Applied Mathematics

Home work 2

MSc VIBOT/Computer Vision

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Just for Fun!

NOTE
You can discuss the problems with each other, but your solutions must be independently written with your own words and formulations.

The Game
Lights Out is an electronic game, released by Tiger Toys in 1995 [1]. The game consists of a 5 by 5 grid of lights. When the game starts, a random number or a stored pattern of these lights is switched on. Pressing any of the lights will toggle it and the four adjacent lights. The goal of the puzzle is to switch all the lights off, preferably in as few button presses as possible

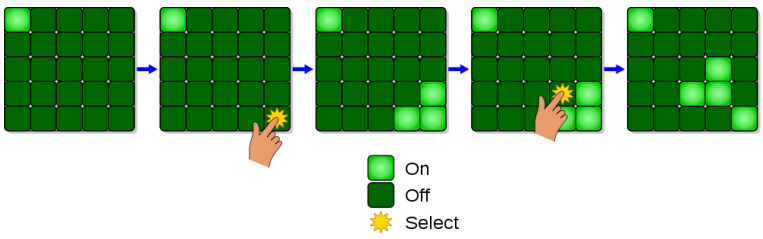

Figure 1: The *Lights Out* game.

Linear Algebra
The fact is that this game can be easily and effeciently solved by simple linear algebra: basics Gauss elimination technique. An example of such strategy is described in [2] and the paper is available on the course webpage.

What do you have to do?

1. Read about the *Lights Out* game (there are many webpages) and the solving strategies with linear algebra.

   Then, write a report about what you have learned. Here, I just want the linear algebra point of view.

2. Write a Matlab code that solve the game, given any intial configuration.

References
1. **Beyond Tetris - Lights Out**, Tony Delgado, *GameSetWatch*, January 29, 2007.
2. **Turning Lights Out with Linear Algebra**, M. Anderson and T. Feil, *Math Magazine*, vol. 71, no. 4, pp. 300-303, October 1998.