

## EE3206 Projects

Two projects that involve Matlab programming are available to provide some hands-on practice. These mini-projects are optional and will not count towards the final mark.

If you need help, you may consult the teaching assistant for these assignments, Cai Lile (lile.cai@nus.edu.sg).

### Project 1 – Hough Transform

Straight lines are common structures found in daily scenes containing buildings, cars and roads. Due to discrete sampling, a straight line structure in the world appears as a sequence of dots at discrete locations in the image. From analytical geometry, we know that straight lines in a 2D image can be completely described by two parameters. The Hough transform is one way of discovering all possible straight-line parameters in a given image scene.

In this project, you have to determine the area of a rectangular shape as accurately as possible using the Hough transform. The program should be implemented in MATLAB. The rectangles are shown in Fig. 1(a). First compute the area of each rectangle, then determine their corresponding relative transformations consisting a scaling  $s$ , a rotation  $R$  and a translation  $T$ , which is shown in Fig. 1(b).

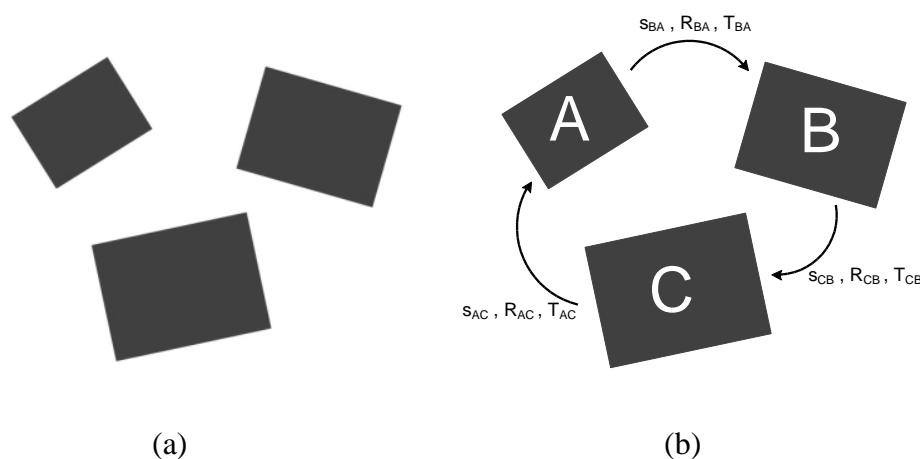


Figure 1: Hough Transform: (a) Three rectangles of different sizes (b) Labeled rectangles,  $S$  is the scaling factor,  $R$  is the rotation and  $T$  is the translation

## **Project 2 – Segmentation of number plates**

Segmentation is a crucial component that can be found in optical character recognition (OCR) systems. A typical industrial application of OCR is automatic number plate recognition (ANPR).

In this project, you are required to use MATLAB to implement a simple algorithm to perform the segmentation on real photos of car number plates. Convert the color image to gray scale image before applying any other image processing technique. Use a median filter, or any other suitable filter, to reduce image noise. Perform edge detection (there are several edge detector functions you can use in MATLAB, choose one that gives good results) on the smoothed image. You may also refer to lecture notes Chapter 6 for details of different types of edge detectors. After obtaining the edge map, implement the contour tracking algorithm described in the lecture notes (Chapter 7) to obtain closed contours around the number digits. Since this is real image segmentation, be prepared for broken digit contours and spurious edges. Try using your own techniques to overcome these difficulties as much as possible.