CSIT5410 HW4 Report

LIN Jialiang 20656855

Catalog:

Content:

1. Weak Classifiers:

   I utilize six weak classifiers based on LBP feature with different window sizes and different classifiers.

- LBP feature is obtained from several regions of original image, and it is also computed with multi-resolution images. Concatenating the histogram of LBP values in all small regions forms the LBP feature vector of this original image.
- The window sizes I use are 128*128 and 64*64.
- The classifiers I use are random forest, svm and knn.
- So the combination of them is 6 weak classifiers.

2. Preprocessing Chain:

- Turn color image into gray image
- Histogram equalization
- Resize the image into a fixed size: 128*128
- After extracting features from images, perform PCA technique to reduce the dimensionality

3. The selected weak classifiers and its weight after the Adaboost algorithm:

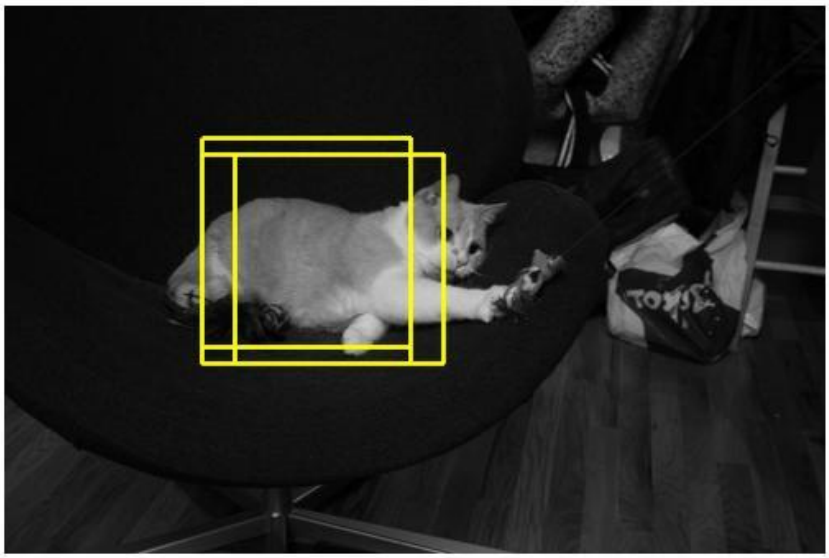
```
Selected weak classifiers: (in order)

model_list =

     3     4     1     6     2

Alpha value for each selected weak classifier:

alpha_list =

    0.4426    0.2654    0.1956    0.0680    0.0281
```

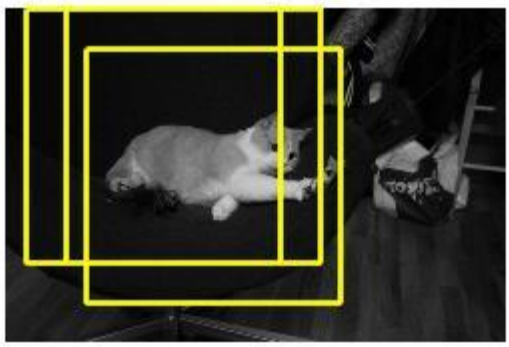
4. The classification of strong classifier and weak classifiers:

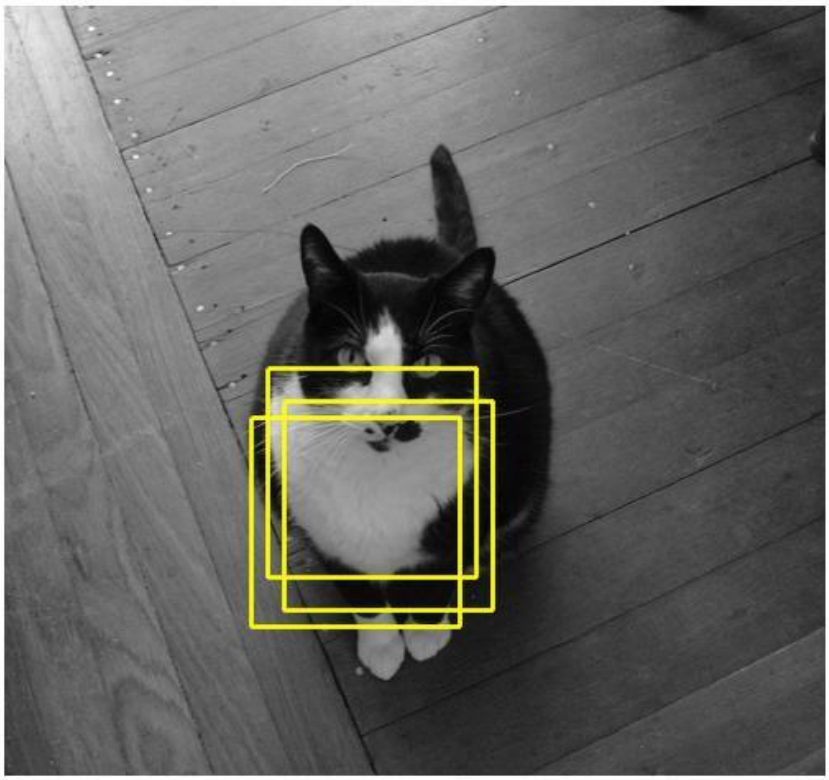
```
Accuracy of the Strong Classifier:    0.72648
Accuracy of the Weak Classifier 1:    0.70751
Accuracy of the Weak Classifier 2:    0.65296
Accuracy of the Weak Classifier 3:    0.70791
Accuracy of the Weak Classifier 4:    0.67826
Accuracy of the Weak Classifier 5:    0.61186
Accuracy of the Weak Classifier 6:    0.63083
```

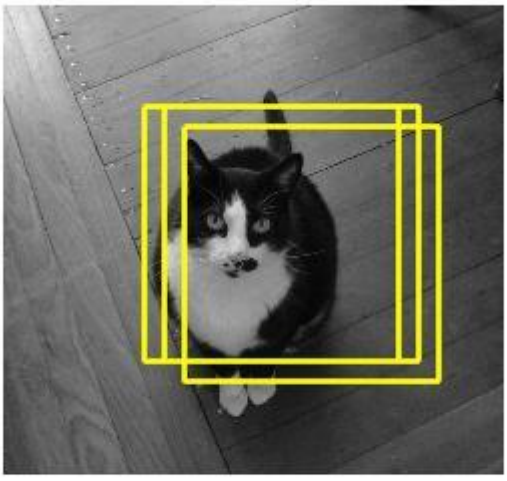
5. The detection results of the given images:

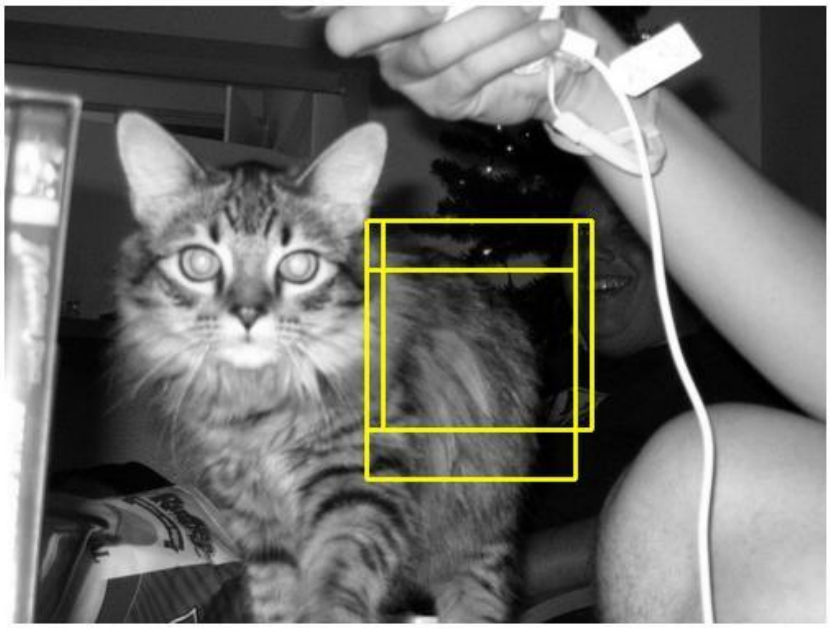
Since the size of cats in the images are varied, I use image pyramid to capture them:

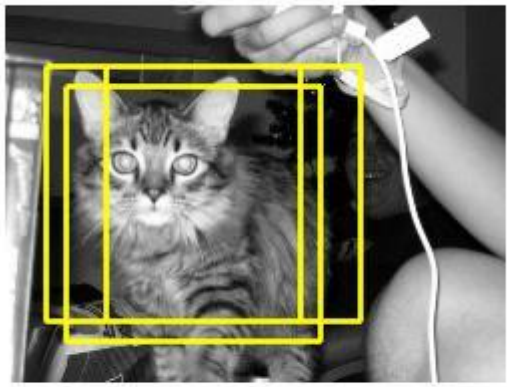


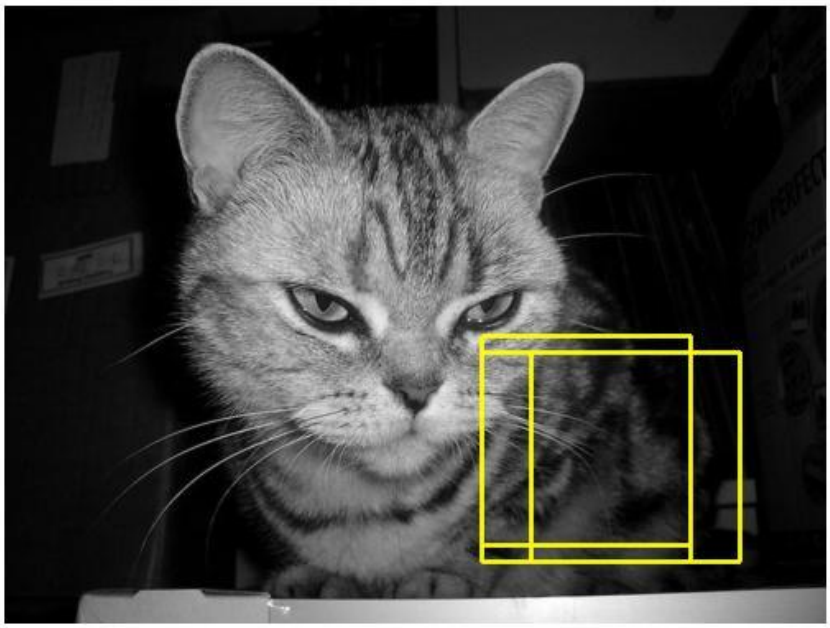


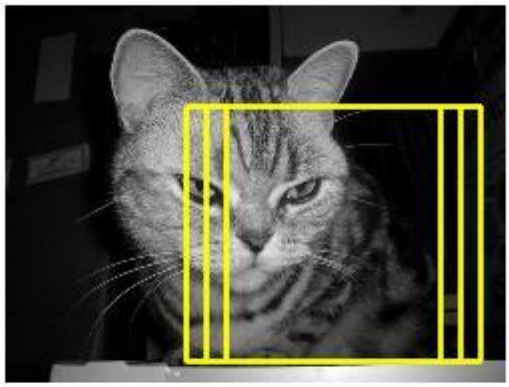


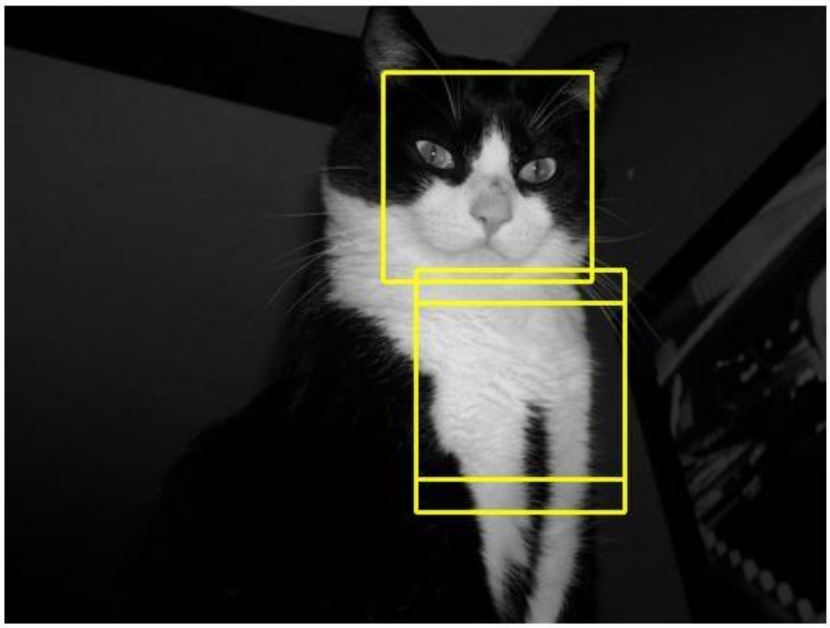


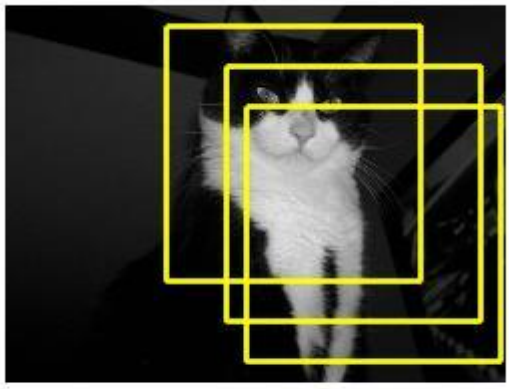












6. Additional work that I have tried:

Since there are still several windows, I utilize non-maximum suppression to filter them and then combine into one single window.

In the implementation, I choose the best 10 windows in the original resolution image to do the above work. The codes are commented in the last of csit5410_assignment4.m and you can try if you are interested.

Here are the merging results (single window) in the original resolution image: