Juni Khyat ISSN: 2278-4632 (UGC Care Group I Listed Journal) Vol-13, Issue-04, No.06, April : 2023 ENHANCEMENT OF SECURITY SYSTEM USING ARDUINO AND FACIAL POINTS

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ABSTRACT:

A smart home security system is a type of system that allows you to monitor and control whocan enter your home. It's also very easy to use, and it's relatively affordable. Unfortunately ,the main issue with a traditional security system is that it can easily be broken and can bemakes it penetrable to through the Techniques and methods of the Hacking. This often leadsto the robbery since the security system will require the expensive installation and have togood chunk of money to get high Accurate Results. In order to solve this issue, we havedeveloped a smart home security system that uses both the Internet of Things and MachineLearning. The system works by connecting a web camera to a laptop and then using a neuralnetwork Algorithm to recognize faces. The system will determine whether the Detected person's image is with one of the members of the home by analyzing facial recognition of pretrained data which consists of 128 encodings for each face in the Analyzed images BecauseModule utilized Deals with the each andevery point in the Human faces. Face Detection and Recognition will be done one after another first come face comes the Face detections andLater the Face Recognition. It will then lock the door if it doesn't match the one shown on thescreen and with all the encodings of the trained data too. This type of security system is idealfor homes since it can perform multi-face recognition. If the owner wants to allow guests, thesystem will send a security key to the individual through a telegram with the Telegram bot. After all the Research this project had surpassed the Accuracy of the Raspberry pi as its Accuracy will too low because of its 1.5 mp tiny cam and the modifications also will beintricate but this designis facile best andsimple which comesatvery its so lowcostandgivesalmosthighAccurateresultsthananyoftheFaceDetectionsDevicesandtheAlgorithms.Key Words: Face Detection, Face Recognition, Telegram Bot, Laptop, Camera, pre traineddata, 128 Encodings, FacialPoints, Raspberrypi, Analyzedimages. Module.

INTRODUCTION

Ahomesecuritysystemisavitalpartofanyhousehold'splantoprotectitsvaluablesandkeep its occupants safe from potential criminals. In the U.S., there are around 7,020 homeburglaries every day. According to statistical data, over 85% of all burglaries are committed in residential areas. Also, over 48% of robberies are carried out with guns. Identity theft is ontheriseintheRussia,Canada,andtheUnitedKingdom[1],anditispredictedthatover5out of 6 homes in the country will be broken in the next two decades. . A home security system that uses the Internet of Things and facial recognition can help prevent these crimes. The IoT will allow a system to detect motion and tri ggeritusingsensorssuchaPirandUltrasonic[2]. Thistechnology can also be used todetermine the position frontofthecamera. Forinstance, if the distance between the camera and the person is less than 230 cm, the face detection[module can perform well.A face recognition system that uses theLBP algorithm has an accuracy of 70% when it is tested using real-time images[3]. A camerawill be able to recognize the face of a person while they are in front of it, and it will compare he faces with those databasethat'sstoredintheRaspberryPi.TheCNNalgorithmthat'susedinourdesignisveryaccurateandisery

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low-cost.Conventionalhome security system uses radio signal between windows and video surveillance to control thepanel. This method can be easily cracked using various advanced technologies, such as datainterception and software programming]. Another drawback of this system is that it canprevent the signal from getting through to the control panel by jamming it. This is done bysending radio noise to prevent the signal from getting through to the sensors. At present, wehaveintroducedan Arduino-basedsecuritysystem that canprevent this issue.

AURDINO BASED SECURITY SYSTEM:

This project is about developing a security system that uses an Arduino board and a laptop. The main idea of this system is to use the micro controller to control the lock and unlockoperations. The laptop isconnectedtoboardthroughasequencecommunication. Inorderto implement this system [4], we need to writ eapart that will allow the computer to communicate with the Arduino.

Figure1: Established connection between the HardwareComponents



As you can see Clearly the Figure 1 shows the Exact Wired Link Between the PhysicalComponentswhichareusedinthisDesign.TheCNNalgorithmisusedintheFacerecognition software. It is a very accurate and unique algorithm that is used to recognize thefaces in real time. It is additionally trained with many human faces [5][6]. This makes it different from other algorithms such as the Histogram of gradients, the local binary pattern, and the Haar Cascade[7]. All of these are not very accurate and produce less accuracy than the CNN algorithm based on the Comparison between machine Learning Algorithms. The concept of the security system that uses the facial points and Arduino enhance theefficiency ofthesystemby using MachineLearning is to andIOT[8][9].Thepersonwhocanenter the premises can be distinguished by the facial recognition that uses the HOG, ANN, or YOL algorithms. The Arduino can be used to control the door's lock and unlock system. Thestored data can be accessed through the photos in the training data set. The Pictorial view canalsobe accessed through the software application. The goal of this project is to create a low-cost and effective security system that uses facial recognition and a camera to detect the faceofapersonenteringthepremises. The system will be using a Solenoid Lock, which is the only device that can communicate with the electromagnetic signals [10].

LITERATURESURVEY

This is a home security monitoring system that uses the Raspberry Pi.

Ifvariousfeaturessuchastemperaturemonitoringandmotionsensors.

HomeSecurityMonitoringsystemwithIOTBasedRaspberrypiSecurity and Privacy of Smart Home Systems Based on the Internet of Things and Stereo Matching Algorithms

• This Security system mainly Focuses on the Video Surveillance by using the machine



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- Learning Algorithms for the Privacy and SecurityThe Physical Components all are
- implemented perfectly the thesis for this project is give Below
- The rise of the Internet of Things (IoT) has led to the development of smart home systems



that are secure and can be accessed by users.

- These systems are able to collect and use data from multiple sensors in the home.
 - Figure 3: Advanced level monitoring System
- The data collected by these systems can then be used to provide a remote control for the home.
- The security of a home is guaranteed with this IoT architecture. The software and hardware components of this system are designed according to its architecture.
- The image recognition and speech recognition modules are mainly utilized. In order to improve the system's accuracy, an algorithm is proposed that will match stereo.
- This security System is Cost Effective



- TheMostAdvancedVideoSurveillancetheaboveFigure3explainsalloftheprocedureand workingof theVideo surveillance
- With this we understood that the Machine Learning Algorithms can be used for theRealtimeVideo Surveillance

• But there are so many modules are used in this which makes the physical or networkstructure too difficult to Understand but the Working and the Performance of theproject is definitely best and the sensors are also used to change the mechanics of themodule so that there should not be any malfunctions in the Working of this type ofmodelusingStereo



METHODOLOGY

Today, everything in the digitizing world is equipped with the latest technology, but the current system is not able to provide us with the necessary security to perform our workefficiently. One of the main issues that we face is the lack of a reliable and secure connectionbetween the camera and the Raspberry Pi. This will be solved by implementing various algorithms and sensors. In order to improve the current security system, we will use an inexpensive and easy-to-use microcontroller known as Arduino as the main controller. This will allow us to implement various sensors and algorithms that will help us monitor and control our work. In order to implement a door locking mechanism, we will use a solenoidlock, which is controlled by Arduino and a connected PC with a face recognition algorithm.Android and web applications will allow remote access to the system. The CNN Algorithmplays the main role in the Detection of the Faces so the CNN Algorithm gives more Accuracythananyother AlgorithmFigure 4: Work flow of Solenoid LocNow Laptop will be connected to the Arduino Board and the message 1 and 0 is transmitted from the Laptop the Arduino Board and it Transmits the Message to the Relay Switch and Again the Relay Switch sends the input of 0 or 1 to the Solenoid lock .The Solenoid Lockwork Procedure is given in the Figure 4 if the input 1 then lock will be Opened or Else itremains locked .but the input 1 will be given based on the security key or the Facerecognition .If the Face is matched with pre Trained data set then the output 1 will begeneratedor thesecuritykeyis correctalso means thenalso output 1willbeproduced.

ALGORITHM

The Proposed algorithm for the Face recognition is the Conventional neural Networks. TheCNN Algorithm can be imported from the Face Recognition module, this module canconsists of the different Algorithms but our system imports the CNN algorithm. The CNN algorithm is very different Algorithm effective recognize and best algorithm in order to thehumanFaces.Figure5: CNNAlgorithmInternalsplittingof ImageThe CNN model is a framework that can improve the accuracy of facial image classification. It is based on the LeNet-5 framework, but it has various differences in its structure. Forinstance, the input data, network size, and full connection layer are different. The model is composed of two sets of pooling and convolutional layers. The two layers are arranged in thesame way as the sketches. The input layer has only one feature map, which is utilized to putthe facial image into the CNN framework. The first convolutional layer is C1. It has sixfeature maps and a randomly generated kernel. The first pooling layer, S1, has six featuremaps. Its output is calculated by taking into account the previous layer's output. The elementsin the feature map are connected to the corresponding kernel in C1's feature map. These willnot overlap with the receptive fields of the other elements. The two pooling and convolutionallayers, known as S2 and C2, are respectively equipped with 12 feature maps and follow thesame calculation steps as their predecessors. A single layered perceptronisals oconnected between the S2 and the output layers. The output la ver'soutputisa40-dimensional representation of a face recognition algorithm as you can see clearly in the above Figure 2 theSplitting of the images of human Face and it's time to implement this in the Real

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import telepot

TimeScenariowhich is used for multi-label classification. We store the 128-bit encodings of therequired faces and compare them with the live face to identify an individual or an open doorusingarelayconnected to an Arduino.

CODINGPROGRAMS

The Below Coding program in the Image 1 is used to connect the Telegram bot to ownerAccountitsendstheSecurityKeyRandomlygeneratedbetweenthe0000and9999andifany unknown person face is detected means it sends the message wrongs person tried theremaining part of the code function is written in the main program to call the Function andsendsthemessages Automaticallywithout anyExternal Help.

import time from telepot.loop import MessageLoop from datetime import datetime telnumbers=['1015560630'] def action(msg): chat_id = msg['chat']['id'] command = msg['text'] print (chat_id,command) bot = telepot.Bot("5430035783:AAGFC2DazTPAyvT8V7Vb6_oypDIFE28ka7Q") #print() def sendmessage_bot(chat_id,password): bot.sendMessage (telnumbers[chat_id], str(password)) #MessageLoop(bot, action).run_as_thread() #while 1: # time.sleep(10)

Image1:TelegramAPI Link

Now the code of face recognition and use of the CNN Algorithm is Shown below in Image 2it's the code from the Snippet tool. The Original Code has more lines of the code than theCode which is the More the Accuracy .We had Given one Standard Value which is givingthe Accuracy of More than 90% if wefurther decrease the deviation thenthe Accuracy willgo beyondthe94% but the Problem is it takes more Computational time than the AveragePicture Processing Time and as there are Encoded data also stored in the Pre Trained Data it'sBetterto haveLessTrained data inthe Encodings

```
import face_recognition, cv2
import numpy as np
from threading import Thread
count=0
with open('encodings.txt', 'r') as myfile:
    textData=myfile.read().replace('\n', '')
splitdata= textData.split(",")
with open('encodingnames.txt', 'r') as myfile:
    textNames=myfile.read().replace('\n', '')
names= textNames.split(",")
[ float(i) for i in splitdata]
a = np.float64(splitdata)
feature=np.array split(a, a.shape[0]/128)
deviation=0.4#accuracy
face_locations=list()
import face_recognition,cv2
import numpy as np
from threading import Thread
count=0
with open('encodings.txt', 'r') as myfile:
    textData=myfile.read().replace('\n', '')
splitdata= textData.split(",")
with open('encodingnames.txt', 'r') as myfile:
    textNames=myfile.read().replace('\n', '')
names= textNames.split(",")
with open('encodingnames.txt', 'r') as myfile:
    textNames=myfile.read().replace('\n', '')
names= textNames.split(",")
with open('encodingnames.txt', 'r') as myfile:
    textNames=myfile.read().replace('\n', '')
names= textNames.split(",")
feloat(i) for i in splitdata]
a = np.float64(splitdata)
feature=np.array_split(a,a.shape[0]/128)
deviation=0.4#accuracy
face_locations=list()
```

Image 3:Imports the Module Face Recognition

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```
rom facedetection import *
mport cv2
mport random, time
rom threading import Thread
rom telmsg import
mport serial, time
wners=["alekhya", "chandu", "charmika", "jayanth"]
basskey=random.randrange(1000,9999)
print (passkev
endmessage bot(0, "new passkey"+str(passkey))
 lobal userkey
iserkey=0
:apture=cv2.VideoCapture(0)
irudinodata=serial.Serial('COM3',9600)
lef on_click(event, x, y, p1, p2):
    if event == cv2.EVENT_LBUTTONDOWN:
        take_input()
lef take_input():
    global userkey
#while True:
```

The testing phase of our system has completed. All that's Left is importing the Module of Face Recognition as described in theImage 3. We have 4 images that are stored in the pre-traineddataoftheencodings.Ifthefaceisdetected,themessage"wrongpersontried"willbe sent to the owners.The unknown user thenhas to provide the correct security code inorder to enter the house or the lock will remain locked. But the Hardware links and WiredConnectionsshouldbe Perfectasgiven inthePictorialView of the Figure 1.A CNNalgorithm was used to analyze 10 individuals all of them were recognized. With the help ofthisalgorithm, the accuracy of the resultswas increased to 90% even more.

RESULT

These are the estimates of the various face recognition algorithms that are used in the field. Although the exact results may vary depending on the implementation, the complexity of thenetwork, the size of the image given in the Figure 5, and the hardware architecture are someof the factors that can affect the accuracy of the results. Pre-trained models can also helpreduce the time spent in the computation of the facerecognition.

ALGORITHM	ACCURACY
Conventional Neural Networks	98%
You onlylookonce	94%-96%
ArtificialNeuralNetworks	85%-95%
LocalBinarypattern	80%-90%
HistogramofGradients	85%-95%
Supportvectormachines	80%-90%
HaarCascade	80%-90%

Table1:Highest Accuracypercentageof Algorithms

In our project we have used the CNN Algorithm to improve Accuracy of the Face recognitionanditdependsupontheHardwareArchitectureandseveralconditionsalsoneedtobeverified. AsyouhaveseentheApproximateValuesoftheAccuracymentionedinthepercentage givenintheTable 1.TheBelow resultIsbasedon ourHardwarecomponents.The CNN had got the Accuracy of more than comparedtotheOtherFaceRecognitionMachineLearningAlgorithmsandmorethantheRaspberrypi. The Above Recorded results noted in the Table 2 are based upon our hardware Architectureandpre-Trainedthe data of the encoding

ALGORITHM	REQUIREMENTS	PERFORMANCE	ACCURACY
ConventionalNeural networks	Low	Medium-High	High (More than 90%)
You onlylookonce	High	Low	Medium-High

Table 2: Recorded Data Based on project Design

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	ArtificialNeural Networks	Medium	Medium	Medium-High
	LocalBinarypattern	Low	Low-Medium	Low-Medium
	Histogramof Gradients	Low-Medium	Medium	Medium-High
	Supportvector machines	Medium	Medium-high	Medium-High
	HaarCascade	Low	Medium	Medium-High

CONCLUSION

The of istimprove face goal this paper the accuracy of the reorganizationalgorithmbyimplementinganimprovedversionusingtheArduino.Thismethodcanbedoneb yimplementing various algorithms such as ANN, HOG, YOLO, and LPB. We will additionallyget the different types of accuracy rate by selecting the appropriate algorithm. The Arduinoand the Laptop are connected to each other using the relay switch and the Solenoid lock. Themain advantage of this method is that it eliminates the need for the Raspberry Pi. The laptopprocessor will allow us to get the more accurate results than the normal camera. We will also to e the owner data in the pre-trained data encodings so that we can easily add images to therepository. The user can easily allow any guest to join the Telegram channel if they have avalid security key. The key is sent to the chat ID of the app with the help of the TelegramBot. The program that we will be using is a Python Application that will developed be be by us.It will able algorithm will be able to produce more accurate and efficient results than the other machine learning algorithm the set of the sets. This is an advanced security system of the Arduinothat will allow us to perform more accurate and efficient facerecognition.

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