



ELC-2023

Real-Time Applications based on Computer Vision

Problem Statement- Real-time Face detection
and drawing effects

Readme

Facial recognition is a category of biometric software that maps an individual's facial features mathematically and stores the data as a face print. The software uses deep learning algorithms to compare a live capture or digital image to the stored face print in order to verify an individual's identity.

How Does Facial Recognition Work?

Step 1: Face Detection

To begin, the camera will detect and recognize a face, either alone or in a crowd. The face is best detected when the person is looking directly at the camera. The technological advancements have enabled slight variations from this to work as well.

Step 2: Face Analysis

Next, a photo of the face is captured and analyzed. Most facial recognition relies on 2D images rather than 3D because it can more conveniently match a 2D photo with public photos or those in a database. Distinguishable landmarks or nodal points make up each face. Each human face has 80 nodal points. Facial recognition software will analyze the nodal points such as the distance between your eyes or the shape of your cheekbones.

Step 3: Converting An Image to Data

The analysis of your face is then turned into a mathematical formula. These facial features become numbers in a code. This numerical code is called a faceprint. Similar to the unique structure of a thumbprint, each person has their own faceprint.

```
import cv2

face_cascade = cv2.CascadeClassifier('haarcascade_frontalface_default.xml')

cap = cv2.VideoCapture(0)

while True:
    _, img = cap.read()

    gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)

    faces = face_cascade.detectMultiScale(gray, 1.1, 4)

    for (x, y, w, h) in faces:
        cv2.rectangle(img, (x, y), (x+w, y+h), (255, 0, 0), 2)

    cv2.imshow('img', img)

    k = cv2.waitKey(30) & 0xff
    if k==27:
        break

cap.release()
```

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