19CSE367 Digital Image Processing

SARATH TV

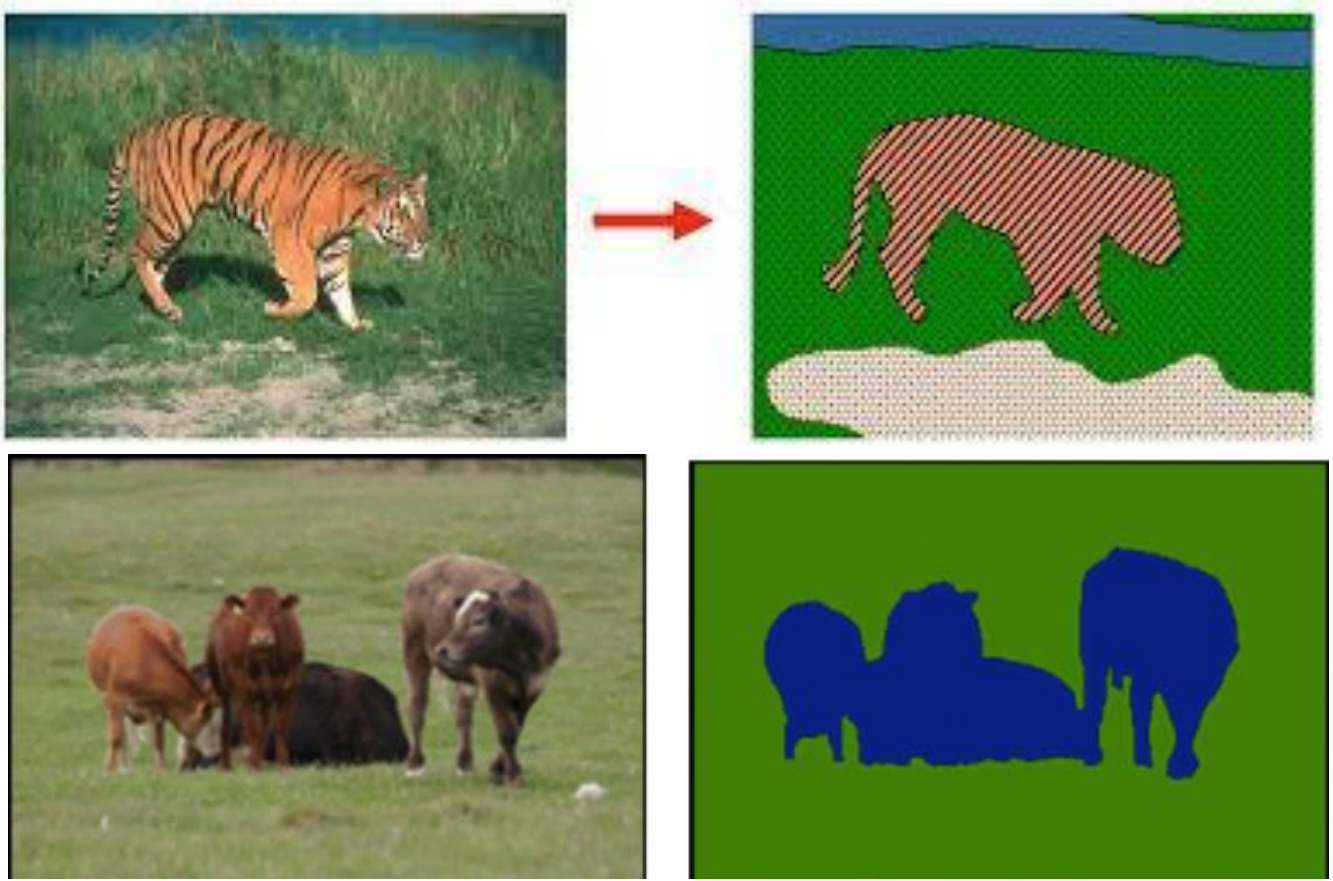
Last lecture

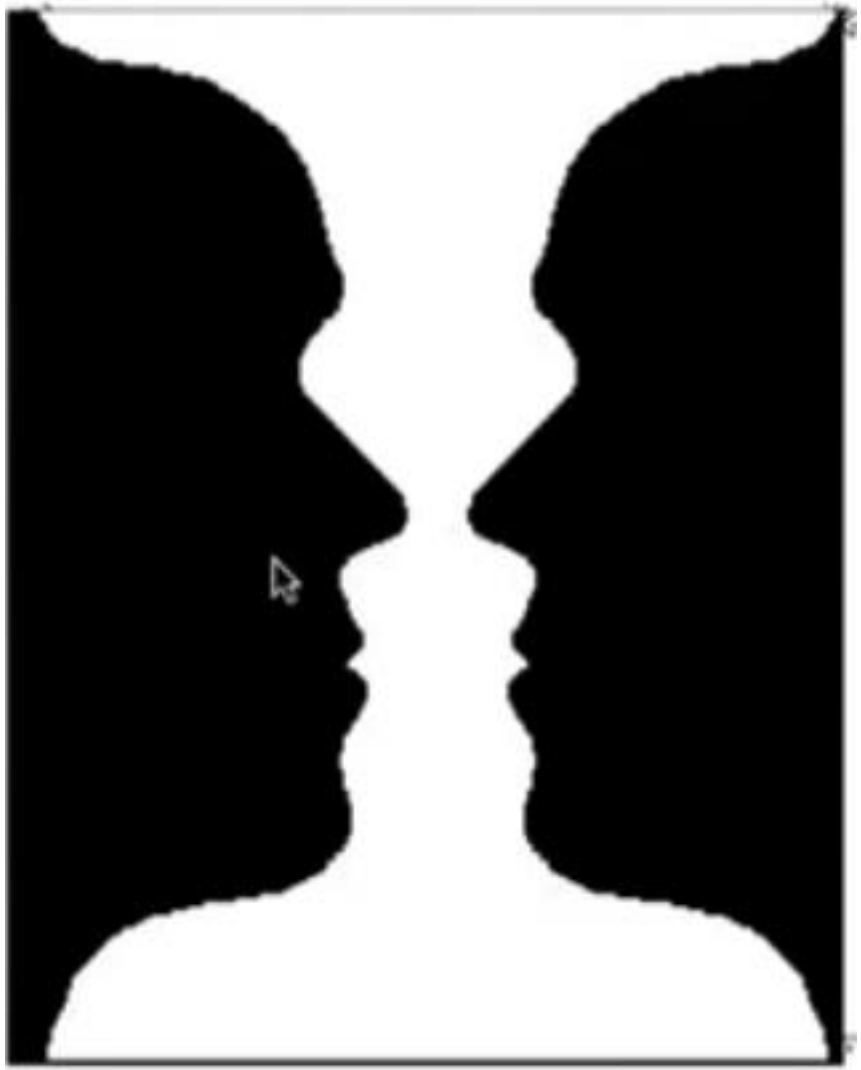
- Estimation of degradation function
- Inverse filtering
- Wiener filtering(min mean square error filtering)

Introduction

- Image processing methods
- Input – Images
- Output – images
- Now new set of methods that gives output- attributes in images
- Segmentation – Process of partitioning the image in subregions
- Based on two basic properties of image intensity-
    - Discontinuity
    - Similarity
- Edge based segmentation
- Region based segmentation

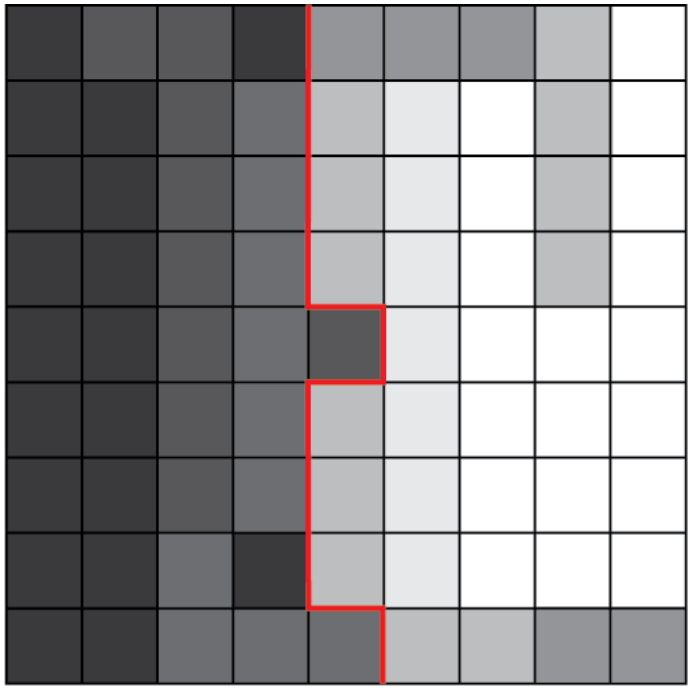
Segmentation





Point, Line and Edge Detection

- Segmentation methods based on detecting sharp changes in intensity.
- Isolated points, lines and edges.
- Edge pixel
- Line



Derivatives of digital function are defined in terms of differences

A basic definition of first order derivative of a 1D function f(x)

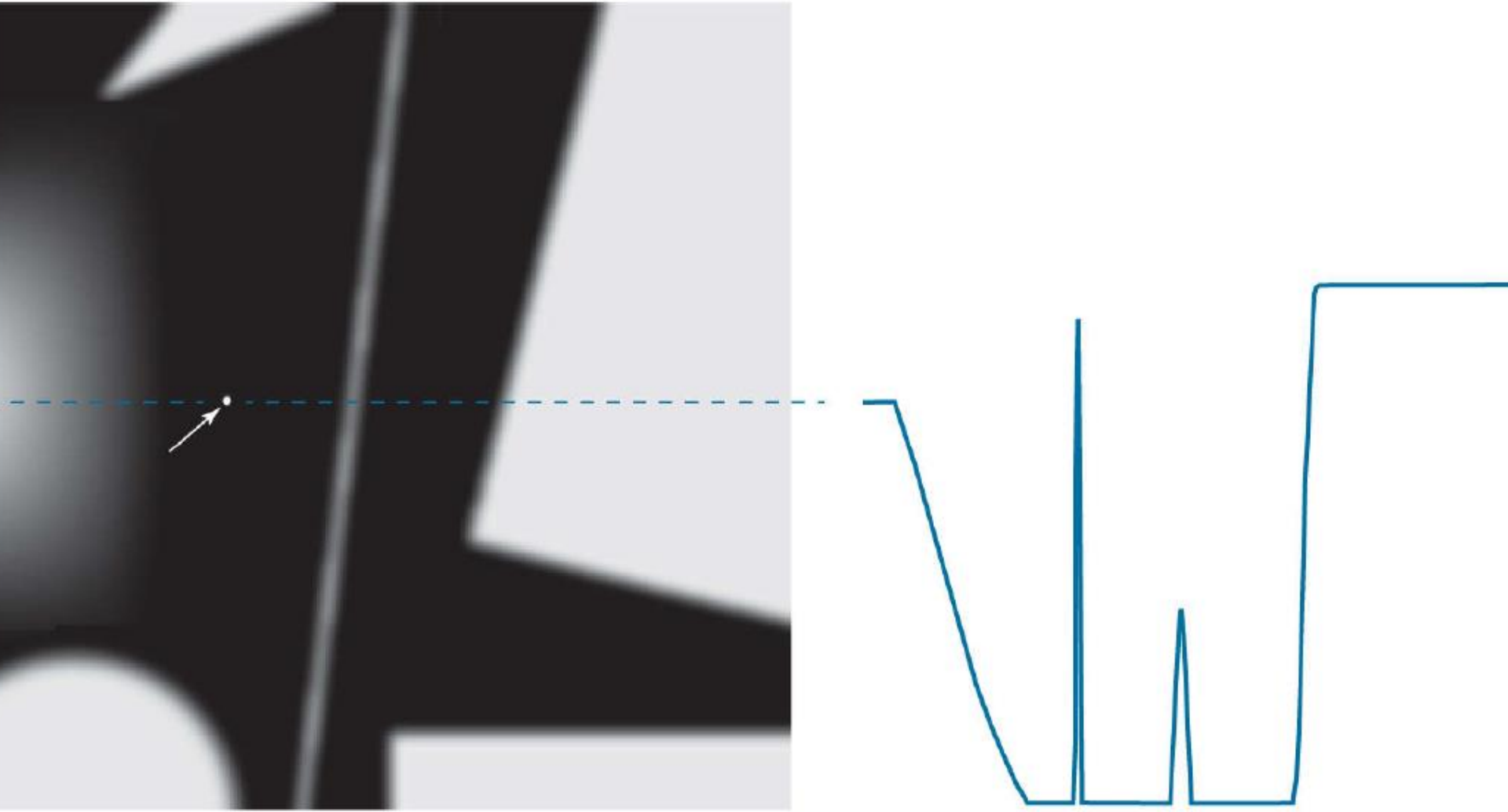
$$\frac{\partial f}{\partial x} = f(x+1) - f(x)$$

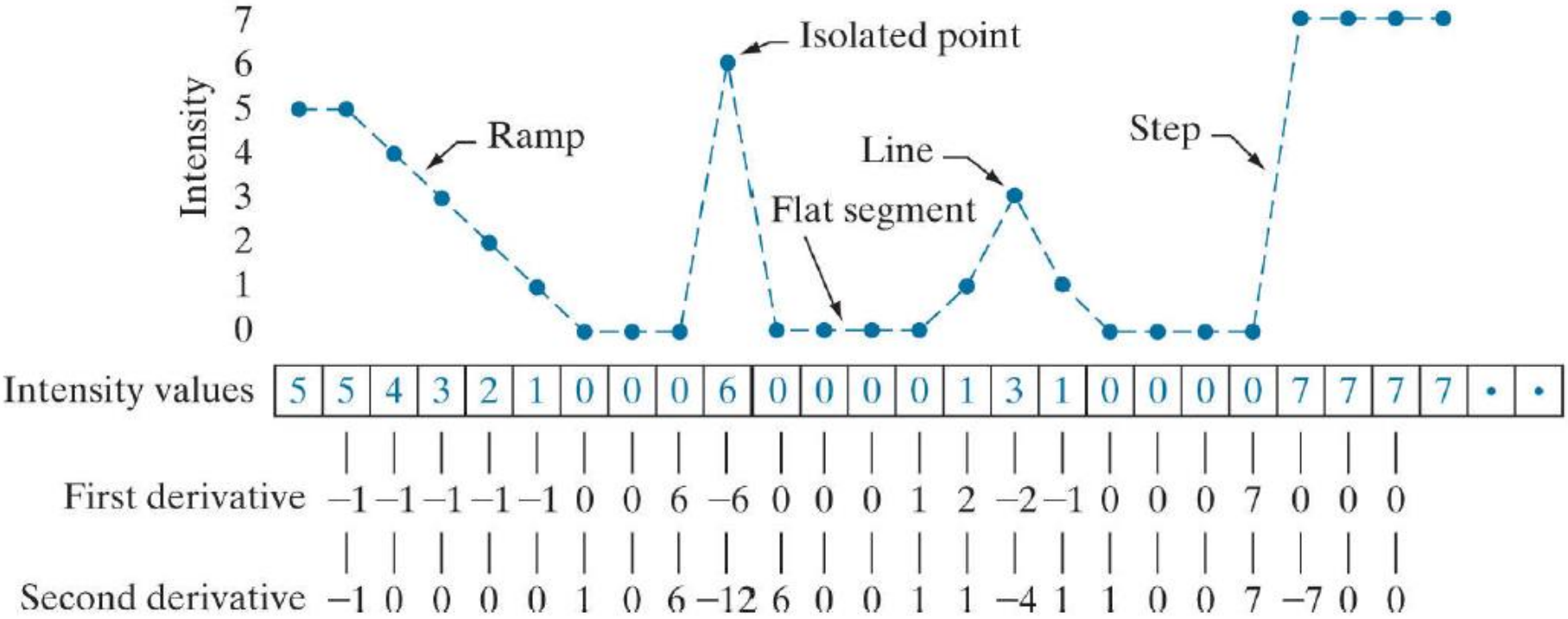
A basic definition of Second order derivative of a 1D function f(x)

$$\frac{\partial^2 f}{\partial x^2} = f(x+1) + f(x-1) - 2f(x)$$

Must be zero in areas of constant intensity
Must be nonzero at the onset of an intensity step or ramp
Must be non zero along intensity ramps

- Must be zero in areas of constant intensity
- Must be nonzero at the onset and ***end*** of an intensity step or ramp
- Must be ***zero*** along intensity ramps




Intensity
7
6
5
4
3
2
1
0
Ramp
Isolated point
Line
Flat segment
Step
Intensity values 5 5 4 3 2 1 0 0 0 6 0 0 0 0 1 3 1 0 0 0 0 7 7 7 7 • •
First derivative −1 −1 −1 −1 −1 0 0 6 −6 0 0 0 1 2 −2 −1 0 0 0 7 0 0 0
Second derivative −1 0 0 0 0 1 0 6 −12 6 0 0 1 1 −4 1 1 0 0 7 −7 0 0


THANK YOU!