CS311-Assignment 0 - Report

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1 Deductions

These report explains the approach followed to solve the problem, information regarding parameters like length, width for boundary, probability for ON/OFF states of sensors, and the time taken by infiltrator to reach the defending country (DC) from attacking country (AC) by crossing the sensor's grid.

2 Parameters And Assumptions

According to the data provided in the question, the length has to be infinitely long, so we took 5000 as value of of length of the boundary.i.e.

$$L=5000$$

Also, the sensor is switched ON, if we receive Heads in tossing the coin, which in turn depends upon the values of probability variable given by us, we are considering. a 'for' loop to assign values of probability starting from 0.12 to 0.80 with a jump of 0.04 in between.
We have also assigned values to Width variable using a 'for' loop which will assign values from 2 units to 50 units with a gap of 2 units for each value of probability variable. These way we try to get results for each probability value and width value.
We have considered that the infiltrator can also step backwards to safeguard itself from switched ON sensors, while moving from AC to DC.
After a duration of every 10 secs, a coin is tossed and based on the probability of getting Heads, the upcoming step from the neighbouring 8 cells is chosen.

3 Results

3.1 Effect of width size

As we increase the size of width, the time taken by the infiltrator to reach DC from AC also increases. The reason is, as the width increases the distance that the infiltrator has to cover will also increase.

3.2 Effect of variation of probability of Sensors being ON

As the probability of sensors being ON increases the time taken by the infiltrator to reach DC also increases because, as probability of sensors being ON increases, the infiltrator's options to proceed towards DC diminishes and hence time required will increase.

4 Approach and Code

We have calculated average time taken to cross the boundary for each width and probability value. The graph plotted uses the average time taken which is the output of our code.

5 Code, Compilation and Execution

We have generated 5 files to solve the problem. The files are:

1. ass0.java (main class file)
2. border.java
3. clock.java
4. infiltrator.java
5. sensor.java

On executing the code it will generate **output.csv** file which contains a column for probability values, another column for width values and a column for average value of time.

We have also made a file **graph.py** for plotting graphs of average time, probabiltiy and width values using *Matplotlib* from python.

6 Graph Details

X-Axis: Width
Y-Axis: Probability
Z-Axis: Time