $1/p_2$ to set the node to done and initiate the nodes at different probability p_1. This way we can get quick initiation of all nodes and also we can get better estimate by decreasing the value of p_2 as the algorithm will run for longer time to synchronize.