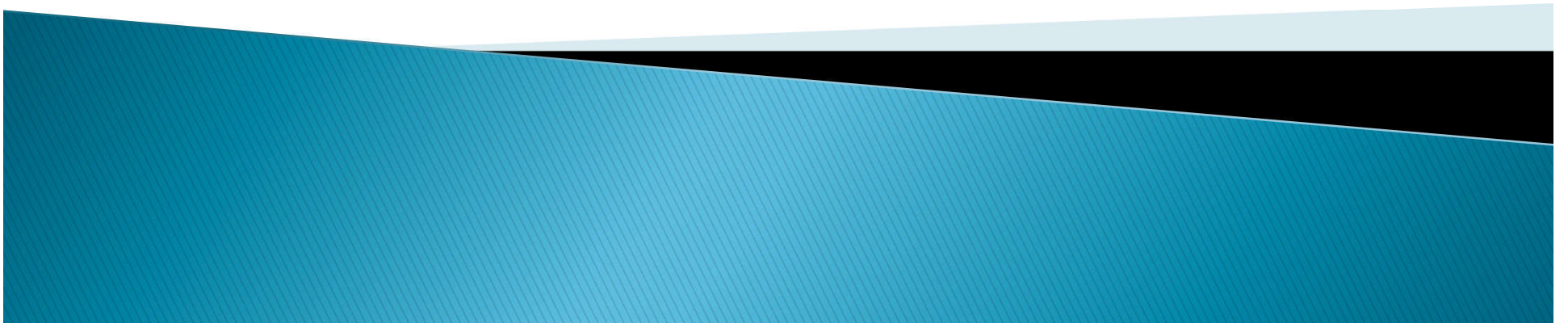


EECS101 Discussion 4

Feb 3, 2017



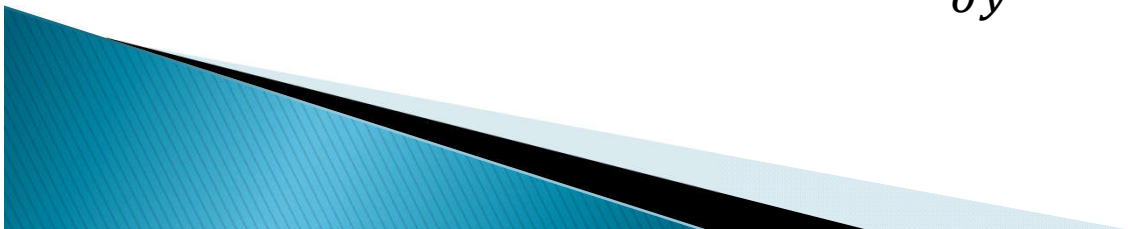
Edge Detection Using Sobel Operator

- ▶ Sobel Operator

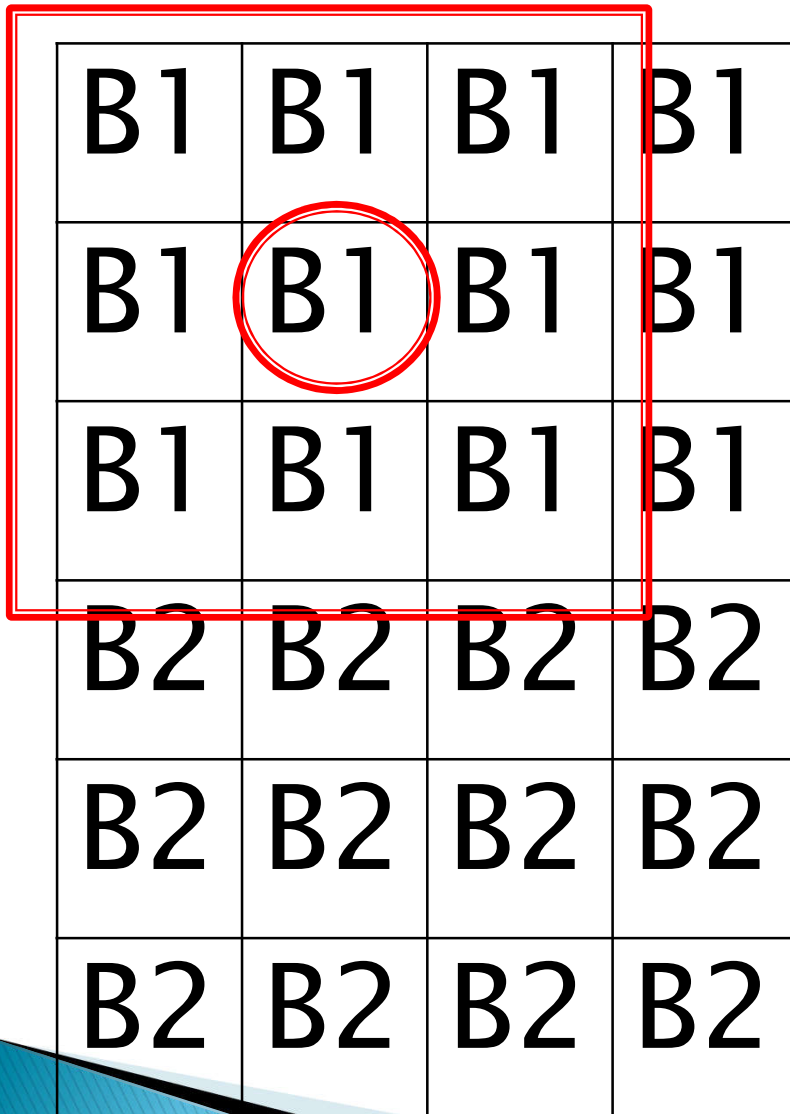
$$\frac{\partial E}{\partial x} = \begin{bmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{bmatrix}$$

$$\frac{\partial E}{\partial y} = \begin{bmatrix} -1 & -2 & -1 \\ 0 & 0 & 0 \\ 1 & 2 & 1 \end{bmatrix}$$

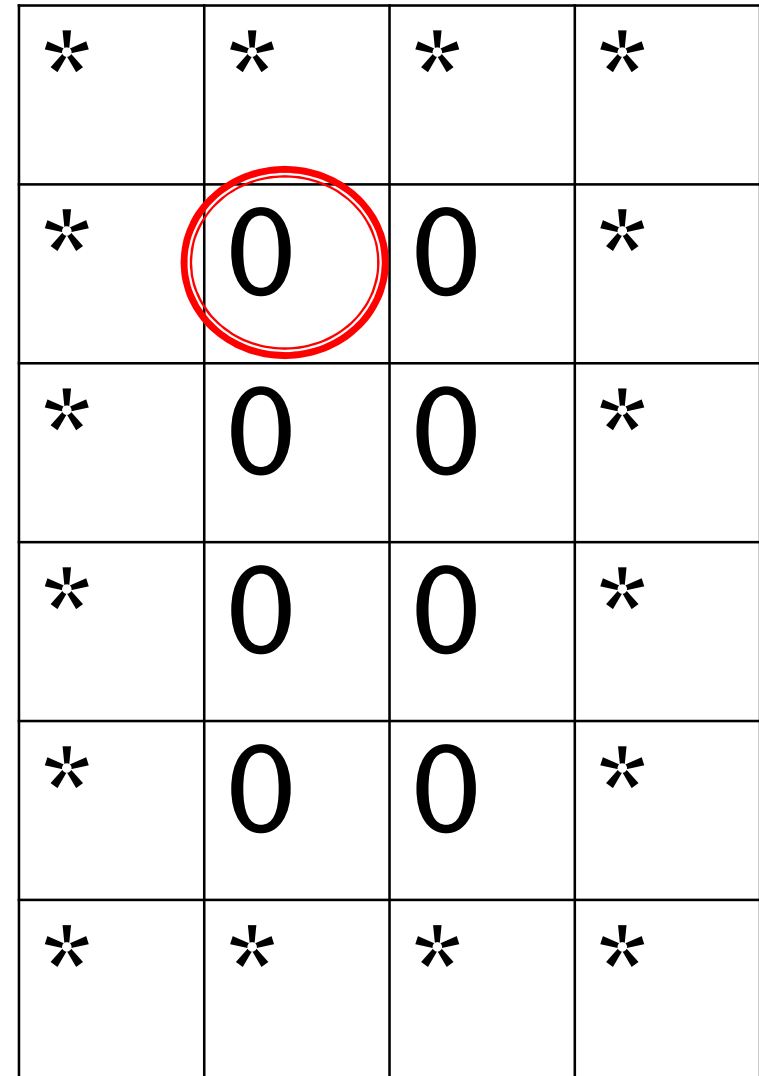
- ▶ Apply $\frac{\partial E}{\partial x}$ to the image and take the absolute value.
- ▶ Divide it by the maximum value and multiply it by 255 (normalize brightness to 255)
- ▶ Repeat the process for $\frac{\partial E}{\partial y}$



Sobel Operator Results for X Direction



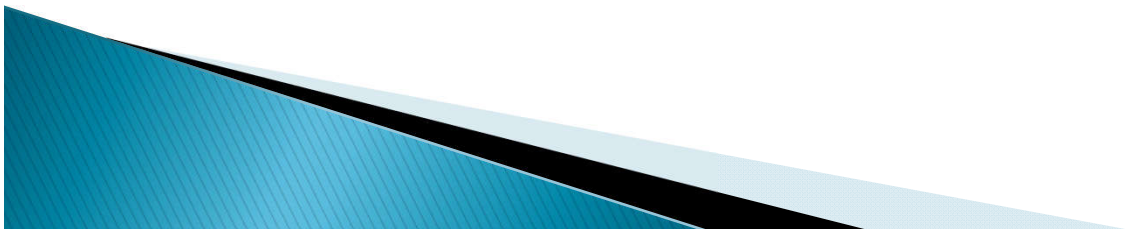
B1	B1	B1	B1
B1	B1	B1	B1
B1	B1	B1	B1
B2	B2	B2	B2
B2	B2	B2	B2
B2	B2	B2	B2



*	*	*	*
*	0	0	*
*	0	0	*
*	0	0	*
*	0	0	*
*	*	*	*

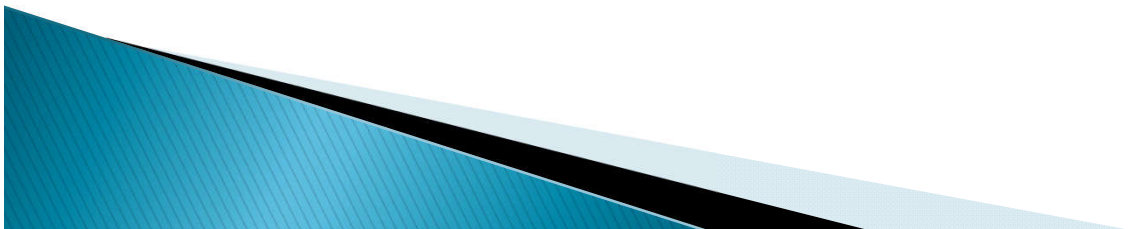
Squared Gradient Magnitude

- ▶ $SGM = \left(\frac{\partial E}{\partial x}\right)^2 + \left(\frac{\partial E}{\partial y}\right)^2$
- ▶ Normalize SGM image so the maximum is 255 (Divide it by the maximum value and multiply it by 255.)
- ▶ Binary image
 - Repeat what you did in homework 3 to **the SGM image**



HW4 Submission Guideline

- ▶ Demonstrate your program by 3pm, Feb 10, in lab.
- ▶ Submit your program and answers to EEE by Feb 10 midnight



Grading Criteria

- ▶ Total 100 points
 - 5 points for submitting a program
 - 20 points for demonstrating your program
 - 25 points for each of the three images
 - 10 for the two gradient images
 - 10 for SGM image
 - 5 for the binary image

