NETWORK PROJECT(PRACTICAL X) 2020

UJ COVID-19 FACIAL RECOGNITION

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PROBLEM STATEMENT

The Country has recently moved to lockdown alert level 1 as a result of the decline in the newly reported covid-19 cases .The University of Johannesburg can now phase-in 100% of their community under these new circumstances . The University's Executive Committee has raised concerns about the viciousness of the staff and students entering the premises by tapping their access cards on the biometric scanner devices as this might pose a threat to the increase in the number of recorded cases for the novel coronavirus which is easily transmitted through contact.

SOLUTION

As a Computer Science 2B student from the University that's leading In the 4IR Conversation in South Africa ,I have been facial recognizer called on to intervene and is tasked with the development of the first phase of their first ever facial recognizer for its stakeholders ,named the "UJ Covid-19 Facial Recognizer" a computer vision application that will combat and mitigate the threat. This intelligent system is designed to automate the entrance of registered students and staff members of the University. The System functions by capturing the face of an individual and apply image processing techniques to compare the image with the one stored on the University's database and make a robust prediction on whether the face it captured is of a particular who is registered with university , with a level of accuracy. The development of this computer vision application will ensure a safety return of the UJ Community to near to its former glory in their working stations.

METHODOLOGY

PRE-PROCESSING FUNCTIONS

CROP

Image cropping prior to feature extraction in the computer

vision pipeline is crucial in shifting the attention span to the Region-of-Interest of a particular observable in an image input . A string of different attention objects carry different amount of information(Kollcaku,2017:4) , as a result a significant attention value per attention object in the minimal perceptible size version of the image(quality compression , color reduction and size reduction in bytes) allows important aspects of the image to be easily sampled for further analysis . Cropping an image in a face recognition application increases the trustworthiness of an optical inspection as outlined by Barnouti(2016:1) , it trims the image into the frame of area of interest and normalize it to the standard size of 64x64 pixels.

GrayScale

Image GrayScaling reduces complexity of an RGB pixel image to a simpler black and white image color space channel . Single channel images reduces computational requirements such as training data for the Machine learning algorithm as referred to by (Kanan,2010:1) In order to acquire accurate performance . Gray Scale images are more preferable in feature extraction and classification phases of the image recognition framework since classification algorithms are more sensible to image quality that's in vast of which grayscale images are more feasible for the training and development dataset to feed into classification algorithms.

Canny

Canny edges yielded from a feature extracted channel image boosts image recognition patterns . Canny edge detection identifies ,detects the human face and picks up the edges of eyes and mouth's features as detailed in "Facial Recognition based on edge detection" .

The canny edge extracted images are easily comparable to the labelled images stored in the database because of the robust canny edge detection algorithms for further classification.

Fast

Features from accelerated segment test (FAST) is an imperative corner detection function as it locates and map objects and features of interest with added advantage of its computational efficiency as researched by(Tyagi:2019:1).It is known to have superior performance in computation time and resources which is favored by Machine learning approaches since it speedily finds feature points by circles on an image.

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