BSysE530: Homework# 4

(Formal Report)

Edge Detection and Hyper-Spectral Image Analysis

A hyperspectral camera (model 1002A-00451, Headwall Photonics Inc., Fitchburg, MA) was used to acquire images of a single honey crisp apple in a lab environment at 0.72nm interval from 372nm to 1006nm (881 Channels). The data was collected at Washington State University Center for Precision and Automated Agricultural Systems in Mid 2012 and is available in Angel (HC_CD1.mat). The color image of the same apple is also available for your reference (HC_CD1.jpg).

Detect the edge of the apple using:

1) Information available in only one channel (any channel from 881 channels)
2) Fifty-dimensional (every other channel from 650 to 750)feature distance of pixels to a mean pattern vector. Use the following two types of distances.
   a. Euclidean Distance
   b. Mahalanobis Distance

Consider using histogram enhancement techniques prior to detecting edges. Present your results in pictures, diagrams and tables. Also respond to the following questions.

1. What are the advantages and disadvantages of each method investigated?
2. What is the primary limitation of analyzing hyper-spectral dataset and what is the potential solution(s) to minimize this limitation?
3. Are the techniques you developed transferable to other applications?