Assignment 2 for Neural Network and Learning Systems

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1 Accuracy and number of weak classifiers

In the assignment, we have used a sample of 4800 observations, half faces, and half non-faces. 25 Haar features were used. Figure 1 shows the dependency of classification accuracy on the number of weak classifiers. We can see that the training and testing accuracy are quite near, which means that the model generalizes well from training data to testing data. The accuracy turns stable and does not significantly increase when number of decision stumps reaches over 30.

The number of weak classifiers was chosen to be 30 by us, which gives a testing accuracy of 0.8902. This accuracy is stable across re-sampling.

2 Mis-classified faces and non-faces

Figure 2 shows some examples of mis-classified faces. As shown, many of these mis-classified faces have some non-typical characteristics, such as base-ball cap, Hijabs, long front hair, glasses, very dark-coloured mustache. Many of these faces does not look right into the camera. On the other hand, the mis-classified non-faces are more difficult to analyze. Perhaps the shape of these non-faces somehow matches the Haar features we were using. We have tried increasing the number of weak classifiers to 200 or 1000, however, the

testing accuracy did not increased, nor did these mis-classified non-faces go away.

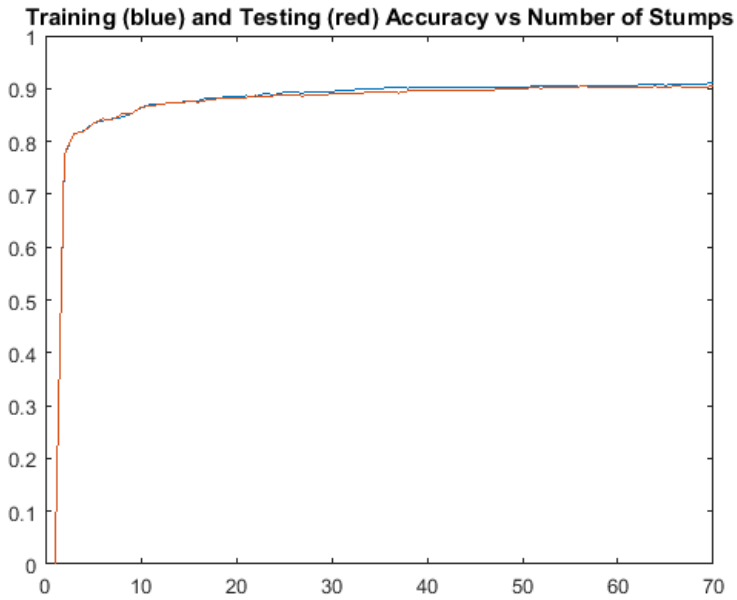

Figure 1: Accuracy vs. Number of Stumps, using 4800 observations and 25 Haar features

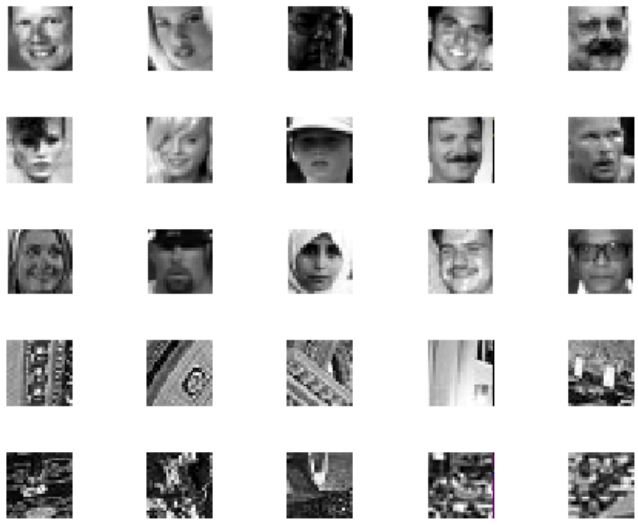

Figure 2: Some Mis-classified Faces and Non-faces