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Microsoft Azure Face Cognitive Service Deployment via Webcam Online Live Stream for Face Identification, Verification and Recognition Using Python

A facial recognition system is a technology capable of identifying or verifying a person from a digital image or a video frame from a video source. There are multiple methods in which facial recognition systems work, but in general, they work by comparing selected facial features from a given image with faces within specific storage. It is also described as a Biometric Artificial Intelligence based application that can uniquely identify a person by analysing patterns based on the person's facial textures and shape.

While initially a form of computer application, it has seen wider uses in recent times on mobile platforms and in other forms of technology, such as robotics. It is typically used as access control in security systems and can be compared to other biometrics such as fingerprint or eye iris recognition systems. Although the accuracy of facial recognition systems as a biometric technology is lower than iris recognition and fingerprint recognition, it is widely adopted due to its contactless and non-passive process. Recently. It has also become popular as a commercial

identification and marketing tool. Other applications include advanced human-computer interaction, video surveillance, automatic indexing of images, and video database, among others.

Face Recognition in our life

In the race for biometric innovation, several projects are vying for the top spot. Google, Apple, Facebook, Amazon and Microsoft are also very much in mix. All the software web giants now regularly publish their theoretical discoveries in the field of artificial intelligence, image recognition and face analysis in an attempt to further our understanding as rapidly as possible.

In the market, face recognition applications are led increased activity to combat crime and terrorism. The benefits of facial recognition systems for policing are evident: detection and prevention of crime. Facial recognition is used when issuing identity documents and most often combined with other biometric technologies such as fingerprints to prevent identity fraud and theft. Significant advances have been made in the health area too. Thanks to deep learning and face analysis, it is already possible to track a patient's use of medication more accurately and detect genetic diseases such as DiGeorge syndrome with a success rate of 96.6%.

Microsoft Azure Face Recognition

This report is written as a part of the technical training process of the National Upskilling Programme held in Al Hussein University, started in Jan 2020, supervised by Microsoft to learn and upgrade trainees skills in artificial intelligence, machine learning and deep learning using Azure services available for students and developers. Whereas Microsoft Azure Face Cognitive

Service is one of the top trending algorithms and tools world wide. The report explains the concepts of face detection, face verification and face recognition for human faces.

Face - Detect operation is used to detect faces in an image. At minimum, each detected face corresponds to a face rectangle field in the response. This set of pixel coordinates for the left, top, width and height mark the located face. Using these coordinates, a developer can get the location of the face and its size. In the API response, faces are listed in size order from largest to smallest. The recognition operations use mainly the different data structures. These objects are stored in the cloud and can be referenced by their ID string. ID strings are always unique within a subscription. Name fields can be duplicated.

Problem Description

The project aims to deploy face cognitive service to build a service / application that is capable to run camera live streams that monitor and track people appearing in the video, and detect their faces to be identified and verified according to a predefined group of people that is trained and scalable to add new users any time.

Service Development

In order to achieve the requirements, a kind of storage must be established to save 1-2 different front-face photos for each user. The storage can be structured as a SQL database, or file that stores all images and lets the application pass through them to create a specific person group for each user and train it to extract face features that are used in the identification and verification processes. Then the application will run a web camera using Open-CV API to

capture video frames and as soons s a face is detected the program will store the shot and send it to the cloud in order to recognize people in the image.

In order to achieve a high accurate rate users' photos should be clear, frontal and …..

A real time face recognition system is capable of identifying or verifying a person from a video frame. To recognize the face in a frame, first you need to detect whether the face is present in the frame. If it is present, mark it as a region of interest (ROI), extract the ROI and process it for facial recognition.

Creating a database

Take pictures of the person for face recognition after running create_database.py script. It automatically creates a Train folder in the Database folder containing the face to be recognised. You can change the name from Train to the person's name. While creating the database, the face images must have different expressions, which is why a 0.38-second delay is given in the code for creating the data set. In this example, we take about 45 pictures/images and extract the face, convert it into grayscale and save it to the database folder with its name.

Training and testing

Face detection is the process of finding or locating one or more human faces in a frame or image. Haar-like feature algorithm by Viola and Jones is used for face detection.

In Haar features, all human faces share some common properties. These regularities may be matched using Haar features. Two properties common to human faces are:

1. The eye region is darker than the upper cheeks.
2. The nose bridge region is brighter than the eyes.

Composition of two properties forming matchable facial features are:

1. Location and size including eyes, mouth and bridge of nose.
2. Value for oriented gradients of pixel intensities.

Testing procedure

CONCLUSION

The ultimate approach to deploy a face cognitive service varies in many different ways. An on-premises infrastructure includes a desktop application that runs offline using a built-in facial recognition service or may run on-line using Docker containers which are available as containers in Microsoft Azure cloud and requires a subscription to the Face cognitive service. On the other hand the software can be a web service that can run over many different operating systems and platforms on websites and mobile devices. And hosted over Azure Web Services that interacts directly with the Facial resources and remote storage structures related to the system. The service can be built in different programming languages according to the underlying development processes, We choose Python APIs and capable to switch to C# any time in the development process. The service is reliable , low-cost and very accurate.

Works Cited

- "What is Facial Recognition? - Definition from Techopedia". *Techopedia.com*. Retrieved 2018-08-27.
- Andrew Heinzman. "How Does Facial Recognition Work?". *How-To Geek*. Retrieved 2020-02-28.
- "How does facial recognition work?". *us.norton.com*. Retrieved 2020-02-28.