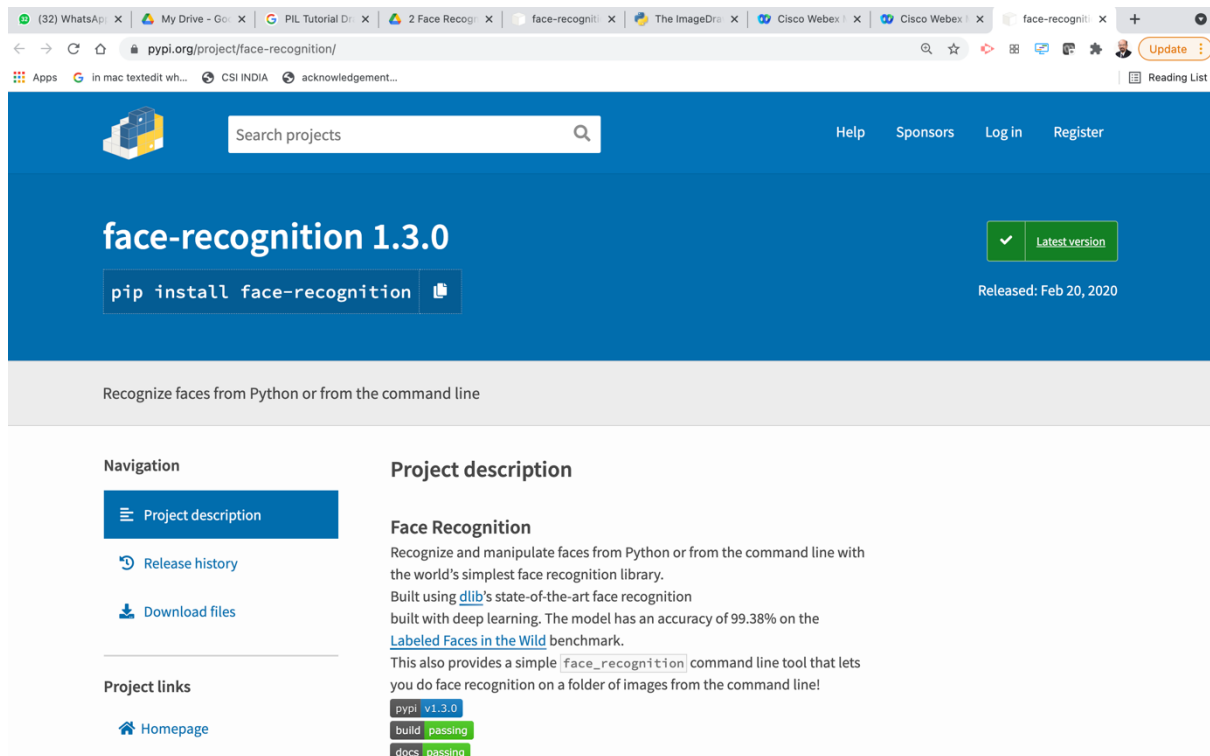


Python face-recognition Library Introduction and Overview

Python face-recognition library is a simple, user-friendly library with methods useful for to recognize and manipulate faces from Python. More details can be found from www.pypi.org/project/face-recognition/.

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The screenshot displays the PyPI project page for 'face-recognition' version 1.3.0. The header includes a search bar and navigation links like 'Help', 'Sponsors', 'Log in', and 'Register'. The main section features the project name 'face-recognition 1.3.0', a 'pip install face-recognition' button, and a 'Latest version' badge. Below this, a navigation menu lists 'Project description', 'Release history', and 'Download files'. The 'Project description' section details the library's capabilities: recognizing and manipulating faces from Python or the command line, built using dlib, and providing a simple 'face_recognition' command line tool. It also mentions an accuracy of 99.38% on the 'Labeled Faces in the Wild' benchmark. At the bottom, there are build status indicators for 'pypi v1.3.0', 'build passing', and 'docs passing'.

Python library **Face-recognition** is built on three important foundations.

1. CMake
2. Dlib
3. Open CV

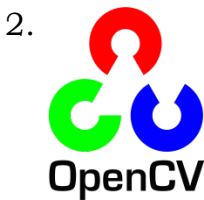


CMake: CMake is a cross-platform free an open source software tool. This is used to manage the

software building process using compiler independent method.

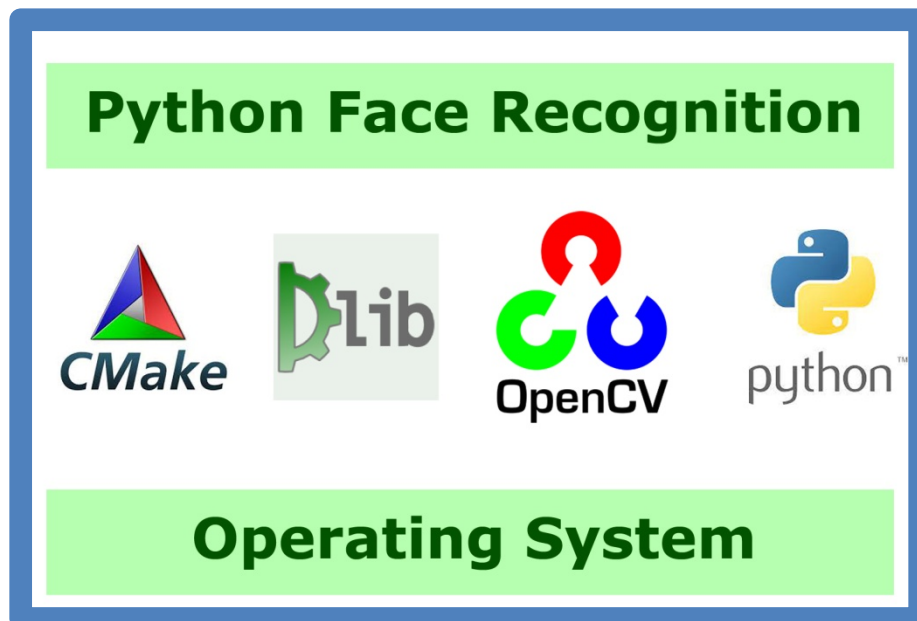


Dlib is a dynamic library. This is actually a modern C++ to solve real life problem. This contains machine learning algorithms and tools for building complex software in C++ to solve real life problem. Most of the Machine Learning packages are built on Dlib



Open CV (opensource computer vision)

This is a very popular opensource library implementing Computer Vision algorithms using Machine Learning.



Major Features

This library has the following key features:

1. Face detection and location

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Face detection is about detecting human faces in a picture. This identifies all the human faces in the picture and locate them in the 2-dimensional representation as rectangle frames. This can be done using two different methods.

1. **Histogram Oriented Gradient** approach denoted as hog approach.
2. Deep Learning based Convolution Neural Network (CNN) based approach

While hog approach is simple and runs in less computing time its accuracy is low. CNN is very complex and takes more time but has a better accuracy level.

Model	Speed	Accuracy
HOG	Fast	Low
CNN	Slow	High

2. Face Encoding

Face Encoding is about extracting the features of faces and convert them into their respective face signatures. The signature is farther used for comparing faces and recognize a resemblance.

3. Face Resemblance Identification

Given two faces, it is possible to check the resemblance. This is done as follows:

1. Load face f_1 and f_2
2. Find Face encoding of f_1 and f_2 and get their signatures s_1 and s_2 .
3. Find the distance between s_1 and s_2 distance (s_1, s_2)
4. If distance (s_1, s_2) is small we say the face f_1 and f_2 have resemblance.

4. Face Landmark Identification

It can identify important landmarks on human faces. The following are identified:

1. Chin
2. Left eyebrow
3. Right eyebrow
4. Nose bridge
5. Nose tip
6. Left eye
7. Right eye
8. Top lip
9. Bottom lip.

5. Face recognition

There are some known faces that are registered in the memory. When a new face f_u is received we can recognize this new face f_u as one of the known faces. This feature is used to used in the face-recognition-based Employee Attendance System and Immigration Systems.