Assignment 5

We use SVM to classify datapoints for two different class. In this HW we are asked to classify fore ground and background pixel using feature extraction. To train our model we use training data points obtained from input image using ginput. Both foreground and background pixel are collected separately and trained into model. For testing we use the whole image. Also, the feature set basically consist of – x coordinate, y coordinate, R pixel value, G pixel value and B pixel value. SVM model is formulated as follow- (pg 426 Boyd).

$$Minimize\ 1^T u + 1^T v$$

$$Subject\ to:\ \ a^T x_i - b \geq 1 - u_i\ \ i = 1 \dots N$$

$$a^T y_i - b \leq\ -(1 - v_i)\ \ i = 1..N$$

$$u \geq 0\ and\ v \geq 0$$

Goal is to find a, b and sparse non-negative u and v that satisfy the constraint.

x_i: foreground feature vector, y_i: background feature vector, a and b are hyper plane parameters, u and v represents number of misclassified foreground and background points.

In this HW we are supposed to classify foreground and background image pixel for apple and hand image. For the apple I have considered 50 points and for hand 150 points as training data. From the plots it's easy to visualize that the SVM based classifier achieves lot better as compared to simple thresholding approach by matlab. There are lot of misclassified points in thresholding scheme and finally the image quality also plays a major role in classification.