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Face Mask Detector with Machine Learning Algorithms

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Abstract: ***The corona virus COVID19 pandemic is causing a alarming crisis so the effective ways of protection methods is by wearing a face mask in public according to the World Health Organization(WHO).The COVID-19 pandemic have governments across globe to impose lockdowns to prevent virus transmissions. Reports indicate that wearing face masks while at work clearly reduces the risk of transmission. An efficient and economic approach of using AI to create a safe environment in a manufacturing setup. A model using deep and classical machine learning for face mask detection will be presented. A face mask detection dataset consists of with mask and without mask images, we are going to use python-OpenCV to do real- time face detection from a live stream via our webcam. We will use the data set to build a COVID-19 face mask detector with computer vision using Python, OpenCV, TensorFlow and Keras. Our goal is to identify whether the person on image/video stream is wearing a facemask or not with the help of computer vision and deep learning.***

Keywords: Keras, TensorFlow, OpenCV.

1. Introduction

In this project, we'll discuss our two-phase COVID-19 face mask detector, detailing how our computer vision/deep learning pipeline will be implemented. We'll use a Python script to train a face mask detector and review the results. We include the original images used to generate face mask samples as non-face mask samples, the model will become heavily biased and fail to generalize well. We Avoid that at all costs by taking the time to gather new examples of faces without masks.

Research Gap Analysis/Drawbacks in Existing System

1) Excess data required for training the system and getting accurate detection of a person is difficult.
2) Physiological signals give accurate results but are complicated to process and time consuming.
3) Need camera with higher clarity or droidcam application can portray better results.

2. Proposed System

To construct a prediction model for predicting mask on face using machine learning algorithms and to assess the accuracy of the model. To integrate common classifying attributes using machine learning methods and predict the occurrence of mask.We will explore CNN models to see which produces reliable and repeatable results.

- **Python-OpenCV, caffe-based face detector, Keras and Tensorflow**:

Keras is a high-level API that uses deep learning libraries like Theano or Tensorflow as the backend. These libraries, in turn, interact with hardware via lower level libraries. If we run the program on a CPU, Tensorflow or Theano use BLAS libraries. when run on a GPU, they use CUDA and cuDNN libraries.

- **MobileNetV2:**

The typical MobilenetV2 architecture has models library to create the MobileNetV2 model instead of defining/building our own model. The weights of each layer in the model are predefined based on the Image Net dataset. MobileNetV2 was chosen as an algorithm to build a model that could be deployed on a mobile device. The layers are

1) Average Pooling layer with 7×7 weights
2) Linear layer with ReLu activation function
3) Dropout Layer
4) Linear layer with Softmax activation function with the result of 2 values. The final layer softmax function gives the result of two probabilities each one represents the classification of mask or notmask.

3. Results

It is working on device with limited computational capability and it is able to process in real time images and video streams, which is seemingly applicable in the real world. It is able to detect the faces from image/video. The cascade classifier which is used to train and spot the ROI has an accuracy of 98.5% for 30 epochs of iteration. The accuracy reading is displayed in Red/Green rectangle indications for different environmental conditions. The system is able to recognize multiple face mapping.

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