CS301: Computer Architecture
Assignment 0

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Approach to the problem

Our approach was pretty simple. We would just see the 3 sensors ahead of the infiltrator where he can move and the current sensor on which the infiltrator is currently standing.

If the sensor at the coordinates of the infiltrator is activated, then he would wait for the next cycle until that sensor is deactivated.

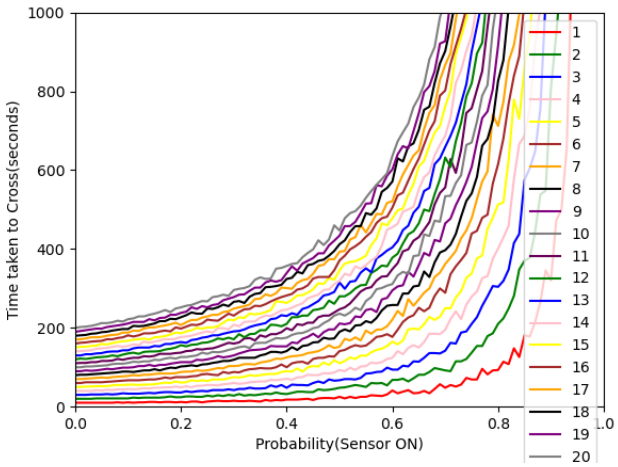
If the sensor on which the infiltrator is standing is off, then we just check if any of the 3 forward sensors are off and we just move forward to any one of them.

If our infiltrator gets stuck then, we just check that if it is still the same case for a 2000 number of iterations, if it is the case, we just make time large to simulate infinity and break the simulation.

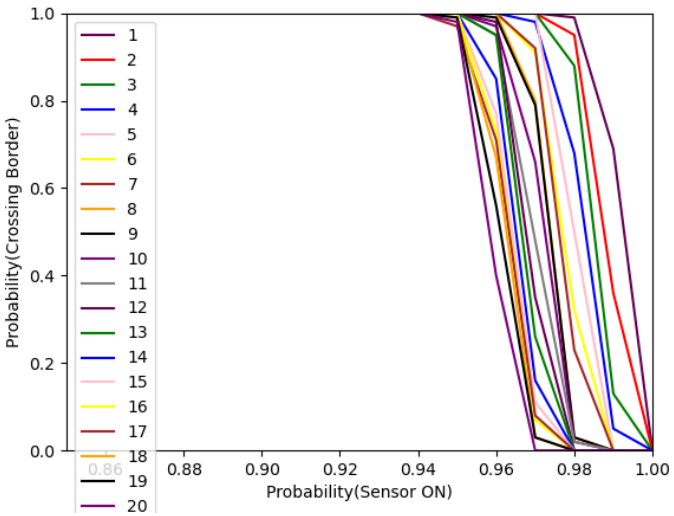
Observations

After running our program and taking the average of 100 epochs for each value for each of the case, the plot between t & p looks somewhat exponential meaning the nearer the probability for each sensor to be ON is 1, the harder it is for the infiltrator to stay undetected and cross the border.
As the width is increased, the y-intercept(time) of the curve also increase.

Plot of time Vs probability of sensor to be on (varying width)



Plot of probability to cross Vs probability of sensor to be on (varying w)



Data Management

In our solution, we are storing the data in a single output file "output.txt" which is in the format :

$$p(sensor\ On\ probability)\ \|\ w\ \|\ t\ \|\ probability\ to\ cross$$

After fetching the data from our java file, we are feeding it in our python file to plot the graph using the matplotlib module.

Conclusion

From the graph, we can clearly observe that when the probability of a sensor to be on is significantly high (say 90%) , we can see that the infiltrator is facing difficulty in crossing the border as it's available options to move starts becoming lesser and lesser with each sensor being on for successive cycles due to the high probability factor. Thus, our theoretical result matched the observations in the simulation hence, we simulated the given problem successfully.