Training ground truth

Testing ground truth

Training predicted

Testing predicted

PART II

```
test_face_classifier(250, 100, 4, True)
```

Performance on training set for varying threshold

Performance on test set for varying threshold

`test_face_classifier(6000, 6000, 4, True)`

Performance on training set for varying threshold

Performance on test set for varying threshold
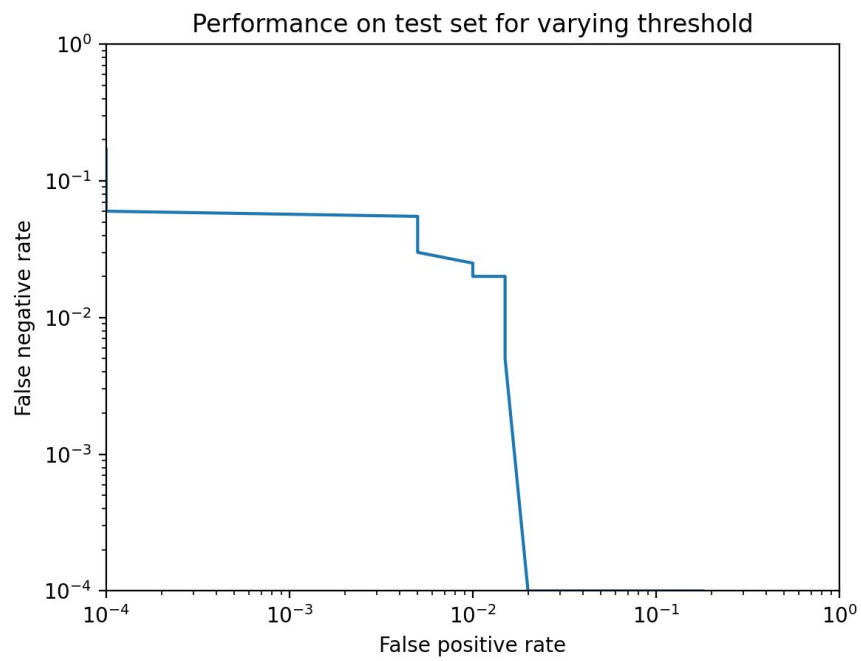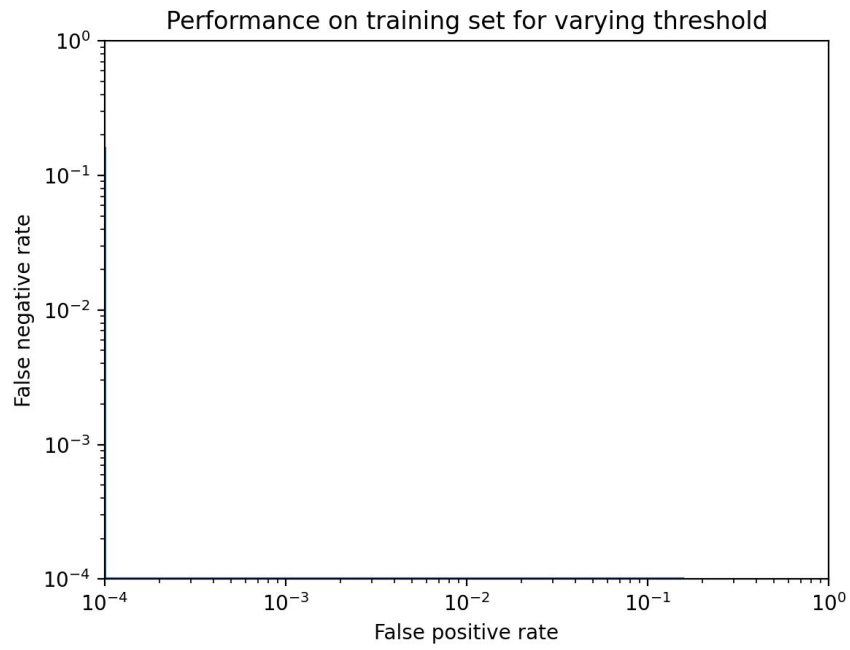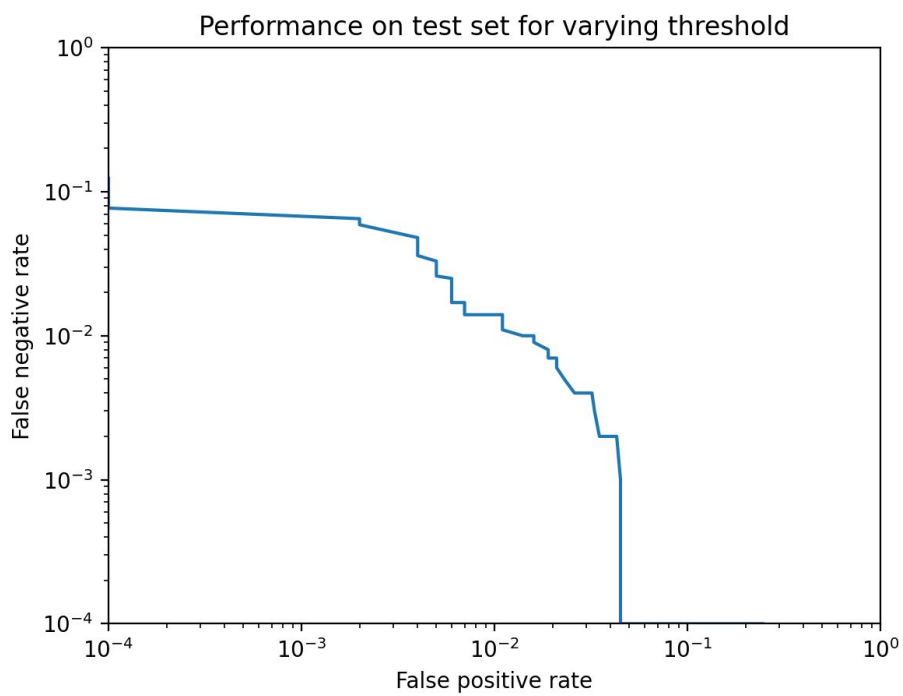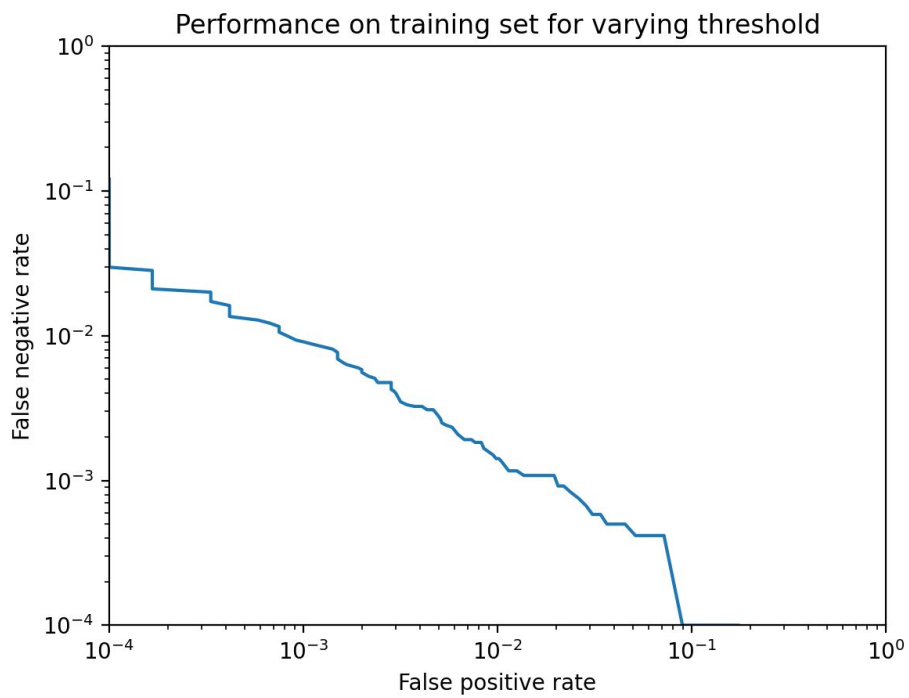
```
test_face_classifier(500, 500, 4, True)
```

Performance on training set for varying threshold

False positive rate

Performance on test set for varying threshold

False positive rate
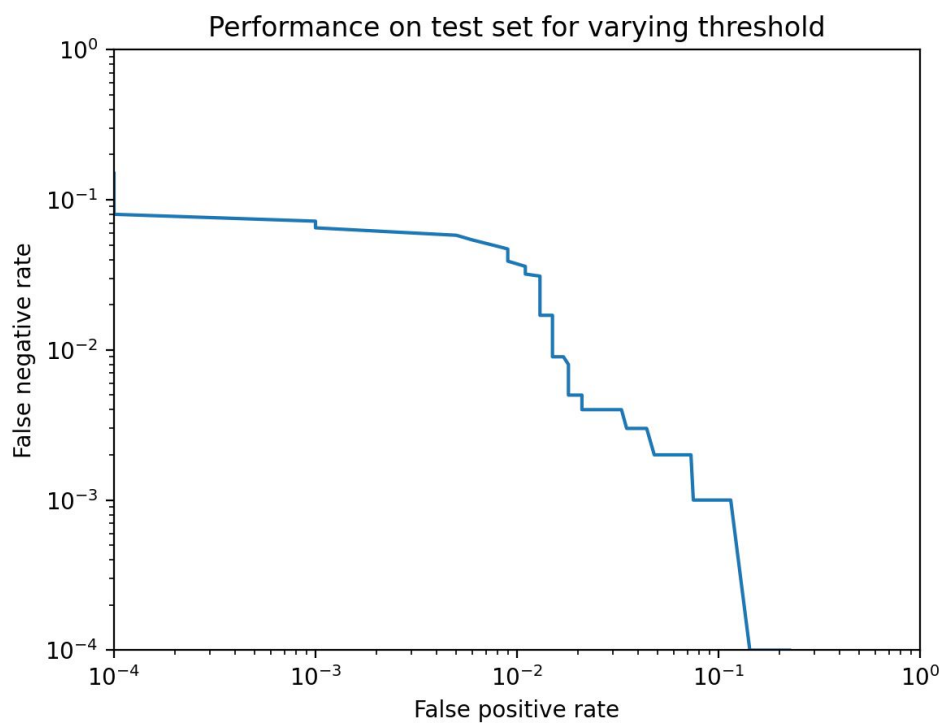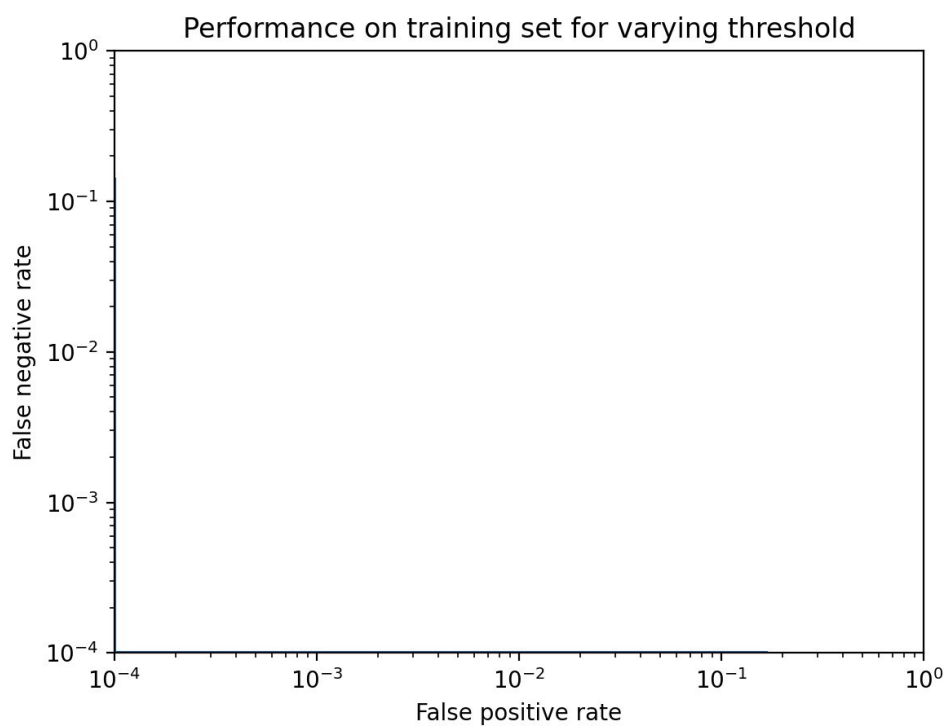
As we **increase the number of orientations** from 4 to 6/9/12, we observe moderate **decreases** in both the **false positive rate and false negative rate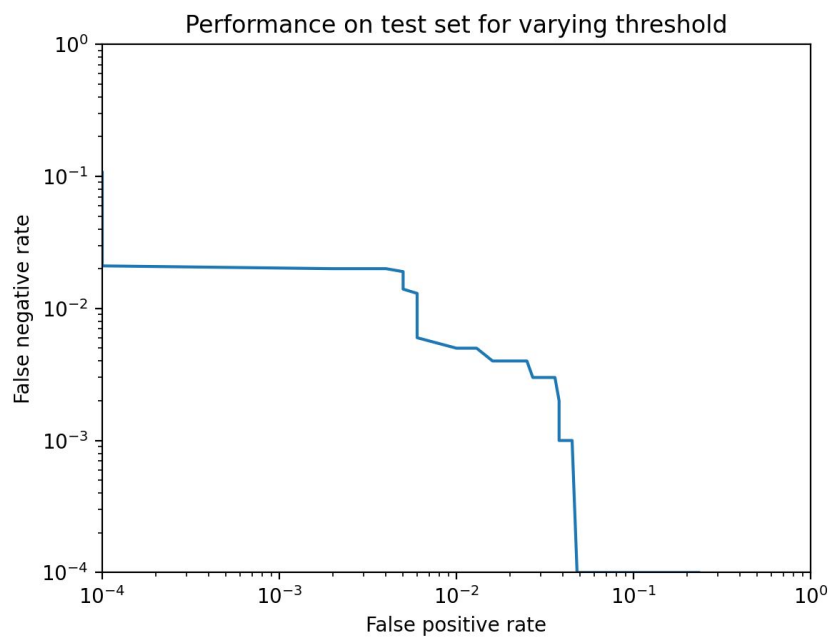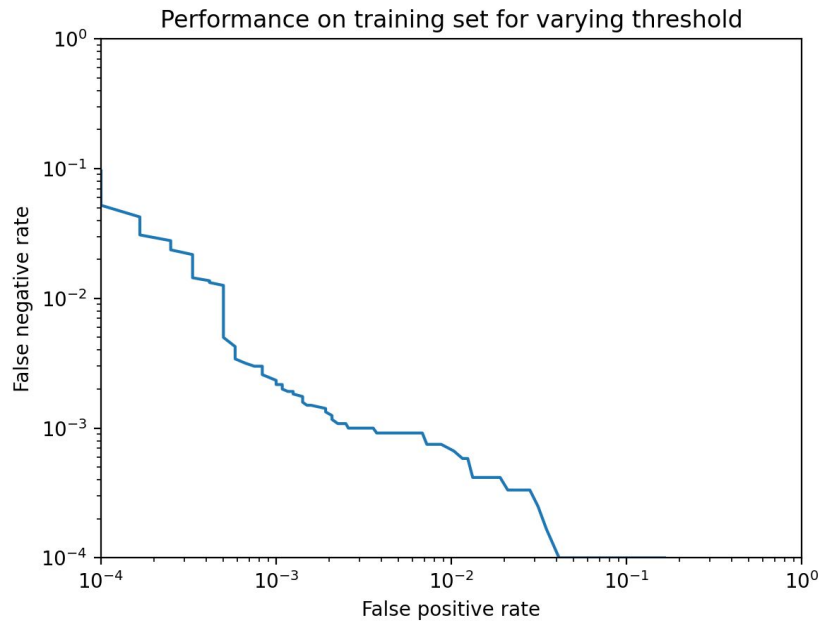s** of our model. This makes sense intuitively, as the classifier has more parameters with more orientations, and thus should detect the face better.
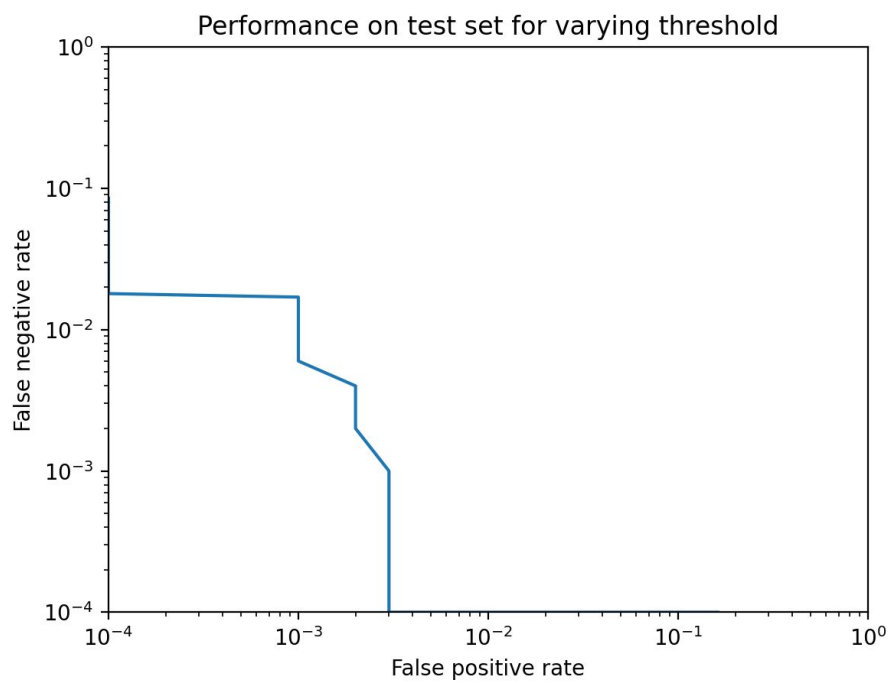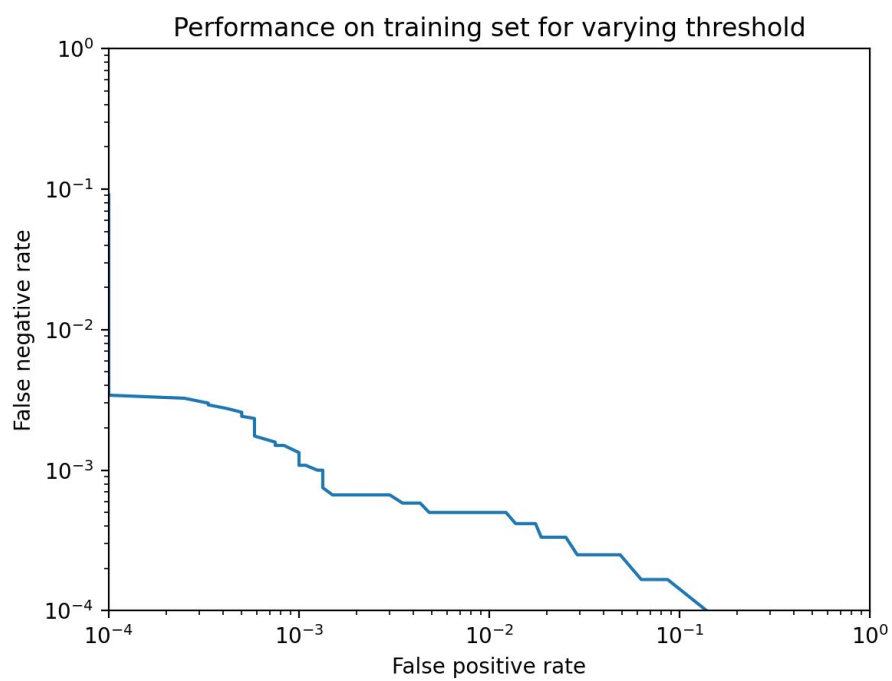

Our findings also **differed** from the conclusion in Dalal and Triggs. Specifically, we found that **disabling 180-degree wrapping increased** model accuracy. Even more specifically, on training data, disabling wrapping increased the false positive rate but decreased the false negative rate. On testing data, disabling wrapping decreased both the false positive and false negative rates, showing a clear improvement from wrapping.

Evidence for this is on the following two pages. The same parameters (12,000 total images, 9 orientations) were used for the two models; however, the first had wrapping and the second did not. Similar to increasing # of orientations, this is most likely because disabling wrapping doubles the number of parameters the classifier takes into account. As such, it should detect faces better.
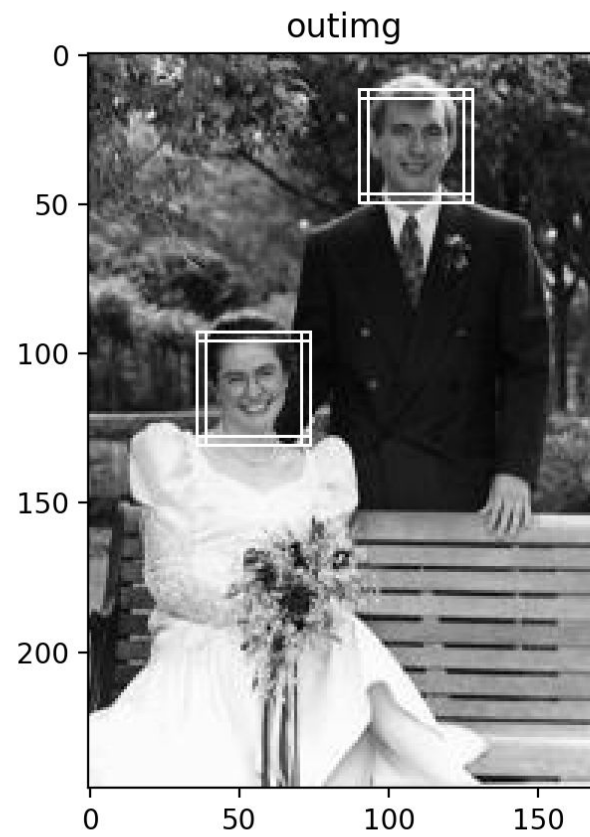
```
test_face_classifier(6000, 6000, 9, True)
```

Performance on training set for varying threshold

Performance on test set for varying threshold

`test_face_classifier(6000, 6000, 9, False)`

Performance on training set for varying threshold

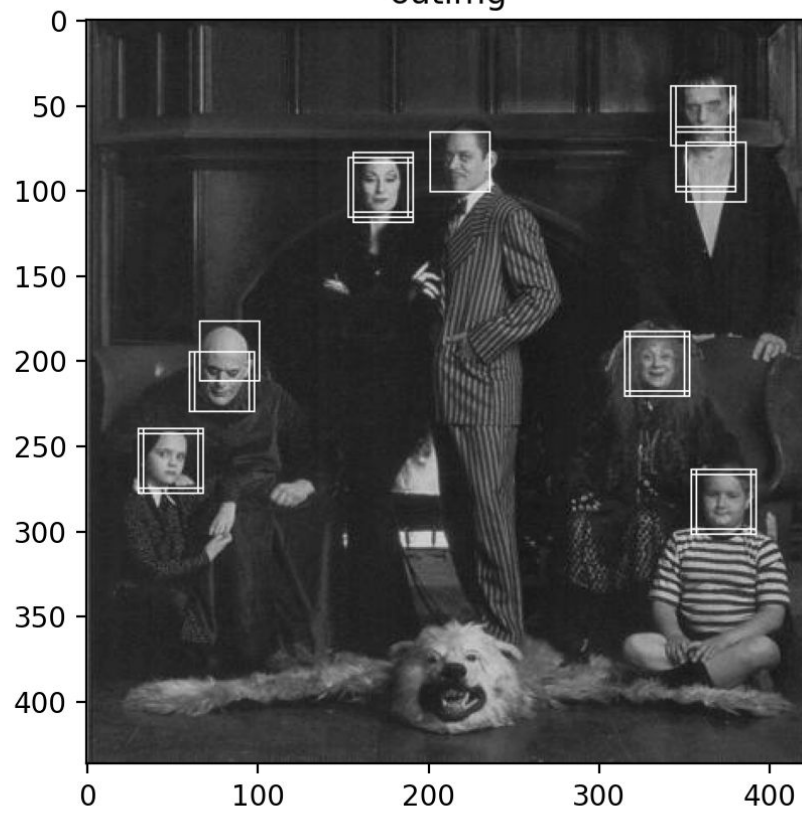### Performance on test set for varying threshold

I would prefer to run this detector with a threshold that favors **fewer false positives**. Personally, if my digital camera could not detect one or two faces (out of many), it wouldn't be a huge inconvenience - I could always adjust my angle/vantage point to make the faces more clear. However, if it started recognizing a host of other objects as faces, it would be very difficult and confusing to find an angle that didn't have any false positives.
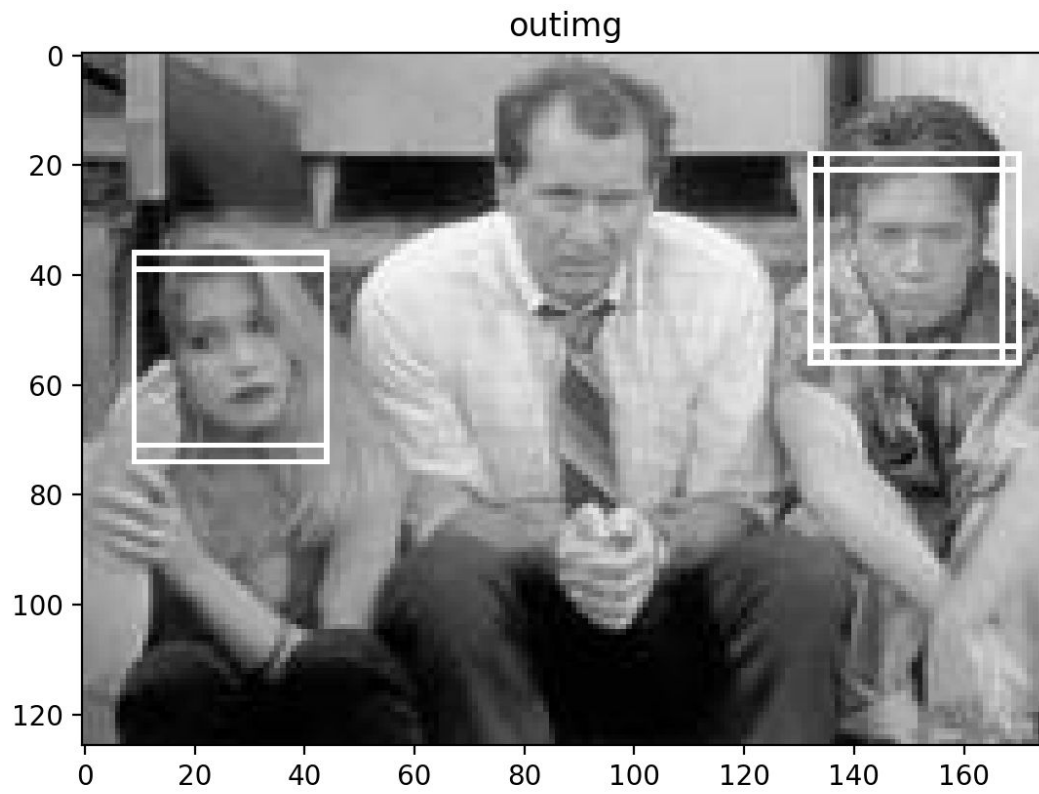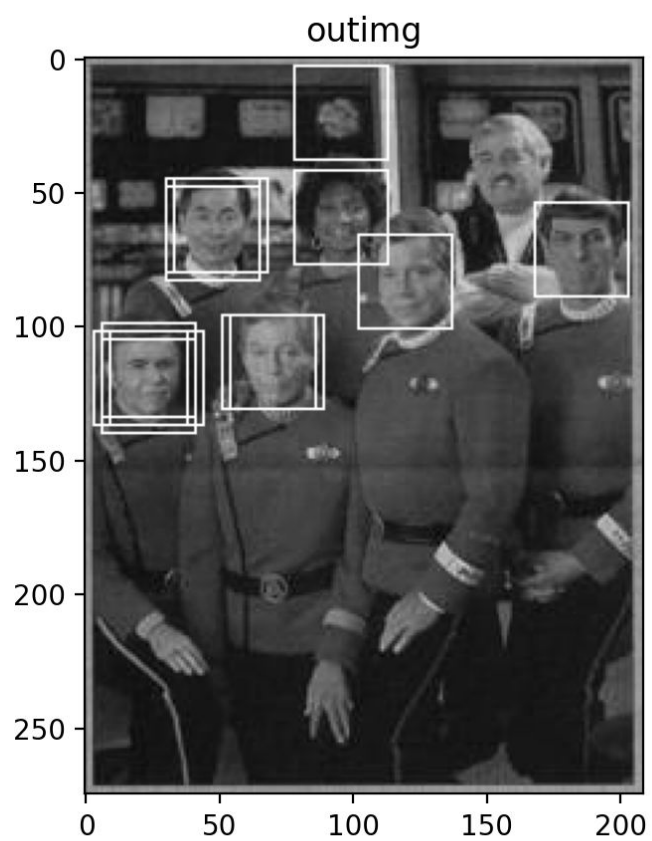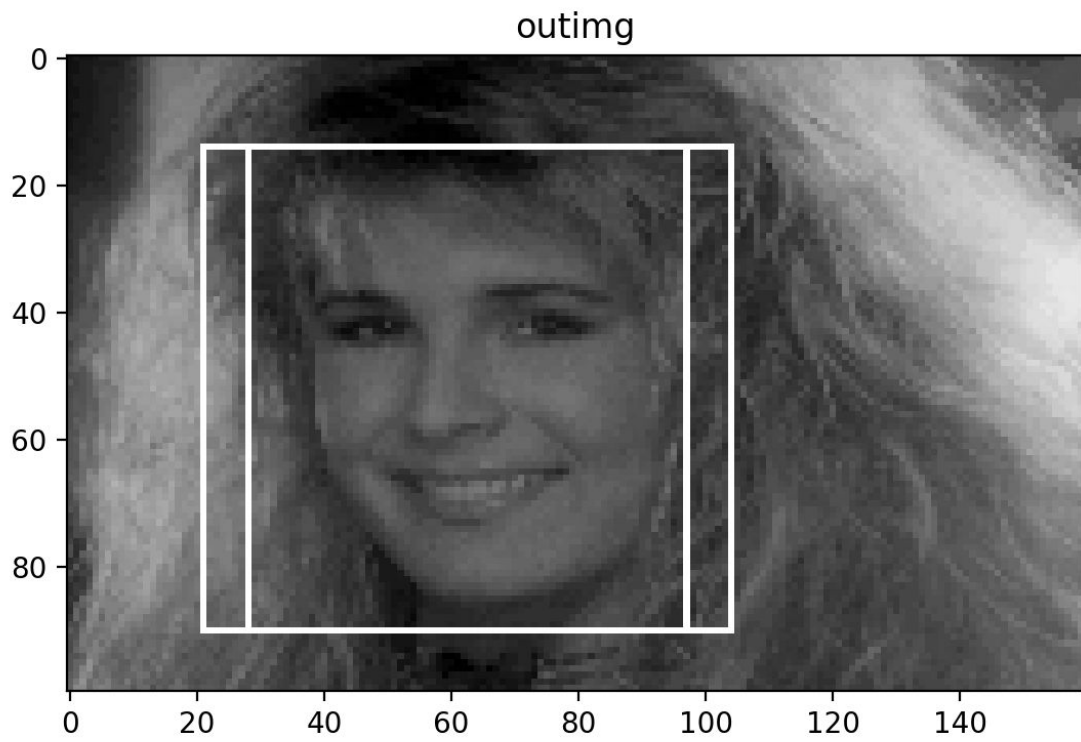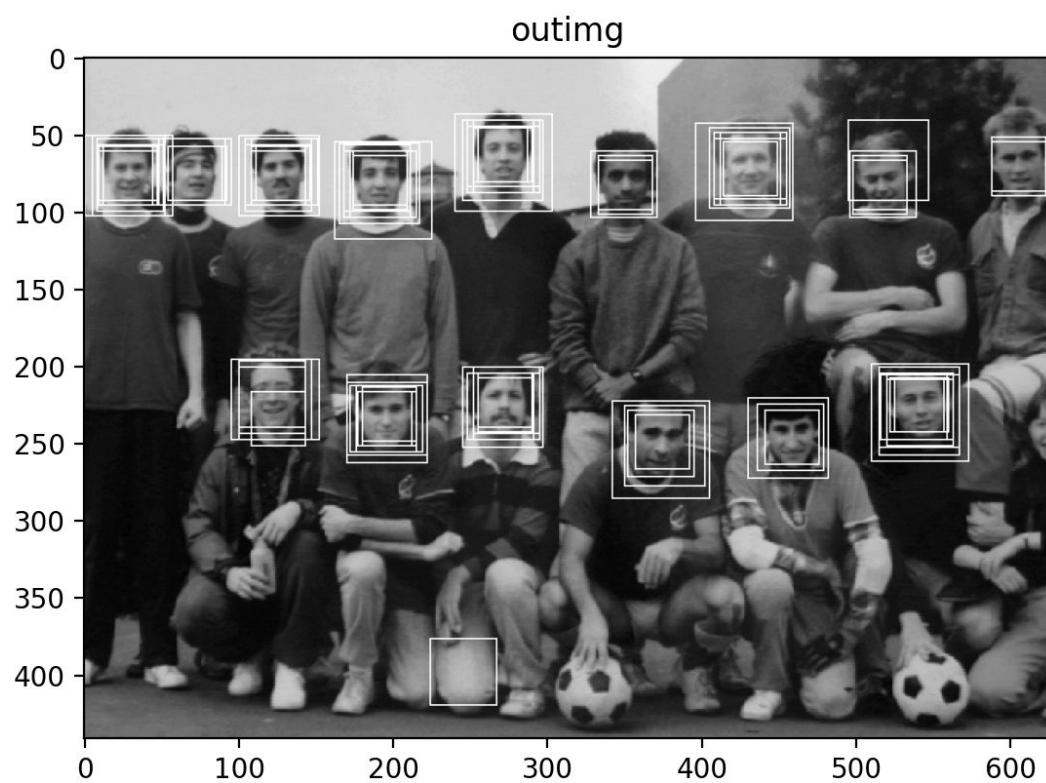
PART III

Good Examples

outimg

outimg

Bad Examples

outimg

outimg

PART IV

Good Examples

outimg

outimg

Bad Examples

outimg

outimg