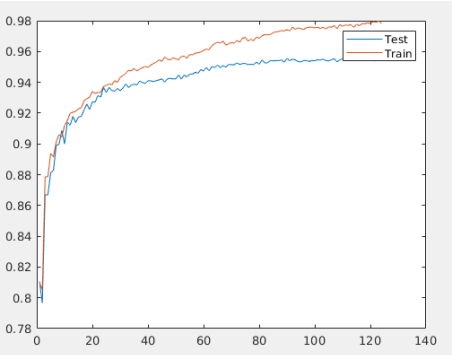
TBMI26 – Computer Assignment Reports Boosting

Deadline – March 15 2019

Author/-s: Jesper Linderg (jesli060), Omkar Bhutara (omkbh878)

In order to pass the assignment you will need to answer the following questions and upload the document to LISAM. **You will also need to upload all code in .m-file format**. We will correct the reports continuously so feel free to send them as soon as possible. If you meet the deadline you will have the lab part of the course reported in LADOK together with the exam. If not, you'll get the lab part reported during the re-exam period.

1. **Plot how the classification accuracy on training data and test data depend on the number of weak classifiers (in the same plot). Be sure to include the number of training data (non-faces + faces), test-data (non-faces + faces), and the number of Haar-Features.**

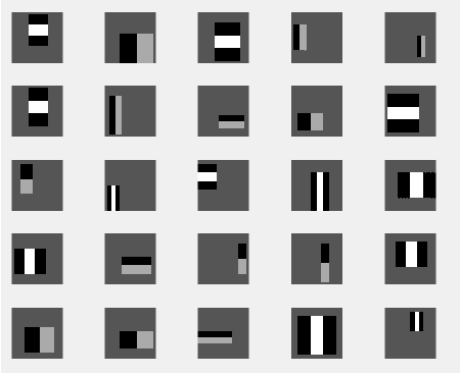


nbrHaarFeatures = 100;
nbrTrainImages = 5000;
nbrWeakClassifiers = 128;
nbrTestImages = 7788

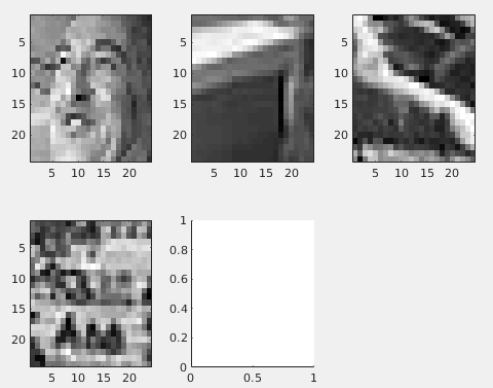
2. **How many weak classifiers did you use when training? How many of them did you use for the final strong classifier? Why?**
   We used 128 weak classifiers, we took this amount since the test error kept getting smaller. On the plot we can see that curve is very steep until around 30 classifiers. However, we wanted to see much more of the curve and therefore we decided to go with 128.

3. **What is the accuracy on the test data after applying the optimized strong classifier?**
   95.49%
   It also looks like it is stable around that value when we look an the plot from Q1.

4. **Plot the Haar-features selected by your classifier (one for each weak classifier). If you have many weak classifiers, select some representative subset.**



5. **Plot some of the misclassified faces and non-faces that seem hard to classify correctly. Why do you think they are difficult to classify?**



Looking at these pictures it's very hard to say what the represent, even for us humans. We can see that the first one is a face but the rest of them we have no clue. The rest of them might have edges or difference in colors which triggers the haar features to believe that they are faces. Exactly how this is done could be found out by maybe taking the miss-classified picture and put the features on top and do the same for a correctly classified picture and try see the relationship.

6. **Defend your results. Are they reasonable?**
   We have an accuracy of 91% which is very reasonable on face detection. There are systems out there with 98% or maybe even higher, however the methods might be different. However we do indeed believe that it is reasonable.

7. **Can we expect perfect results? Motivate your answer.**
   No, we can't expect 100% accuracy. There might be relationships between a picture of a face and non-face after applying the haar features on the picture. This will cause the algorithm to miss-classify these pictures.