Computer Vision

Face Recognition Workshop

Presenters:

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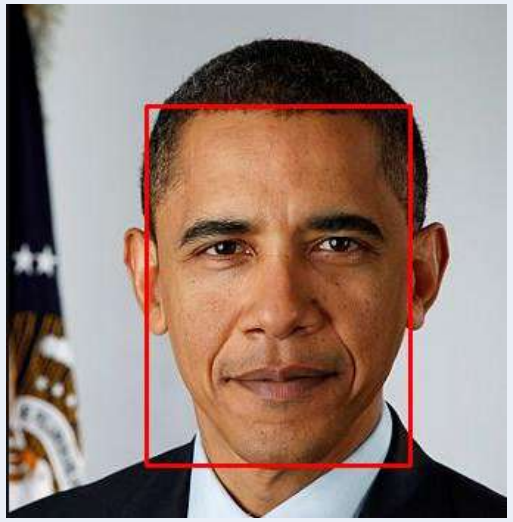
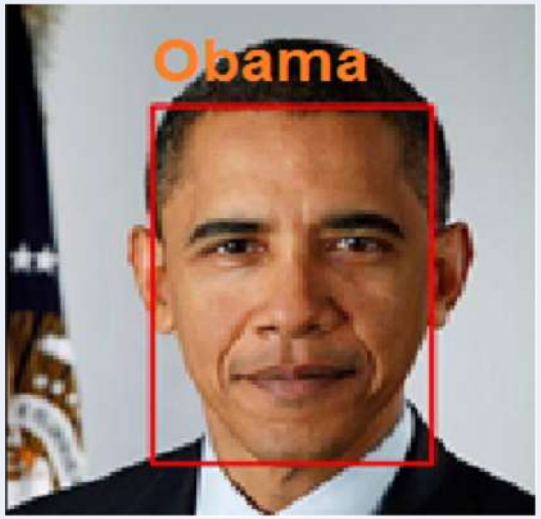
Features learnt by the end of this workshop

OpenCV Features
Read and display images
Image Properties (gray-scaling, resizing, etc)
Read and display video input

Face Detection
Haar Cascade Classifier



Face Recognition
Model trained using LBPH



Pre-requisites:

Basics of python or other programming language (C, C++, Java)

Pre-requisite Installation Steps:

Install Python>=3.5 (32/64 bit) from https://www.python.org/downloads/

After installation, Open cmd terminal

Check Python Version	python --version
Install Jupyter notebook	pip install jupyter
Install Numpy library	pip install numpy
Install OpenCV library	pip install opencv-contrib-python

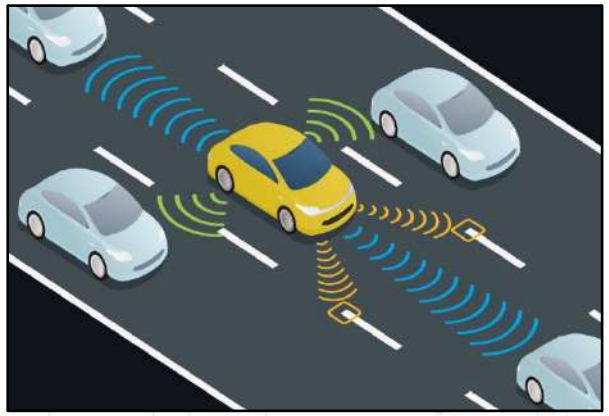
Workshop Flow

Objective	Minutes
Introduction to Computer Vision	10
Discuss the features of OpenCV • Read & display the image • Modify image properties (gray-scaling, resizing, etc)	20
Face Detection: • Explain Haar Cascade Classifier • Demo on images, video	20
Face Recognition: Discuss training the model using LBPH on dataset	10
• Train a model using LBPH • Demo on video	20
Open for Questions/ Discussions / Poll quiz	10
	Total: 90 minutes

Introduction to Computer Vision

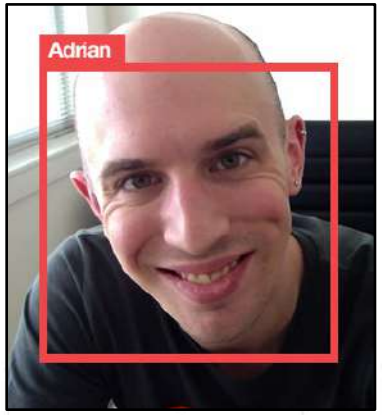
- Computer Vision is the discipline under a broad area of Artificial Intelligence
- Teaches machines to see
- Extract meaning from pixels of images / videos

Implementations in various fields



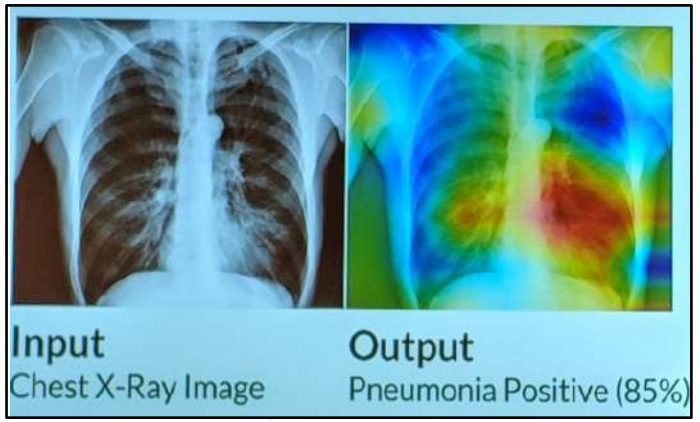
Automobiles
Self Driving Cars

Detects objects,
Lane markings,
Traffic signs & signals



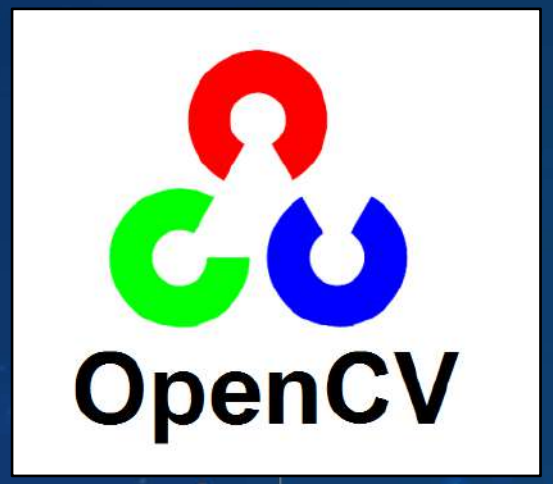
Security
Face Recognition

Police work,
Payment portals,
Security checkpoints at airport



Health Care
Accurate Diagnosis

Medical Imaging,
Timely identification of
illness



OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library

The library has more than 2500 optimized algorithms

Used for:

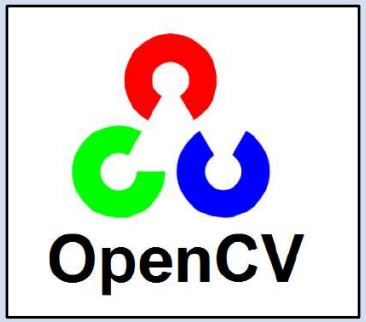
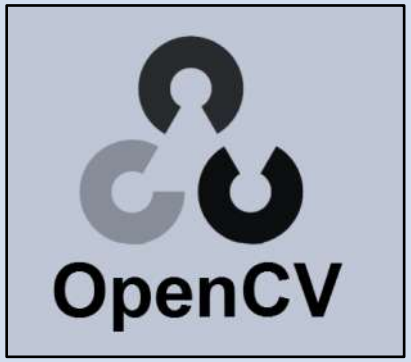
- Detect and recognize faces
- Identify objects
- Track camera movements
- Track moving objects
- Extract 3D models of objects
- Many More

Supports:

- C, C++, Java, Python interfaces
- Linux, Windows, Mac OS, iOS, Android

https://opencv.org/

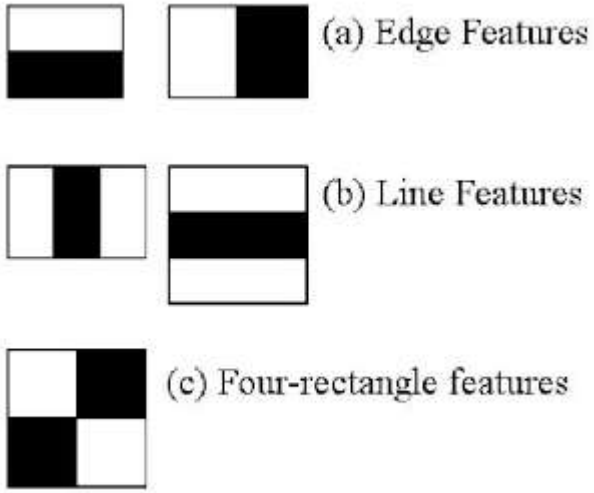
Features

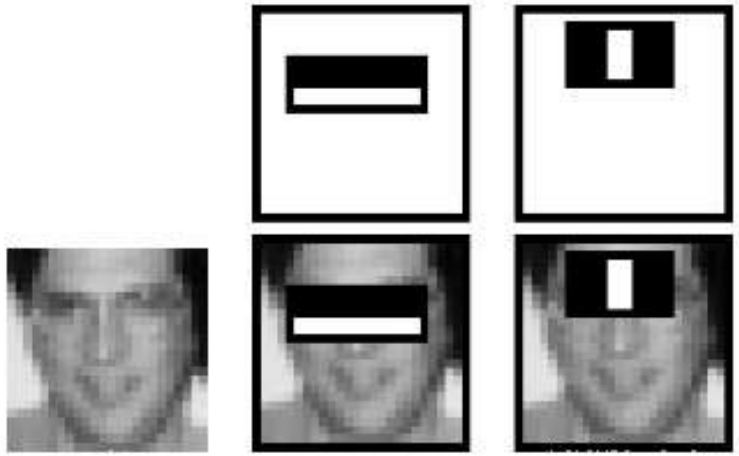
Functions used	Output
Read and display the image imread() imshow()	
Modify Size of image resize() **Gray Scaling of Image** cvtColor() COLOR_BGR2GRAY	 

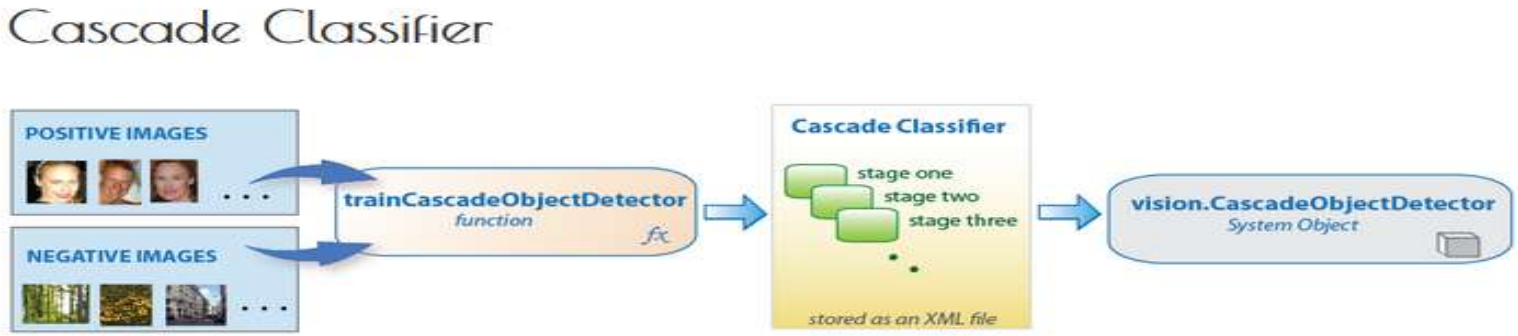
Haar Cascade Classifier

Haar Cascade is a machine learning object detection algorithm used to identify objects in an image or video

Steps
Haar Feature Selection
Adaboost Training
Cascading Classifiers





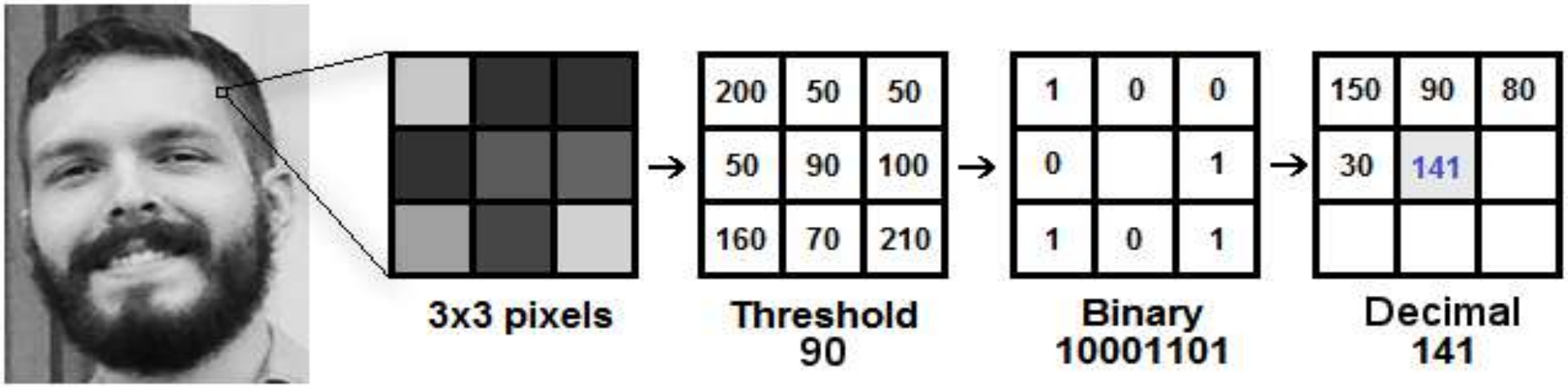


Local Binary Pattern Histogram (LBPH) Algorithm

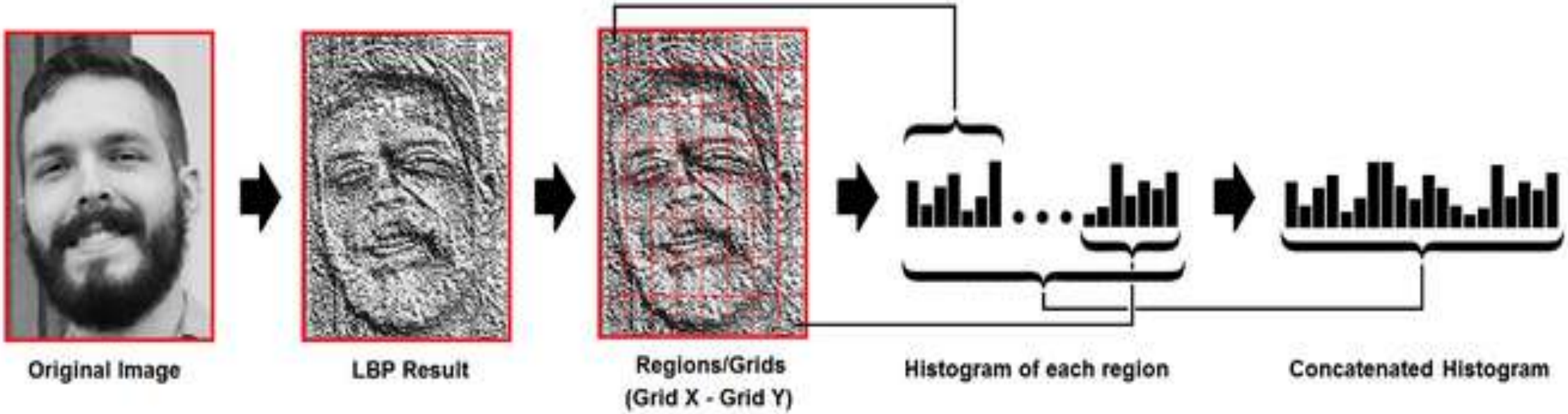
LBP is a simple & efficient texture operator which labels the pixels of an image by thresholding the neighborhood of each pixel and considers the result as a binary number.

Steps:

1. Parameters: Radius, Neighbours, Grid X, Grid Y
2. Training the Algorithm
3. Applying the LBP operation



4. Extracting the Histograms



5. Performing the face recognition

References

Opencv Official Documentation:

https://opencv.org/

https://docs.opencv.org/2.4/modules/objdetect/doc/cascade_classification.html

https://opencv-python-tutroals.readthedocs.io/en/latest/py_tutorials/py_imgproc/py_pyramids/py_pyramids.html

https://docs.opencv.org/2.4/modules/contrib/doc/facerec/facerec_tutorial.html#local-binary-patterns-histograms

Thank You