Computer Architecture LAB Assignment 0

180010028

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1 Problem Statement

Consider the scenario where one country, called the defending country (DC), wishes to defend its border against another country, called the attacking country (AC), whose aim is to send an infiltrator to cross the border and enter DC's land. DC decides to deploy a wireless sensor network along the border. If a sensor detects an infiltration attempt, DC can then send its troops to counter the infiltration with "fire and fury" (Trump style!). Quite obviously, the infiltrator would like to enter DC's land without triggering any sensors.

2 Simulation

The simulation was done using JAVA programming language. Separate classes for Border, Infiltrator, Clock, Sensor were made. Also a Simulator class was made to calculate average time for a given 'p' and 'w' by running the simulation ten times.

NOTE:- if probability is greater than given 'p' then the sesnor will be on

3 Approach

Initially, the Infiltrator is presumed to be standing behind the First Row of the Border i.e at Attacking Country (AC) Area. As soon as the Infiltrator tries entering the Border, the Clock starts from Zero. For entering the First Row of the Border, the Infiltrator checks the entire first row. Once the first move is made then the infiltrator checks the three cells:forward-cell, forward-left-cell, forward-right-cell to make a move. Infiltrator only makes the move if his current cell's sensor is off and one of the three cells sensor is also off, otherwise he stands in his cell.

As soon as the infiltrator crosses the border, the time taken is noted. Multiple simulations for a pair of 'p' and 'w' are done to calculate the average time taken.

4 Graph

Here is the 3D plot for the result obtained from the simulation.

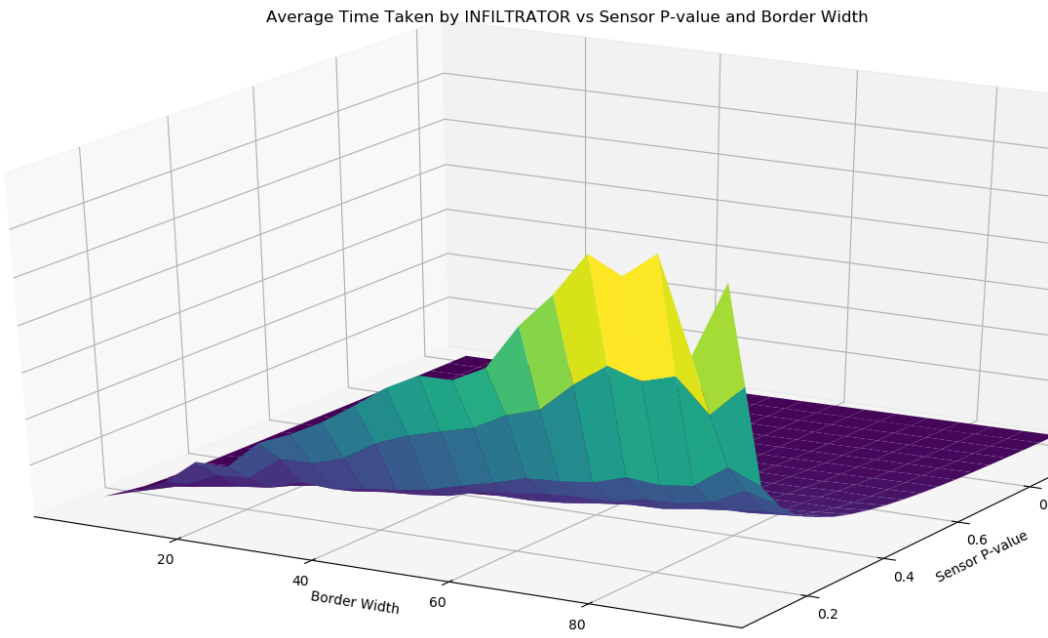

Figure 1: Figure shows changes in average time taken (10 iterations) for specific values of Sensor P-value and Border Width. Varied the value of probability from 0.1 to 0.9 in steps of 0.1 and the value of width from 5 to 100

5 Conclusions

Since we are switching sensor on if the probability is greater than 'p', the following points can be observed: (i) Time w.r.t to width is linear (ii) Time w.r.t to p is exponential