Image Processing with MATLAB
Lecture 7: Feature Extraction Using Segmentation and Edge Detection

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Lecture Contents:

1. Feature Extraction from Images
2. Methods
   - ❑ Edge detection
   - ❑ Corner detection
   - ❑ Segmentation

Edge detection

- An edge is a set of connected pixels that lie on the boundary between two regions.
- To detect an edge we apply a threshold to the magnitude of image gradient
- Gradient is computed by convolving the image with a 3x3 Prewitt mask, and edges are thinned applying non-maximum suppression

Original image

Edge Detection

Edge

Edge detection

h = fspecial(type)
h = fspecial('prewitt')
h = fspecial('sobel')

Example:
b=imread('3rdyear2.jpg');
h = fspecial('sobel');
I = imfilter(b,h);
imshow(I)

Edge detection

BW = edge(I)
BW = edge(I,'Sobel')
BW = edge(I,'Prewitt')
BW = edge(I,'Canny')

(a) Original image   (b) Canny   (c) Sobel
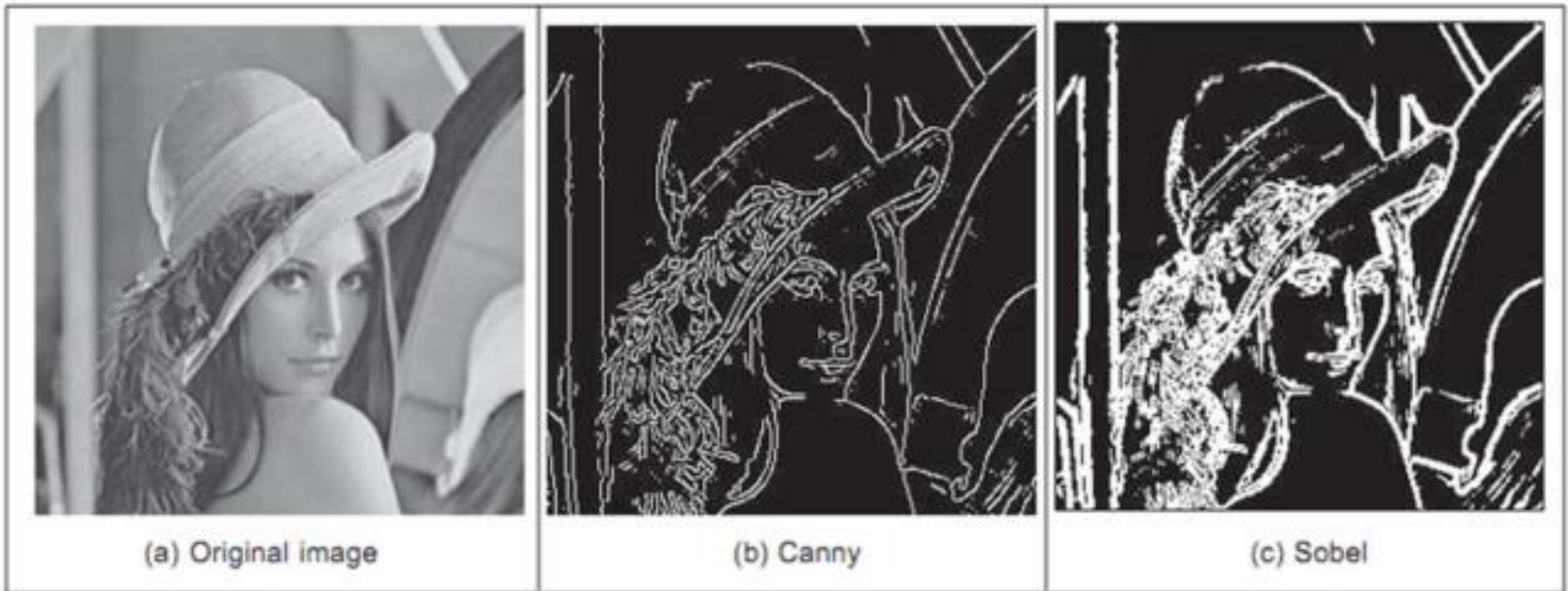
Corner detection

- Corner points are detected by a significant change of the gradient values along two directions

- The core receives in input the image gradients and the required number of corners, and outputs the coordinates and the degree of confidence of the extracted corners.

- Corners are easy to track

- Once the position of corners is known along the video sequence, many information on camera motion can be retrieved.
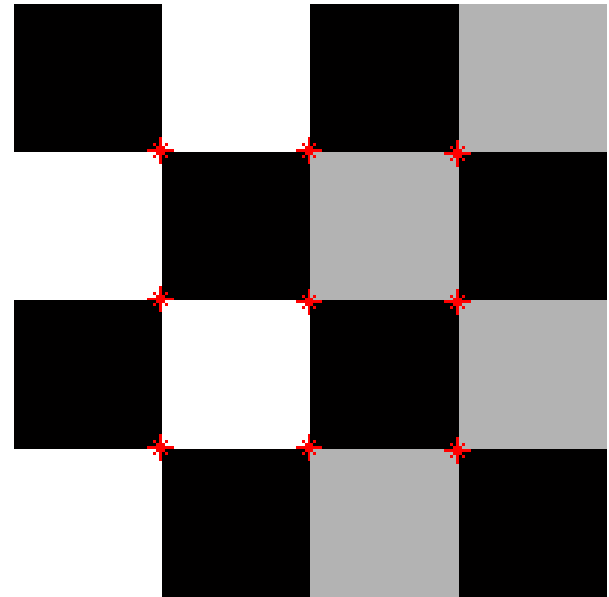
Corner detection

C = corner(I)
C = corner(I,method)
points = detectHarrisFeatures(I)
points = detectHarrisFeatures(I,Name,Value)

Segmentation

- Segmentation is usually one of the first steps in image analysis

- The purpose of image segmentation is to subdivide an image into meaningful, non-overlapping regions

- Single thresholding produces as a result a binary image which distinguishes between background and foreground

Input image

Segmented image

Segmentation

BW = imsegfmm(W,mask,thresh)
BW = imsegfmm(W,C,R,thresh)
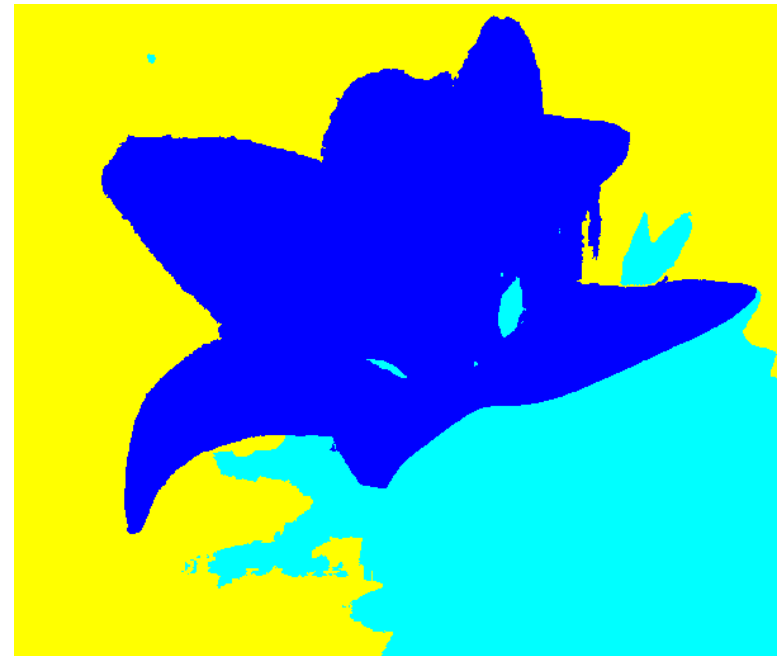**level = graythresh(I)**

Original Image   Segmented Image

Segmentation

Segment image into two or three regions using geodesic distance-based color segmentation

L = imseggeodesic(RGB,BW1,BW2)

Supplementary files:

- https://www.youtube.com/watch?v=mCYS09wRmPo
- MATLAB Tutorial:

http://www.mathworks.com/products/matlab/matlab_tutorial.html

- MATLAB documentation:

http://www.mathworks.com/access/helpdesk/help/techdoc/matlab.shtml

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