

OBJECT RECOGNITION FOR MILITARY BASED SERVICES USING IMAGE PROCESSING

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To access & cite this article

Website: www.ijirmet.com



ABSTRACT

Face detection and recognition are playing an important role in today's digital world. Now this face recognition, detection are widely available in mobile phones. This project deals with real time working with images. We do this face detection/recognition method, for the main purpose to help the military soldiers who are working in the borders, which helps in saving many lives. Hence, the military organization can take the help of this project to carry out the risky jobs which is difficult to be recognized by the humans. In this, the project is carried out in such a way that it can capture the enemy's image . This project is made easy with the help of Raspberry pi kit which is itself a minicomputer and helps in processing the images and gives detection or recognition of faces of the soldiers, village people or intruders. With the invention of Raspberry pi face recognition is taken to the next level. This system is programmed by using python programming language. The realization of the system will be completed by means of a low cost camera and a Raspberry pi kit The Raspberry Pi kit along with Open Source Computer Vision - OpenCV helps in face detection and recognition of the system. The camera will act as a third eye to the soldier. This helps soldier to be alert at any time.

KEYWORDS Face Detection, Dataset, detection, recognition, Histogram Equalization, Raspberry Pi Module.

INTRODUCTION

In this project we will use Digital image processing techniques as we create datasets and then capture the image, process the image, and will produce the output. Usually digital image processing algorithm consists of three stages: input, processor and output. Face detection is concerned with checking of face in the image given or to check and detect the face when the camera is working. Security is the important aspect of soldiers working in the borders. They need to recognize who is coming in front of them. In this paper we propose face recognition system that will be capable of processing images and to provide the positive face detection rate output. We use Python language which is predominantly used in developing standalone applications. Most face detection algorithms are designed using these type of software domains and requires only few seconds to detect faces. The processing speed will be good for real-time applications. This paper describes a simple and easy hardware implementation of face detection system using Raspberry Pi, and using a camera which is itself a mini computer and is at a very low price.

METHODOLOGY

The device was set to look like a helmet with a raspberry pi module inside it and with a camera mounted on it. The project would collect real world image as a dataset. The Noobs OS is installed in raspberry pi using a secondary storage device. This program consist of all modules which includes Image libraries, Opencv2, OS. The USB type camera helps in detection and recognition of the faces. The opencv2 module is used to do face recognition

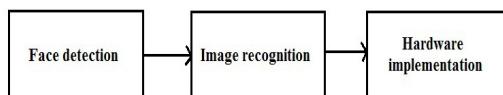


Fig 2.1.Module diagram.

PYTHON

Python is a programming language which is used mostly in modern real time computational

applications. This programming language is capable of processing data, videos, text and also the images. It helps in recognizing the images also according to our application. This proposed system is being tested using python 2.7. Python along with NumPy which is a library function of image processing helps in performing numeric related operations.

PI AND CAMERA

In this proposed system we use Raspberry pi 3b which is a minicomputer itself and helps in performing many applications. We give boot setup to Raspberry pi using an external secondary storage memory card containing all the data. The camera is connected to the Raspberry pi itself. To program for the same using python language. The code imports certain modules that enable functions such as face recognition, GPIO modules. The dataset creator program is to be first loaded into the Raspberry pi storage. Then by using the camera more number of photos are taken and the dataset is to be created.

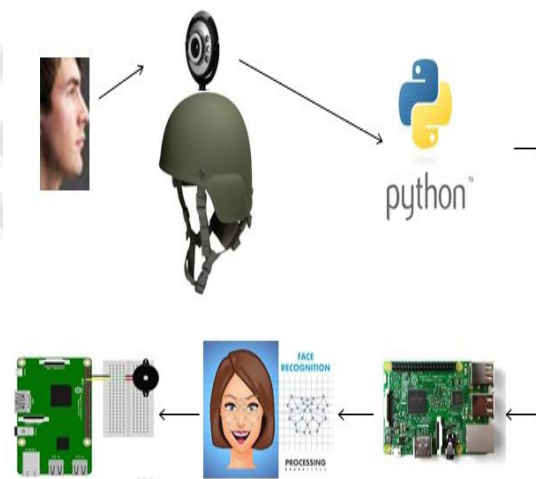


Fig 2.2 Pictorial Representation

The above pictorial representation displays the perfect view of the proposed structure of the project. At first a camera will be mounted on the top surface of the military helmet and will be provided to the soldiers working in the border of our country. The camera is capable of detecting all the faces which comes in the camera. All the information of the soldiers or villagers required will be saved as id's and dataset by using python programming language. After creating the dataset the images of the certain soldiers or villagers will be obtained as it helps in finding the difference between civilians and terrorists. Here the camera acts as a main source. The camera will be kept always on. Then after creating proper datasets a new python coding is to be used to train the

datasets acquired. It includes PIL photo image library function which helps in normal vision enhancement of the image. It also uses the LBPH (Local Binary Point Histogram) which acts as a face recognizer. LBPH labels the image pixels and it produces results in binary numeric values. For detection purposes it use cascade classifier. Next it should get the path of all the files in the folder. Then to create an empty face list and continuously followed by creating an empty id list. This empty id list is used for creating more dataset of civilians or soldiers. Next we have to do now looping through all the image paths and loading the Ids and the images. Then to code in such a way that if there is no jpg extension image in the allotted folder then the image file will be ignored. Here the next process is to load the required image file and converting it into a grey scale image. After converting it into grey scale and there is a need in converting the PIL image into NumPy array. Now in this process it gets the id from the image. Then extract the face from the training image sample. If a face is there then append that in the list as well as Id of it to create a single file called yml file. The yml file get saved in the trainer folder. Then to make a detector coding program for exact recognition of the faces. In detector coding we include font functions to display the name or the word unknown. This detector program is designed to load the datasets from the yml file that has been trained. Here we should declare the id's to the corresponding datasets name and an extra id denotes the unknown person.

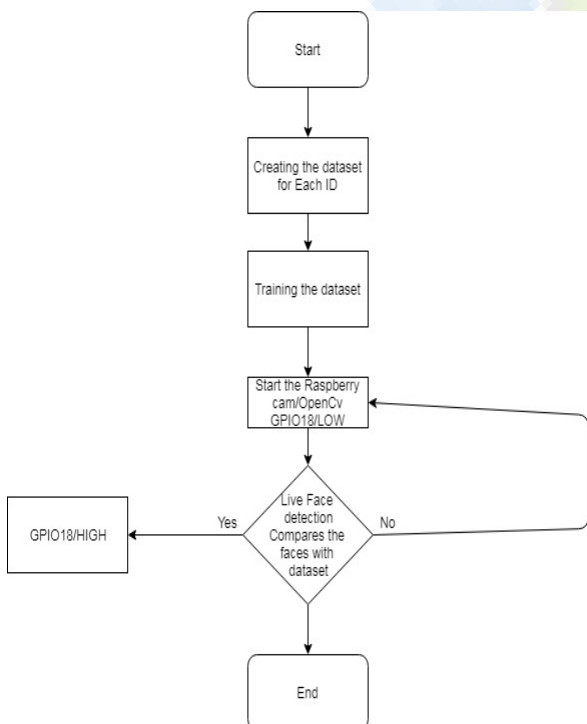


Fig 2.3.Flow diagram.

At first the dataset program is allowed to run. It opens the camera and ask the id number for which the dataset is to be created. For a particular id minimum of two thousand images are to be taken as a dataset more number of images indicate the best accuracy of the output. Then for the dataset created it will need to be trained. The dataset trained will form as a single file trainer.yml. This file is then copied into the Raspberry pi module. The camera is also connected to the Raspberry pi module. 5v and 2.5 amp ensures power supply to the Raspberry pi module. The module will be powered on and the camera starts functioning. If any faces gets detected it compares with the trained dataset file and ensures that whether the person is known or not. If the face is detected it makes a small alarm sound to the soldier wearing the helmet. If the face is NOT recognized the loop runs again and checks the faces. The process gets repeated until it recognizes the exact image.

OUTPUT

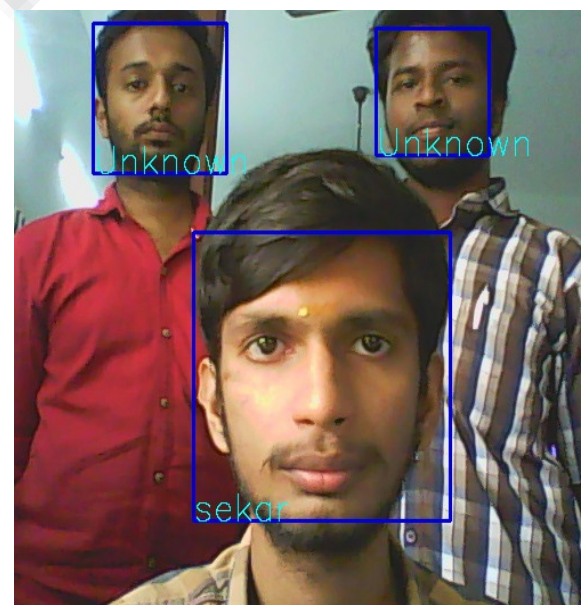


Fig 3.1 Output

The above image shows the exact output of the proposed system ie. face detection and face recognition. In this diagram we can understand that only one name is taken and given as a dataset then the result is that the other two member's

face is marked as unknown while the dataset created name is shown correct as well.

FUTURE WORK

This proposed system is designed with an objective that it detects and recognizes the face for only closest distant face images. In order to achieve recognizing of face for a long distance face then high resolution cameras are to be used. This project is done with a low cost camera with low frames per second. The camera with high resolution along with high frames per second can provide us a great accuracy for long distance recognizing of images.

CONCLUSION

By developing this project it is proved that it is possible to avoid sudden attacks in the military border which uses object recognition which can identify difference between terrorists, civilians and soldiers. More testing would be needed and more time should be spent on the implementation of this project in the real life environment. Huge investment in this project will result in more accurate in output.

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