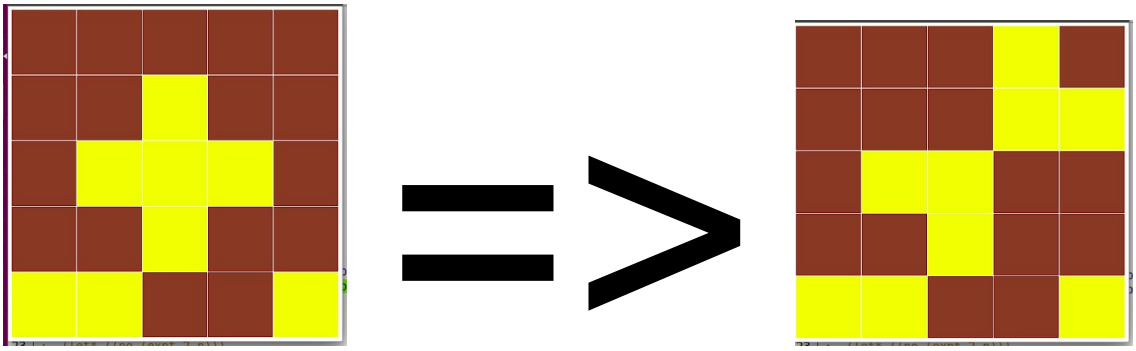
Lights Out

Description

It is an old puzzle game in which we are given a 5x5 grid. Each place has a light placed at it. Initially we are given a random arrangement of lights (on and off). Our objective is to turn off all the lights.
The rules are such that if we toggle a light, then its immediate neighbours will also be toggled.
If we toggle (2,4),then the following change will occur.



Design of program

We have made a 5x5 grid of coloured blocks of two types- yellow (on) and brown (off).
Using big-bang, we are changing the grid when we presses the mouse button on any block.
We have used an algorithm which consists of these points :-
If we toggles a light twice, it will have the same effect as not toggling it at all.
So our solution will consist of only 1s and 0s (1 means toggled once and 0 means not toggled at all).
Also the order of toggling does not matters.
Using some other tricks, the program will find the minimum no. of steps in which all lights can be turned off.

Sample input and output

Input will be taken in the form of mouse click on any block (or light) to toggle it.
The output will be in the form of changing of lights' state (on or off).

Also on calling an function (which uses the algorithm to find the minimum no. of ways), it gives the answer as which lights can be toggled to turn off all lights.

Limitations and bugs

There is another good algorithm of solving this puzzle using matrix multiplication and solving matrix equation. But we are unable to use that algorithm (solving AX=B) because B is variable and the determinant of A is 0, so infinite solutions are possible.

Other points of Interest

We found it as a direct application of Linear Algebra (MA106 course) which we learnt in this semester.