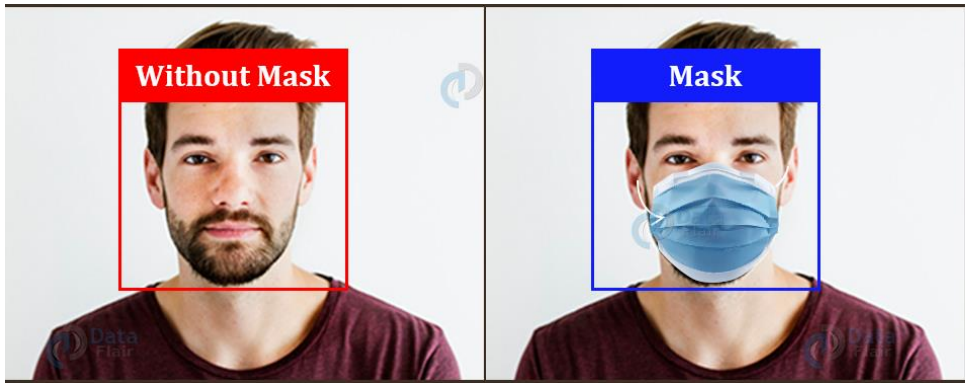
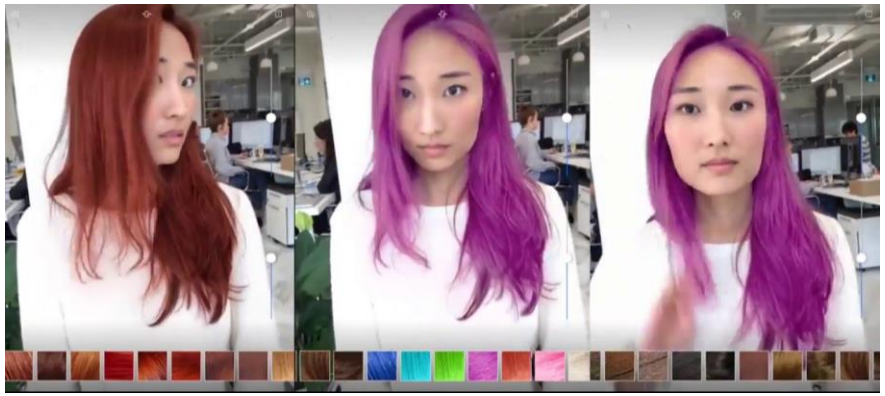
AIS – Lab assignment 1

- Image processing and face detection in real-time -

- Face detection - applications -

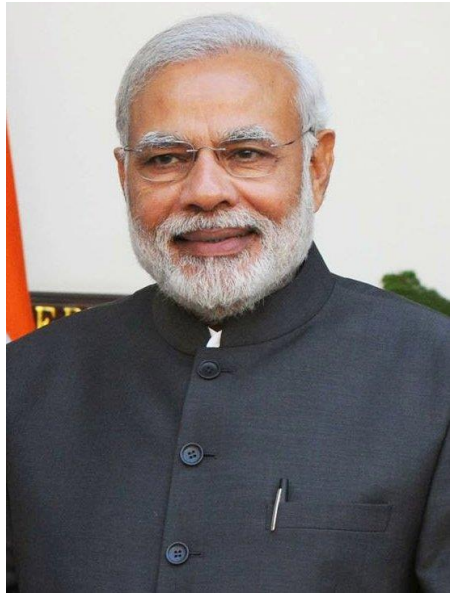




- Image processing -

Important stages:

Image acquisition

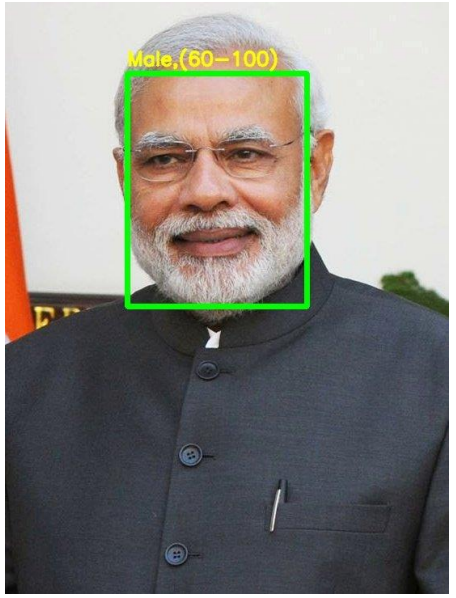


Preprocessing

- Smoothing noise
- Removing outliners
- Normalizing data
- Reducing data
- ...

Segmentation and detection

Representation and description



Recognition and interpretation

- Lab assignment -

1st task - Basic image processing:

Implement different image processing techniques (image filtering, thresholding, histogram equalisation, edge detection...).

grayscale

histogram equalisation

Gaussian blur

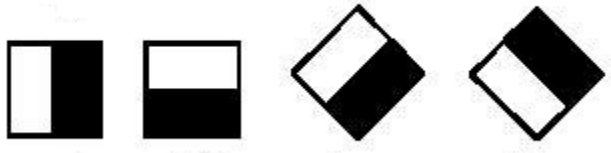
thresholding

Sobel (x)

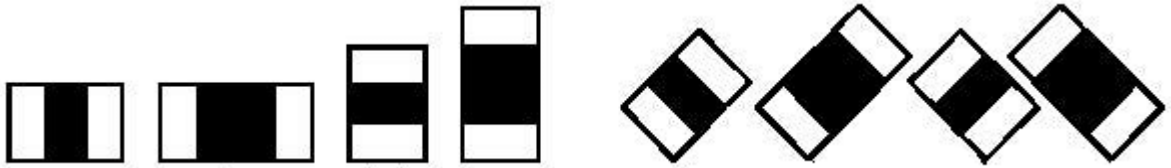
Sobel (y)

Canny

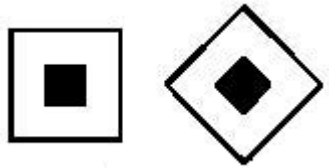
- Face detection using Viola/Jones detector -
- Haar-like features -



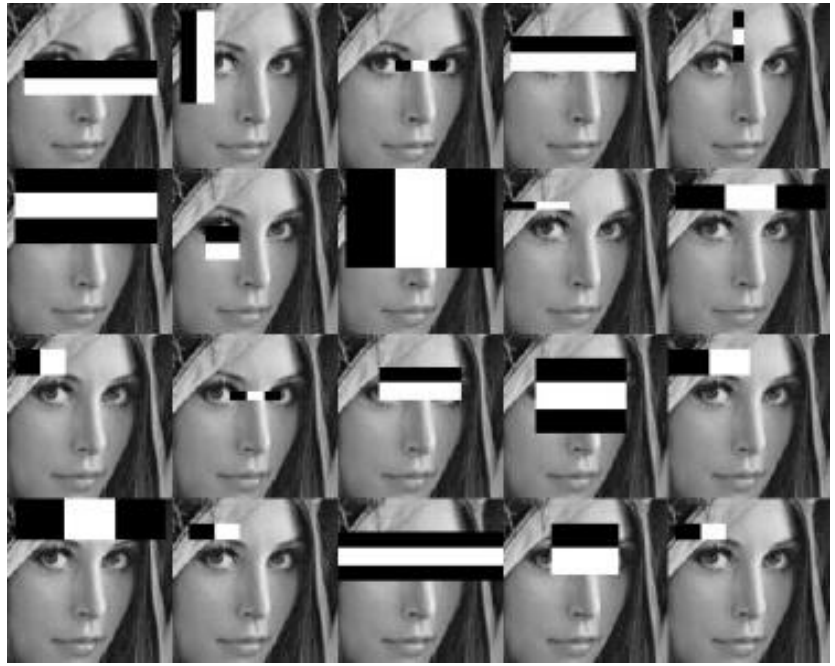
-edge detection-



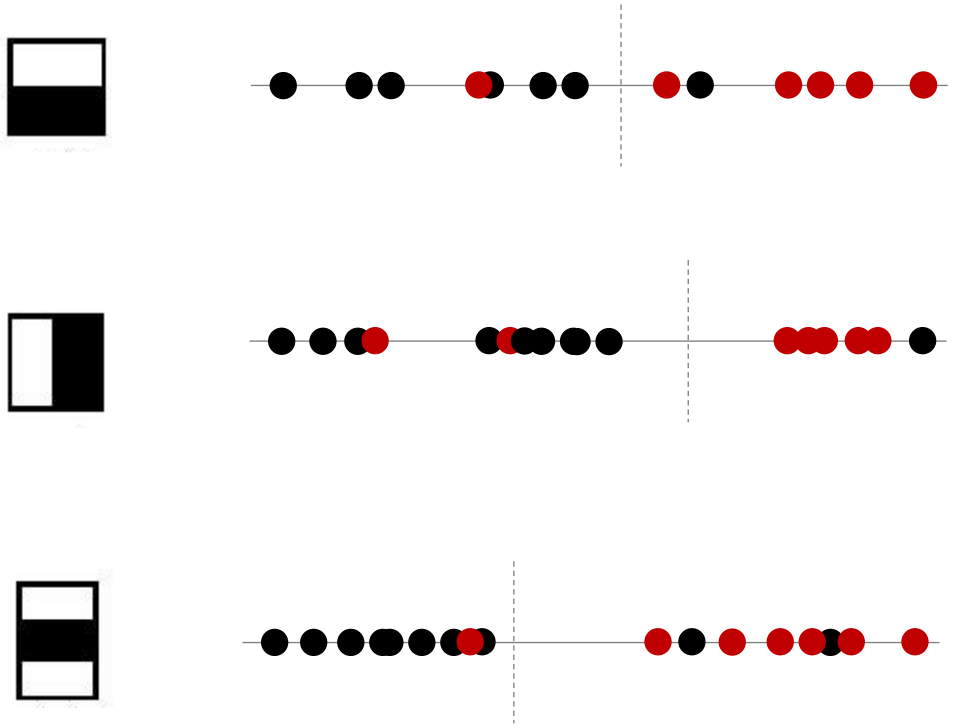
-line detection-

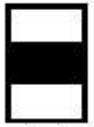


-center-surround feature-



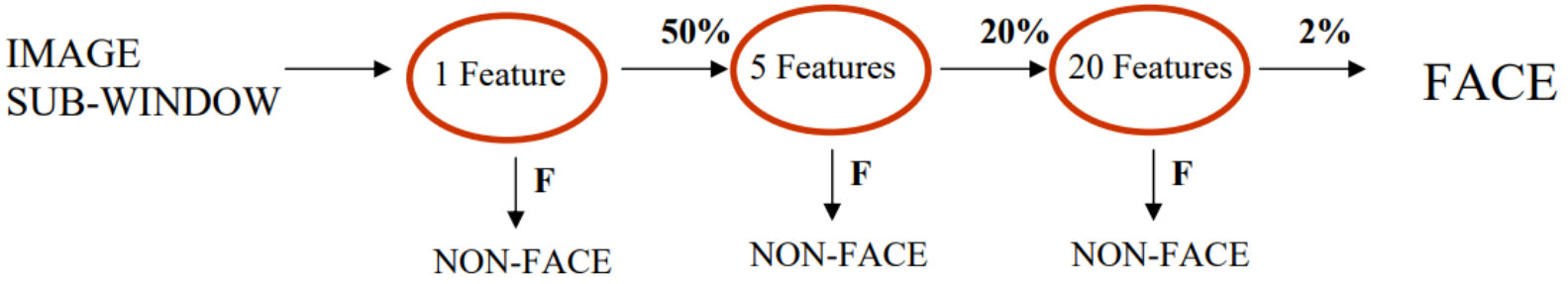
- Combining weak classifiers -

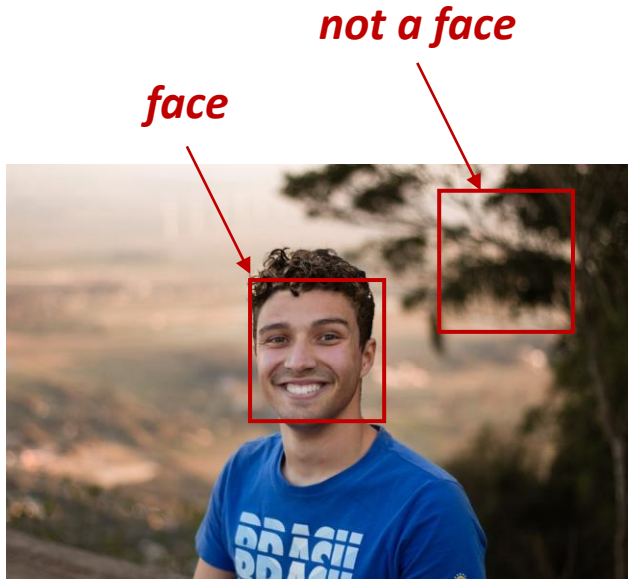


Linear combination learnt from the training dataset: $w_1 \cdot$  $+ w_2 \cdot$  $+ w_3 \cdot$  $+ \ldots$

- Cascaded classifiers -

- Start with simple classifiers that reject many negative windows while detecting almost all positive windows
- Positive response from 1st classifier triggers the evaluation of a 2nd, more complex classifier, and so on…
- Negative outcome at any point leads to *immediate rejection*

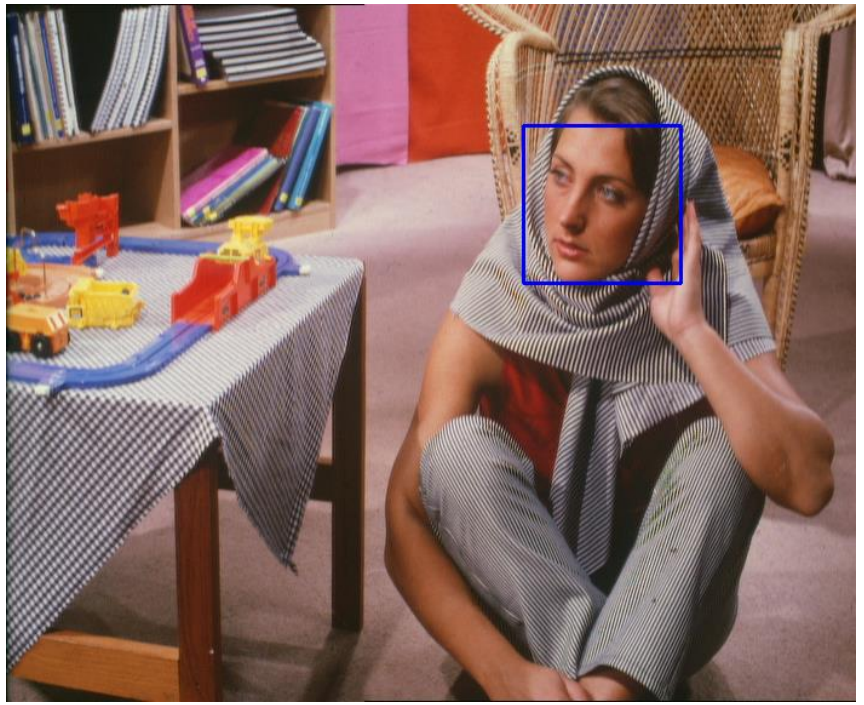




- Lab assignment -

2nd taks – Face detection using Viola-Jones:

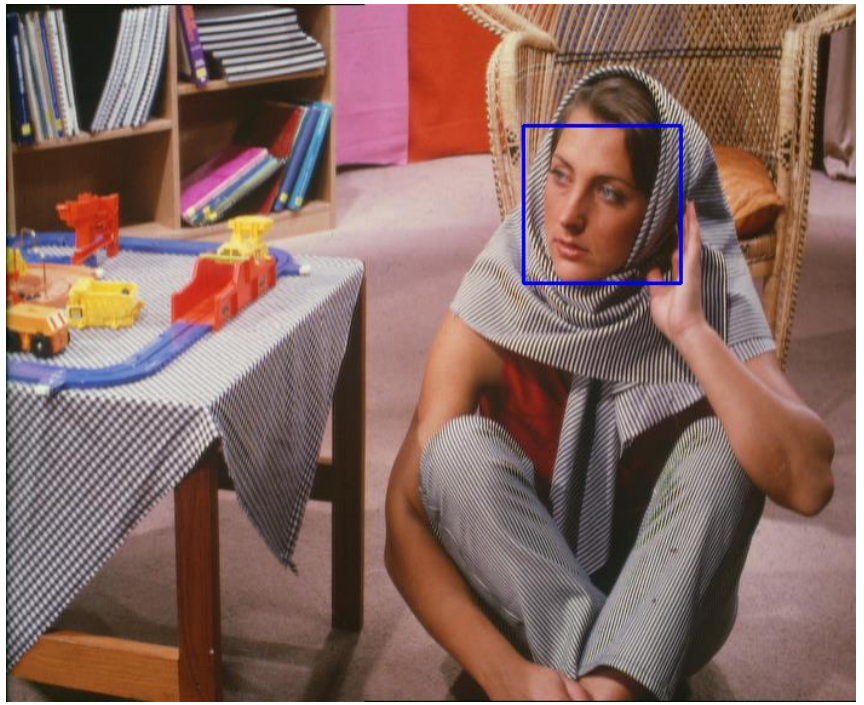
Using pre-trained haarcascades append the baseline code to track faces in the web camera stream in real time. If you don‘t have access to a camera, use an appropriate image from the Internet.



- Lab assignment -

3rd taks – Face detection with deeplearning models:

Repeat task 2 by replacing the Viola-Jones face detector with **MTCNN**.



- Software -

Package management:

PIP – installs and manages software packages written in Python

- install **Python 3** (for Windows: https://www.python.org/downloads/windows/, for Linux: https://www.python.org/downloads/source/)
- Pip should be automatically installed. If it‘s not installed follow https://www.liquidweb.com/kb/install-pip-windows/ for Windows or https://www.tecmint.com/install-pip-in-linux/ for Linux/UNIX

Development environments:

PyCharm

Visual Studio Code

Libraries:

OpenCV – for installation use *pip install opencv-python* (in the terminal/command prompt)

MTCNN – for installation use *pip install mtcnn* (in the terminal/command prompt)