Intelligent Access Control System For Safety Critical Areas

Contents

Abstract of project with project statement

1) In some industries it is necessary for the workers to wear safety

helmets and shoes while working. So to check weather workers are taking safety precautions or not we are proposing this system.

2) We can train our classifier to identify helmet and safety shoes with IBM Cloud. There will be video streaming near the entry of the industries where we can first detect the face of a person and if any person is present then we can capture the image of that moment and send it to IBM Cloud to detect whether the person is wearing helmet or shoe.

3) If the person is wearing shoe and helmet we can give him access by opening the door. If he is not wearing then we can restrict his access by not opening the door. We can even warn him through voice commands to take the safety precautions.

Components

Software Components:

1. IBM Cloud Service

2. Python IDLE

3. MIT App Inventer

1.IBM Cloud Services:

1) IBM Cloud is a suite of cloud computing services from IBM that offers both platform as a service(PaaS)and infrastructure as a service(IaaS).

2)IBM Cloud platform supports access to other IBM tools and services -- including IBMWatson and IBM Cloud Functions for serverless computing -- as well as those from third-party vendors.

3)The IBM Cloud Catalog lists over 170 services across categories, including:

4)Internet of things (IoT) -- Includes the IBM IoT Platform, which provides services that connect and manage IoT devices, and analyzes the data they produce.
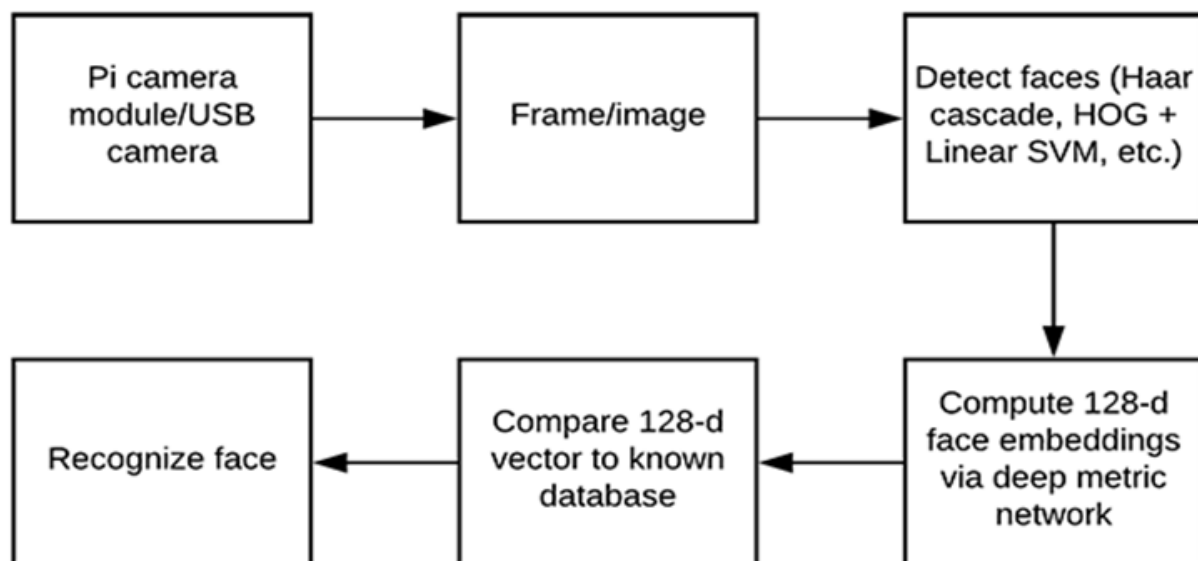
2.Python IDLE:

1)IDLE is integrated development environment (IDE) for editing and running Python 3.7

2)The IDLE GUI is automatically installed with the Python interpreter. IDLE was designed specifically for use with Python

3)IDLE has a number of features to help you develop your Python programs including powerful syntax highlighting.

3.MIT App Inventer

1) **MIT App Inventor** is a web application integrated development environment originally provided by Google, and now maintained by the Massachusetts Institute of Technology (MIT)

2) It allows newcomers to computer programming to create application software(apps) for two operating systems (OS): Android (operating system) | Android, and iOS, which, as of 8 July 2019, is in final beta testing. It is free and open-source software released under Multi-licensing/dual licensing.

Block Diagram for face recognition system:

Block diagram for Text to speech coversion:

Text

Text Analysis
Text Normalization
Linguistic analysis

Phonetic Analysis
Grapheme-to-Phoneme
Conversion

Prosdic Analysis
Pitch and Duration Attachement
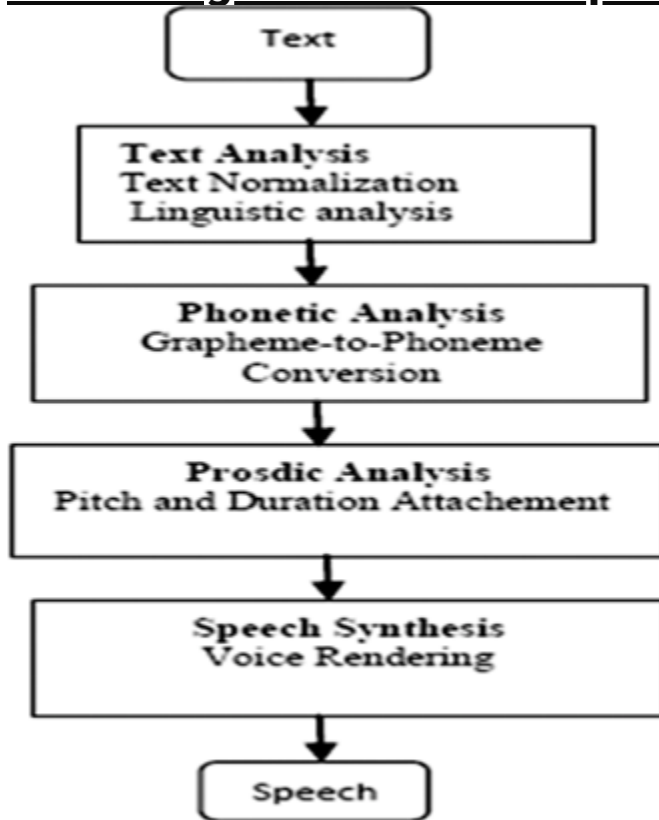
Speech Synthesis
Voice Rendering

Speech

Figure 3: Block diagram of TTS [7]

Project Working process:

1) Install Python IDLE version 3 in the system.

2) Create an IBM Cloud account and start using different services like visual recognition, text to speech, cloudant database etc.

3) Install all the required libraries for the cloud IBM service to function like the OpenCV, JSON, Visual

Recognition etc. using command prompt.

4) Write the python code for the Access Contol by integrating both visual recognition and text to speech services of the IBM Cloud.

5) Capture images of the person standing in front of the camera and give a warning in speech if he is not having proper safety equipment.

6) If he has proper safety equipment, allow him to enter the premises.

7) Make sure that the captured image is stored in the cloudant data base.

8) Now create a node-red flow and create a HTTP request for the mobile app to get the data from the cloud

9) Using the MIT app inventer, create a mobile app using API and install it in the mobile phone.Check whether the data is being updated in the mobile phone as the python code is run in the background.

Coding:

1) Write code for the Camera to start video recording and clicking pictures and saving them in specified directory.

2) If the camera is not able to read the person's image, then an audio must be played via speaker asking them to

stand in position for face detection.

3) These images are verified with those trained models in Cloudant   visual recognition custom models and an accuracy score is generated.

4)Based on the accuracy score, the program will decide whether the worker is to be allowed access.

5)It will convert text to speech and give output via a speaker.

6)A Motor must begin rotating when access is allowed. Else, it will not rotate.

Conclusion:

1)This paper offers an implementation of a low cost yet powerful computing system for face recognition.

2)The use of Local Binary Pattern Histogram (LBPH)algorithm for face recognition works very well provided that the database should have clear images.

3)The availability of OpenCv proves to be advantageous to design Face recognition system more on local level.

4)The authority provided to the user via mail plays an important role.

5)The more variations of the face training data the system has, the better face recognition are and also the less chances of naming the unknown face from one of the available database.

6)The use of OpenCv library proves to be very effective for face detection and face recognition.

7)The paper shows the integration of OpenCv library with IBM cloud can be used to build IoT applications.