CSC3061: Assignment

# Training

## Feature Descriptor

### Full Image

### Reduced Dimensionality

### Gabor

### Hog

## Learning Method

### SVM

### Nearest Neighbour

## Parameter Tuning

# Testing

# Detector

## Selected Method

From the testing and training stages, the initial thought was that we would select the HOG Feature Descriptor with SVM Learning Method at a basic recognition rate of 85.42%, however after looking at the false alarm rate, it appears that the HOG-SVM approach had a very high false alarm rate at 20.00%.

Off of the basic recognition rates it would appear that the Full Image Feature Descriptor with the KNN Learning method (at k = 10) would be the next most accurate method, however looking at the false alarm rate we get a rate of 70.00%, this would strike the Full Image-KNN method out.

The Gabor Feature descriptor with SVM Learning method was the next most accurate with a basic accuracy rate of 79.58% and a false alarm rate of only 10.00%.

We decided to produce detectors for both of these methods as seen below.

## Detection Method

The biggest problem when running the Gabor-SVM Sliding Window method was its speed. For im4.jpg it took on average 47 minutes and 32 seconds to run. It was because of this that we decided to pair the HOG and Gabor Feature extractions together.

The script, *hog\_gab\_SVM\_dector.m*, starts by running the HOG-SVM detector, this gives us an accurate but more sporadic detection, with a high percentage of false alarms. These detections are then fed into the Gabor-SVM Detector that refines these predictions.

This gives us a quicker detection speed with the im4.jpg now only taking 10 minutes and 43 seconds to run. The dramatic decrease in speed is not all that has changed, the images detected faces are more accurately aligned.

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|  |  |  |
| HOG Detection: im1.jpg | Gabor Detection: im1.jpg | HOG-Gab Detection: im1.jpg |
|  |  |  |
|  |  |  |
| HOG Detection: im2.jpg | Gabor Detection: im2.jpg | HOG-Gab Detection: im2.jpg |
|  |  |  |
|  |  |  |
| HOG Detection: im3.jpg | Gabor Detection: im3.jpg | HOG-Gab Detection: im3.jpg |
|  |  |  |
|  |  |  |
| HOG Detection: im4.jpg | Gabor Detection: im4.jpg | HOG-Gab Detection: im4.jpg |

## Results

# Evaluation and Improvements