

## Project Assignment A2

Deliverable: 1. Matlab program, 2. Report with test results, 3. Presentation

### 1. Object Extraction and Preprocessing

*Use the same test images for 1.2, 1.3, and 1.4.*

1.1 Contour finding ([WANG, QIANG](#): Oct. 30)

Input: Binary image containing segmented objects as black pixels

Output: Sequence of boundary pixels of the largest object

Use connected component labeling (p. 133-35 in [1]) and border following.

Apply to MPEG-7 Shape 1 data set.

1.2 Image segmentation by histogram thresholding. ([RAJAGOPAL, VENUGOPAL](#): Oct. 30)

1.3 Image segmentation by region growing and shrinking (p. 83 in [1]).

([B.J, SIDDALINGA](#))

1.4 Image segmentation by clustering in the color space. ([XU, QIFANG](#))

1.5 Edge detection (Ex. #5, p. 394 in [1]) plus Laplacian (p. 66 in [1]). ([TRAN, HAO](#): Oct. 30)

1.6 Hough transformation (p. 75 in [1]).([BEHESHTI, SHAHRAM](#) )

1.7 Template matching (Ex. #7, p. 397 in [1]). ([MIEZIANKO, ROLAND](#): Oct. 30)

1.8 Morphological Operators (Ex. #4, p. 390 in [1]).([LI, XUEYAN](#): Nov. 13)

### 2. Shape Matching

2.1 Statistical object features ([JIN, TAO](#))

Compute moments, area, and perimeter (p. 135-7 in [1]). Use these features for object retrieval in a small test image database.

2.2 Euler number computation ([KULKARNI, KISHORE](#))

Count convexities and concavities (p. 137-8 [1]). Show why this approach returns the Euler number. Use these features for object

retrieval in a small test image database that includes [image1](#), [image2](#), [image3](#), [image4](#) .

2.3 Turn angle function and elastic time series matching. Compute retrieval rate for MPEG-7 Shape 1 data set. (WANG, XINZHEN)

2.4 Elastic matching of polygonal curves. Compute retrieval rate for MPEG-7 Shape 1 data set.

### 3. Image Similarity

*Use the same test images for 3.1, and 3.2.*

3.1 Global pixel-based image similarity (PATEL, RONAK: Nov. 13)

3.2 Global histogram-based image similarity (WANG, WAN: Nov. 13)

### 4. Video Processing

4.1 Shot detection in videos (LIN, HESHAN)

4.2 Key frame extraction in videos (SHEAFFER, JEREMY )

4.3 Optical flow (motion vectors) computation (GHUBADE, NILESH)

4.4 Object segmentation based on optical flow

4.5 Combine Matlab programs from assignment A1 to a joint Matlab program that creates a joint video (WEN, XIANGDONG)

[1] Scott E Umbaugh. *Computer Vision and Image Processing: A Practical Approach Using CVIPtools*, Published by Prentice Hall, 1998.  
[http://www.ee.siu.edu/~cvip/CVIPtools\\_demos/mainframe.shtml](http://www.ee.siu.edu/~cvip/CVIPtools_demos/mainframe.shtml)