

Python for Data Science

Object Detection



Development in Africa with Radio Astronomy

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University of Manchester



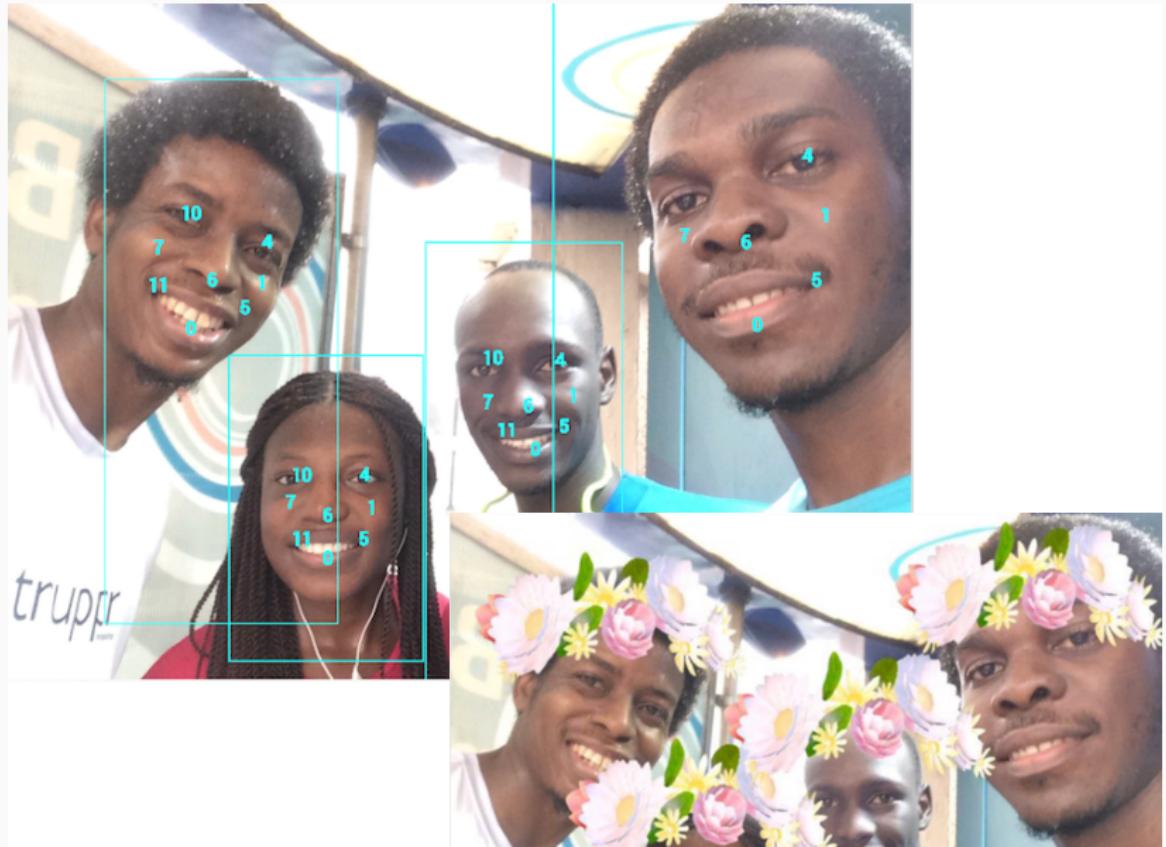
Science & Technology
Facilities Council

Object Detection



Google™

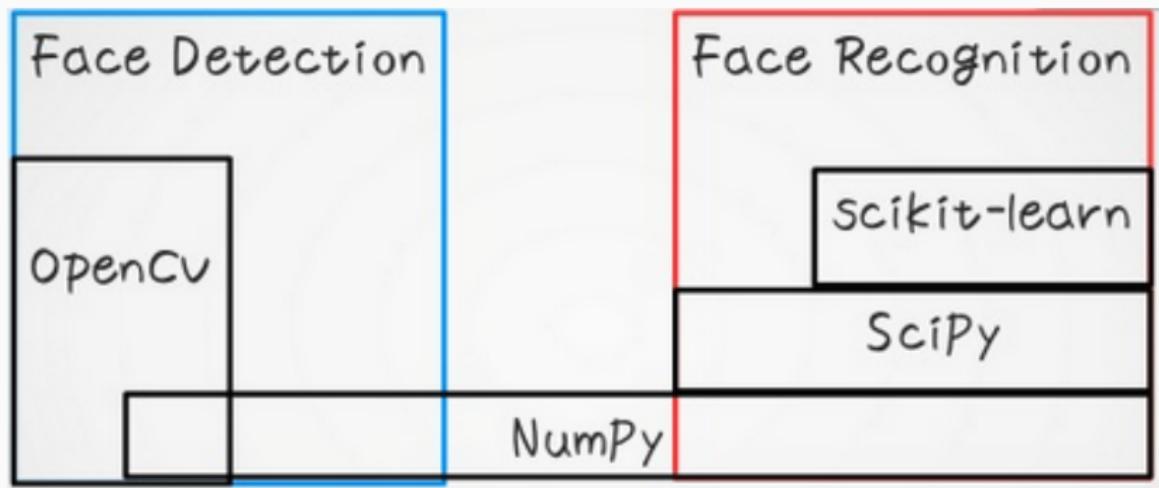
Object Detection



Object Detection

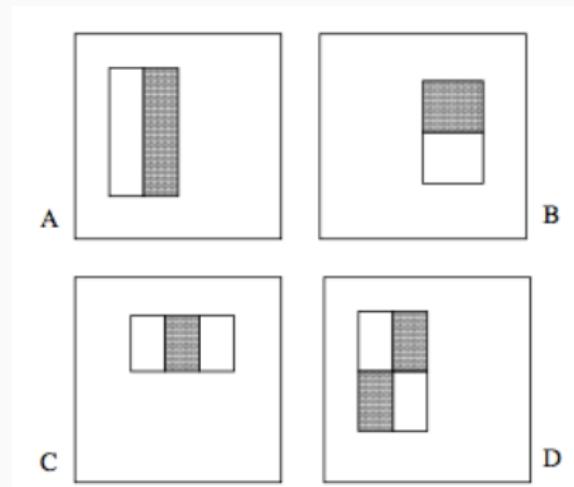


Detection vs. Recognition



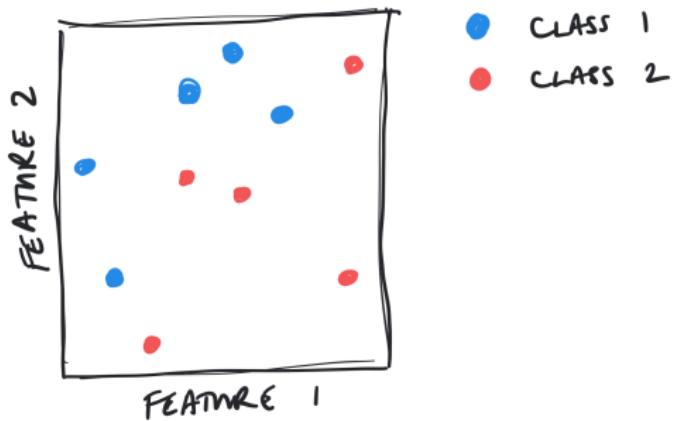
<https://www.slideshare.net/lucidfrontier45/face-recognition-with-opencv-and-scikitlearn>

Object Detection - Haar Cascades

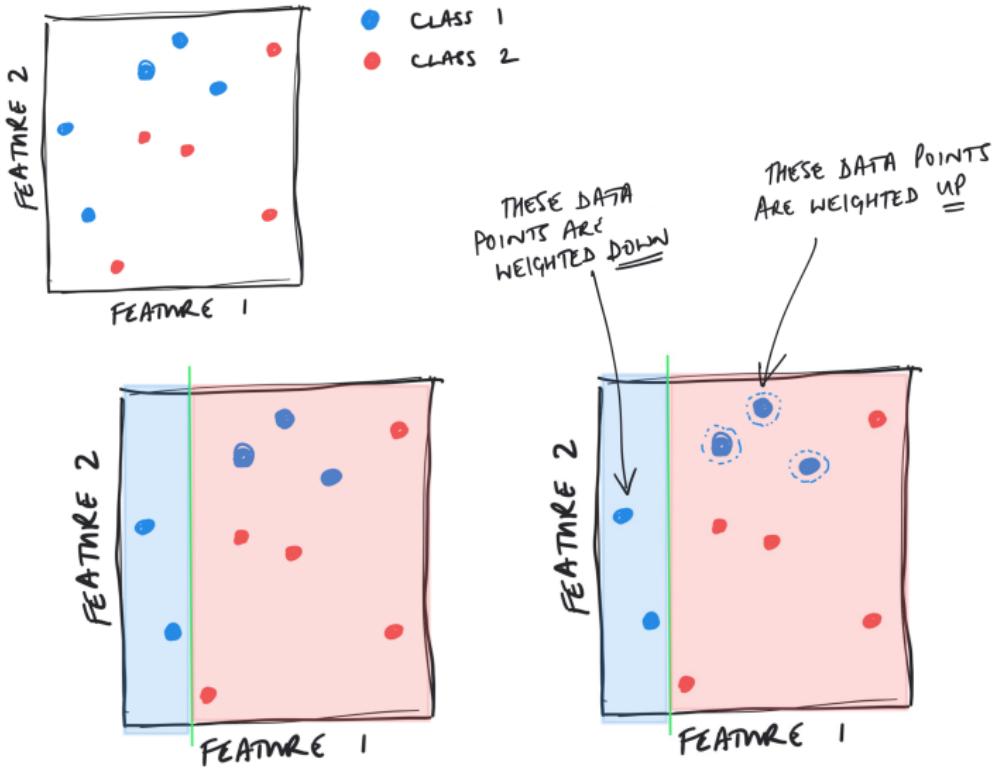


Viola, P. & Jones, M.J. International Journal of Computer Vision (2004) 57: 137

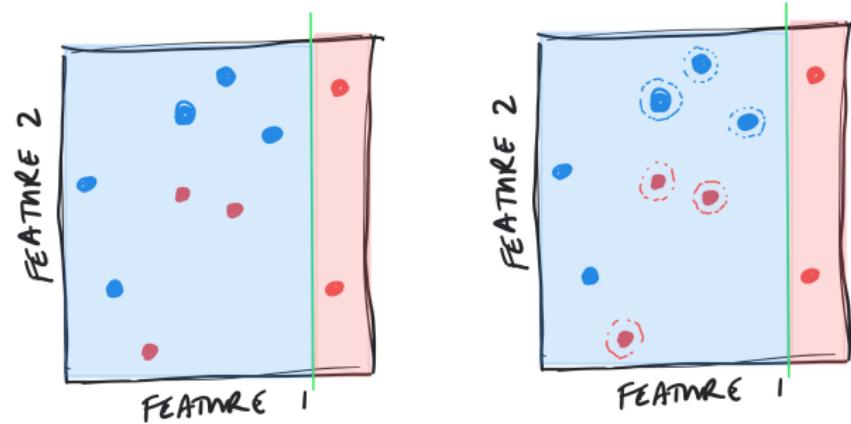
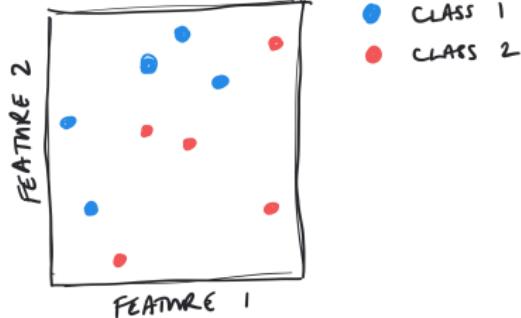
Adaboost



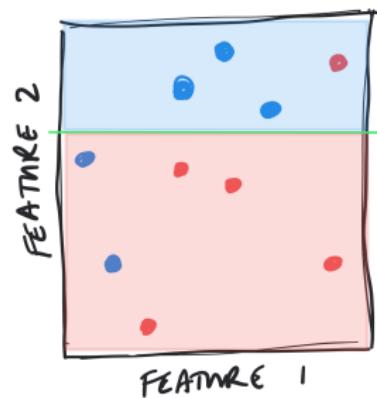
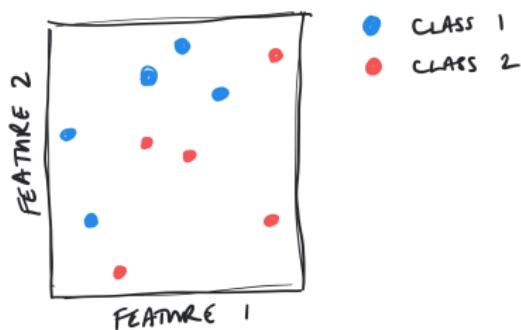
Adaboost



Adaboost

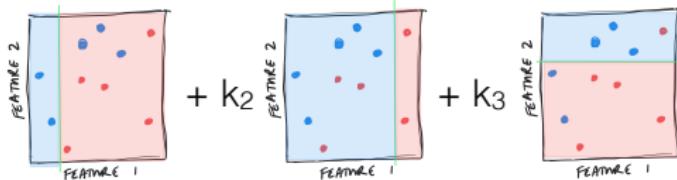


Adaboost

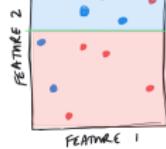


Adaboost

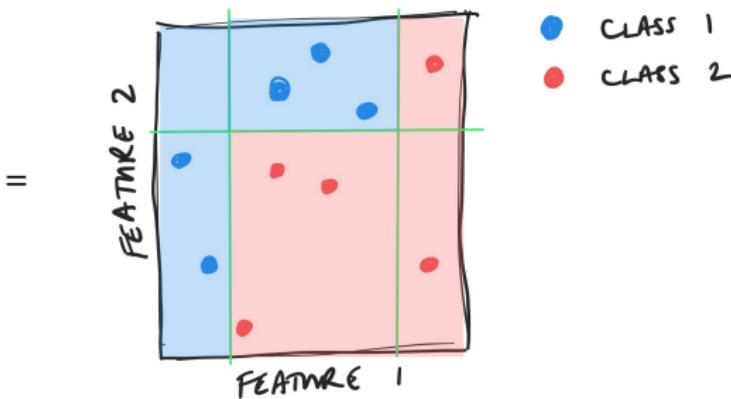
$$\text{Final} = k_1$$



$$+ k_2$$



$$+ k_3$$



||

Test Image

Pre-trained sets of classifier parameters are available online:

<https://github.com/opencv/opencv/tree/master/data/haarcascades>

```
cascfile="haarcascade_frontalcatface_extended.xml"
```

OpenCV

```
import cv2
```

```
from PIL import Image
```

Test Image



```
imagefile="cat1.jpeg"
```

```
catCascade=cv2.CascadeClassifier(cascfile)
```

If you grabbed the XML file from github be careful to download the actual XML file and not the HTML link to the file... if you do the latter by accident then you will see an error like this:

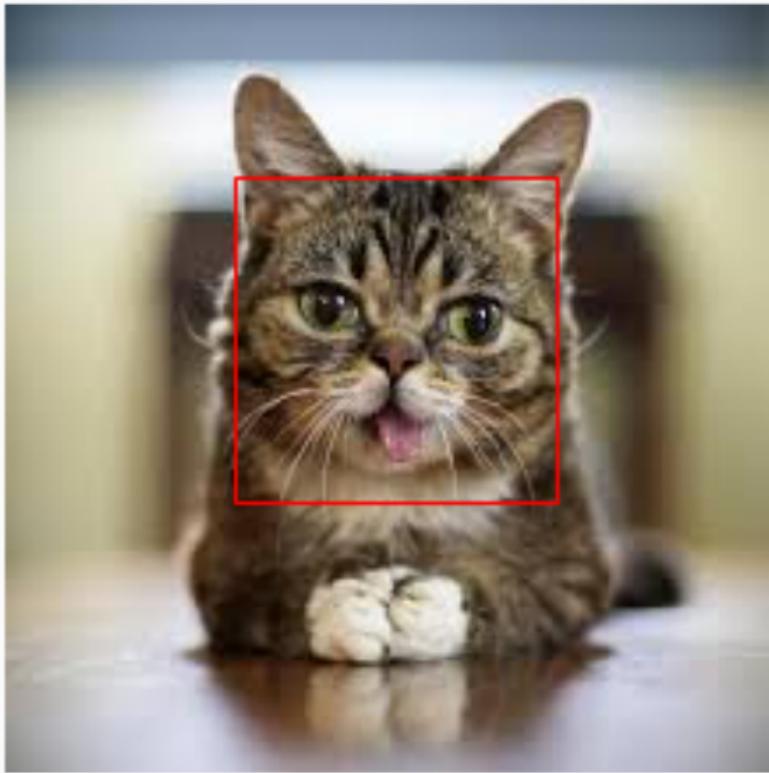
(-49) Input file is empty in function cvOpenFileStorage

To download a single file from github: click on the file to open it, then hit “raw” in the top right, select all and paste into your text editor then save.

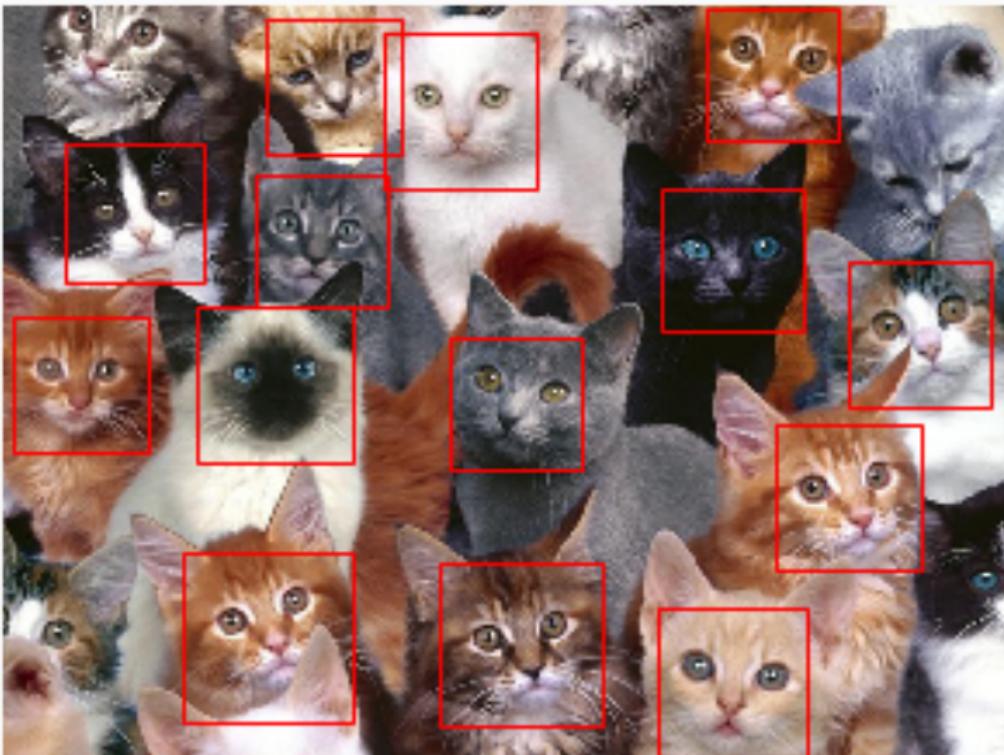
```
# read the imagefile into OpenCV:  
image=cv2.imread(imagefile)  
  
# convert the RGB image to a greyscale image:  
image_grey = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)
```

```
cats = catCascade.detectMultiScale(  
    image_grey,  
    scaleFactor=1.003,  
    minNeighbors=10,  
    minSize=(75, 75)  
)
```

Cat Detection



Many Cat Detection



Only Cat Detection



Training Data

The key to object detection and recognition is the quality of your training data.

The most time consuming and laborious part of creating a training dataset is the labeling.

Every photograph you tag on-line is going into someone's training data.