

Outline

CS376 Computer Vision

Wednesday, January 26, 2011

Edge detection and image gradients

Review questions from last lecture on linear filters

Motivation: Why is contrast so important?

Computing image gradients with convolution

- Partial derivatives in x and y via finite differences
- Other popular finite difference derivative masks
- Properties of the gradient: direction, magnitude
- Impact of noise, counteracting with smoothing
 - Smoothing and differentiating with derivative of Gaussian filters
 - Laplacian of Gaussian filter for edges
 - Impact of smoothing scale on edges found
- Compare: mask properties for smoothing vs. derivatives
- Application with image gradients: seam carving
 - Energy function definition
 - Greedy solution
 - Optimal solution with dynamic programming
 - Example results

Edge detection

- Basic pipeline: smooth, enhance, localize
- Thresholding a gradient image for edges
- Canny edge detector
 - Non-maximum suppression
 - Hysteresis
- Low-level edges vs. perceived contours

Summary