FACE DETECTION PROJECT

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Overview

Face detection is a computer technology that is being applied for many different applications that require the identification of human faces in digital images or video. It can be regarded as a specific case of object-class detection, where the task is to find the locations and sizes of all objects in an image that belong to a given class. The technology is able to detect frontal or near-frontal faces in a photo, regardless of orientation, lighting conditions or skin color.

How It Works

Face detection applications use algorithms that decides whether an image is a positive image (face image) or negative image (non-face image). This is called a classifier. To classify a new image correctly, it is trained on hundreds of thousands of face and non-face images. This feature answers the question “Where are the faces in this picture?”. For each face detected, you get a complete analysis of key points (landmarks) around the eyes, eye brows, jaw, nose and mouth.

Importance

Face detection is an important part of face recognition as the first step of automatic face recognition. Because human faces are able to convey many different emotions such as happiness, sadness, interest, excitement, confusion, and intrigue, if you pay attention to one’s face, you are able to develop an idea for what another person is thinking and what they might do next. For businesses, all of this information is extremely valuable and it can help with understanding how the intended target audience feels about the brand and its communication at all its contact points.

Applications of Face Detection

People Counting and Marketing – For businesses, Face Detection is a great tool for measuring and understanding the demographic makeup of an intended audience. A camera can be integrated into a digital signage display and the installed face detection software will be able to pick up any face that walks by. Using algorithms, the software is able to detect faces and predict age, gender and other factors in order to serve up relevant advertisements.

Event feedback form – Through the use of facial recognition systems such as face detection, event professionals are now able to use data from cameras placed around the event to recognize attendees and report back on how they are feeling based on what their face is telling the system. With this face detection software, as an event marketer you will be able to quantify whether or not your attendees were interested in one speaker over another and which table displays pleased your guests the most.

Goals

1. To Detect Face From Live Webcam And Store the Features (Eyes, Nose, Mouth)
2. To Detect Face in Static Image
3. To Detect Face in Video File

Libraries

In this Project we have included many libraries, which played a crucial part in Detecting the Faces. So we will be discussing all those libraries one by one in detail...

OpenCv ::

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being a BSD-licensed product, OpenCV makes it easy for businesses to utilize and modify the code.

OpenCV-Python is the python API for OpenCV. You can think of it as a python wrapper around the C++ implementation of OpenCV. OpenCV-Python is not only fast (since the background consists of code written in C/C++) but is also easy to code and deploy(due to the Python wrapper in foreground). This makes it a great choice to perform computationally intensive programs.

Matplotlib ::

Matplotlib is a python library used to create 2D graphs and plots by using python scripts. It has a module named pyplot which makes things easy for plotting by providing feature to control line styles, font properties, formatting axes etc. It supports a very wide variety of graphs and plots namely - histogram, bar charts, power spectra, error charts etc. It is used along with NumPy to provide an environment that is an effective open source alternative for MatLab. It can also be used with graphics toolkits like PyQt and wxPython.

MTCNN ::

MTCNN (Multi-task Cascaded Convolutional Neural Networks) is an algorithm consisting of 3 stages, which detects the bounding boxes of faces in an image along with their 5 Point Face Landmarks (*link to the paper*). Each stage gradually improves the detection results by passing it's inputs through a CNN, which returns candidate bounding boxes with their scores, followed by non max suppression.