IET SMP 2021-Computer Vision

Welcome Guys!!!

Instructors:

M.T.Aakash Chandra-2nd Year CSE

Email :aakash.191cs132@nitk.edu.in

Contact:9110272655

Aprameya Dash -2nd Year IT

Email: aprameyadash.191it209@nitk.edu.in

Contact:7735784564

Viola-Jones Algorithm

One of the first algorithms for detection of objects on an image.Developed in 2001.

Has two stages:Training and Detection.

Being now surpassed by neural networks and deep learning models.

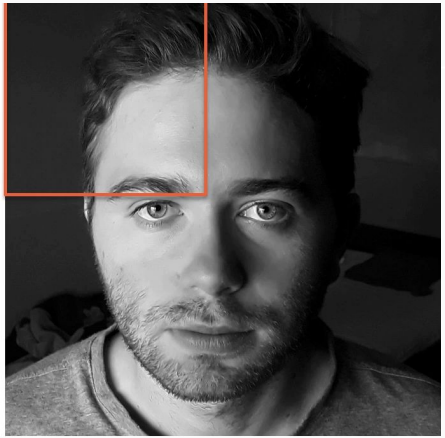
We’ll first go ahead and see how detection works.

Detection using Viola-Jones Algorithm

Step 1: Convert to Gray Scale

Reason: Easier to process gray scale and less data to process.

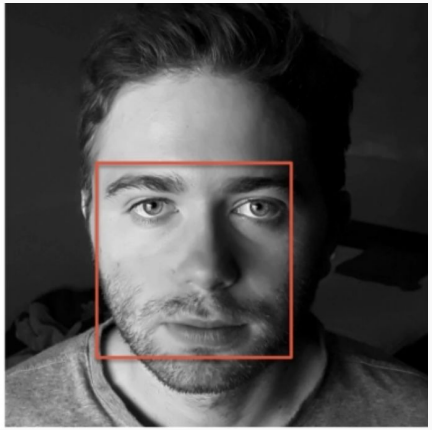
Step 2: Takes a box around on the image and searches for features that belong to a face in that box.



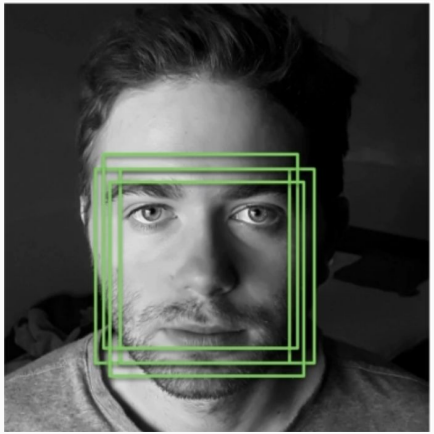
Detection using Viola-Jones Algorithm contd.

Tries to find for features in the image that correspond to a face. If its not found, it discards and moves next.

A possible box containing a face would be.



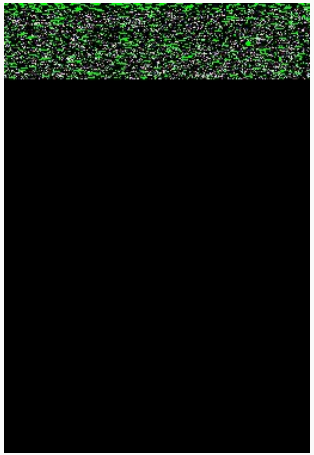
All possible boxes might be



Detection using Viola-Jones Algorithm contd.

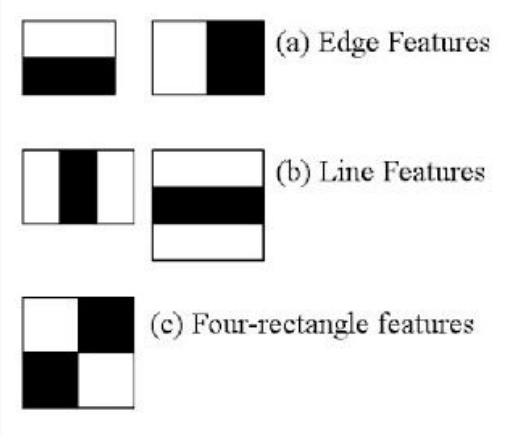
If many such boxes overlap in a particular place, it is most likely that it is a face detected.

The below is a simulation of how the detection takes place.



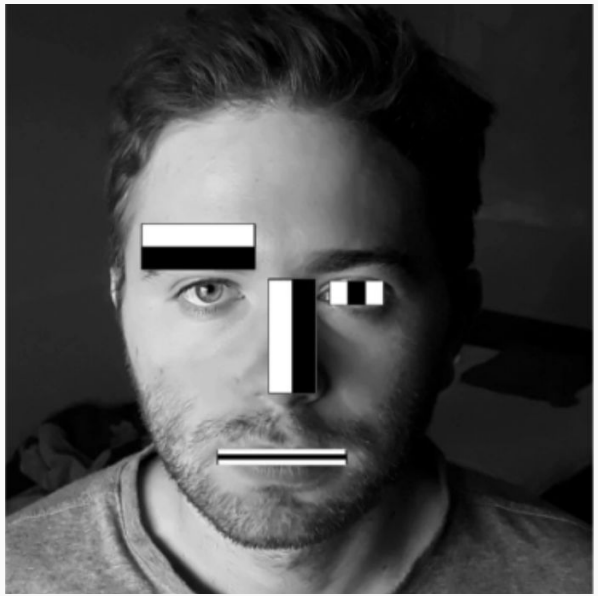
Haar Like Features

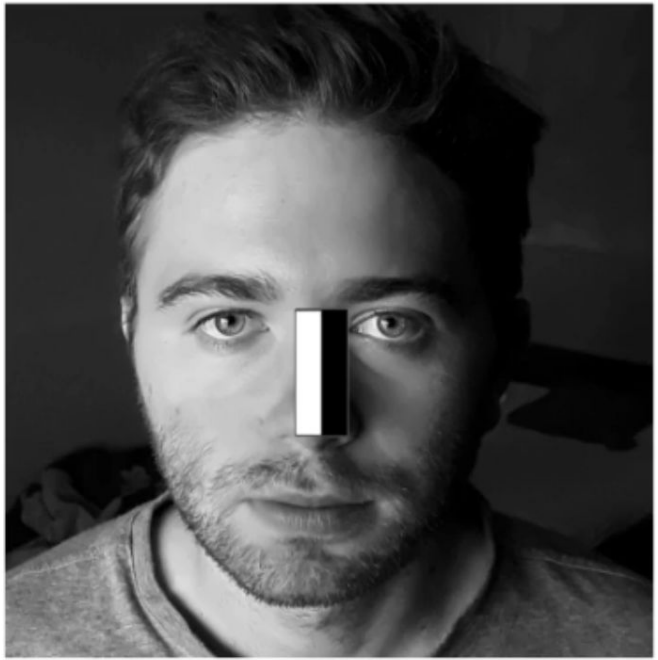
They are of three types-Edge,Line and Four rectangle.These features are scalable



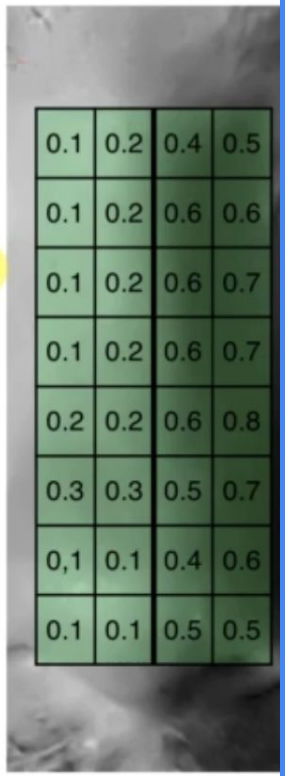
Haar Like Features on a Face

They are of three types-Edge,Line and Four rectangle.These features are scalable





"JD"


0.1 0.2 0.4 0.5
0.1 0.2 0.6 0.6
0.1 0.2 0.6 0.7
0.1 0.2 0.6 0.7
0.2 0.2 0.6 0.8
0.3 0.3 0.5 0.7
0,1 0.1 0.4 0.6
0.1 0.1 0.5 0.5

Training Classifiers

Finds for common features in all the training set and sets a threshold for these common features in the training.

Step 1: Shrinks image to 24x24 pixels and looks for each of the features.

Step 2: Search for the features.

We need to supply many positive images to find common features and give good results. We also need to provide negative images to make sure it knows which features are not common in the positive images.

Adaptive Boosting

Even for 24x24 pixels the number of features possible are over 1,80,000. Hence it is time taking and needs to be optimised.

Consider the following function

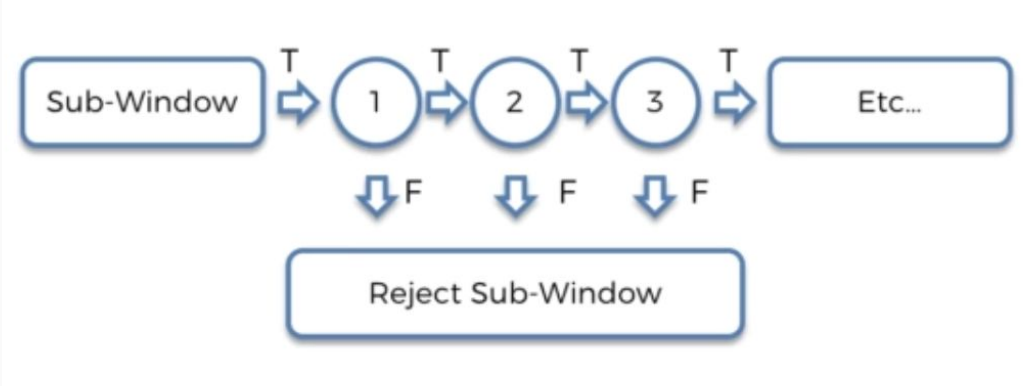
$F(x)=k_1f_1(x)+k_2f_2(x)+k_3f_3(x)+...$

F(x) is a strong classifier and f1,f2.. are weak classifiers. Helps in removing many redundant features and features that contribute less to the final output.

Building strong classifier by using many weak classifiers and eliminating those features that dont contribute a lot.

Cascading

Helps in speeding up the process of detection of features in an image and thus improving the speed of the face detection model.



Let’s head over to Jupyter Notebook

Thank You Guys!!