

Intrusion Detection System

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Abstract— The need of intruder detection framework has become an indispensable part for the instructive foundations where unapproved individuals enters. After we have run over this issue, we have fostered an intrusion detection system by incorporating live video transfer with face acknowledgment. This framework recognizes the approved and unapproved people. We have made a data set putting away the pictures of approved people groups and we have additionally directed a few trials with live transfer video from the camera which successfully recognizes the live feed. On the off chance that an interloper is distinguished, an alert beginnings blowing simultaneously and with such a caution, the gatecrashers' caught picture is shipped off the authority with a portable notice. Our framework is not the same as some other face recognition framework as it takes care of with live video transfer and the framework alert is created.

Keywords—Intruder, Face Recognition, Live Video Stream.

I. INTRODUCTION

As facial recognition has become an essential part of security purposes, which is used in numerous ways for providing the secured and reliable means for many major and minor tasks of daily life from unlocking personal phones, laptops to all the way used by Google photos for grouping photos over cloud. Because of every one of these advantages, we can have an advanced and more secure way of life. Nonetheless, it is likewise officeholder on us to consider the security. In this manner, alongside the cutting edge method of living, security has a prime worth. A visual interruption framework, in light of most recent innovation, can be useful to accomplish this goal. As our lifestyle is evolving, so does our technology and the requirement regarding security concerns is increasing, due to this our system is using a technology that is known AWS (Amazon Web Services). AWS is a subsidiary of Amazon providing on-demand cloud computing platforms and APIs to individuals, companies, and government on a metered pay-as-you-go basis. These cloud computing web services provide a variety of basic abstract technical infrastructure and distributed computing building blocks and tools . As of 2020, AWS comprises more than 175 products and services. We are using some of the services in our project named Amazon Kinesis Video Stream, Amazon S3, Amazon Rekognition, Amazon DynamoDB, Amazon Lambda, Amazon IOT (Internet of Things) and Amazon SNS. With the use of these technologies our system is based on taking the input from a CCTV (Closed-Circuit Television). CCTV cameras have end up being valuable for observing applications . From that point forward the CCTV has been ceaselessly developing from a basic aloof observation framework to a further developed and canny checking framework. It would now be able to be considered as an indispensable piece of our general public.

The main objective of this work is the setting up of an intelligent visual surveillance security system through the use of AWS and IOT.

II. LITERATURE SURVEY

The idea of facial recognition was first proposed by Woodrow Wilson Bledsoe[1] and he is also known as the founder of facial recognition. The facial recognition is also used by the leading companies which will be resourceful.

Some of the previous work in the same fields are :

The motion based intruder detection system using computer vision but the whole system is on monolithic approach so its unable to handle the large number of comparisons. As it is unable to use high computational power at ones[2].

A CCTV based surveillance system in 2013 the system is capable of identify the instruction very effectively but the whole over process is slow and sometime unreliable so we are using a better and faster approach we are adding cloud with all the technologies[3].

A hose base surveillance system is developed in December 2018 but the system is only limited to the low data set but the response time of the system is cooperatively high so the comprising approach of the same can be helpful[4].

The computer vision algorithm is discovered in 2011 and is the main base for the whole project [5].

III. METHODOLOGY

We are using Nodejs for uploading the video stream to the cloud based analytic system. Nodejs is one of the most leading backend language and an expert on handling the real time projects. The same is used for the maintaining database, storing image and comparing them with the video stream. We are storing the details of members of the organization or those who are permitted to enter the premises with their profile photos and some biometrical unique features in the database. And comparing these features (i.e. structure, shape, and proportions of the faces; distance between the eyes, nose, mouth, and jaw; upper outlines of the eye sockets; the sides of the mouth; the location of the nose and eyes; and the area surrounding the cheek bones)[17] with the live video feed from CCTV Cameras. We are using AWS Rekognition API for comparing the live video feed with the standard data set and the API returns the number of matched faces and unmatched faces in the image with a confidence level. If the confidence level of matched faces is high, individual is permitted to enter into the premises otherwise the system will raise up an alarm and a notification with captured image of unauthorized person is sent to the concerning authorities.

Why Nodejs?

Nodejs brings occasion driven programming to web workers, empowering advancement of quick web workers in JavaScript[14]. Designers can make versatile workers without utilizing stringing by utilizing a rearranged model of occasion driven programming that utilizes callbacks to flag the finishing of an undertaking. As portrayed in the above definition it gives a quick web worker and furthermore simple to scale and best for building up the ongoing applications.

What are Biometric unique features?

Biometrics are physical or conduct human qualities which can be utilized to carefully recognize an individual to allow admittance to framework, gadget or data[17]. Examples of these biometric identifiers or biometric unique features are finger prints and facial features (color of iris, nose structure, mole or any other unique feature on the face).

Why AWS?

AWS is one of the best leading technology in the world, providing latest and high-tech technology on pay as you go features[13][16], which is easy to handle, to add in a code. The services that AWS provides are reliable and cheap, providing less latency anywhere in the world. With AWS our system will be fast with more security comparative to other alternatives in the market.



Image (a) [11]

IV. ALOGRITHM

Backend

- Get Feed
- Compressing and converting it to up loadable stream
- Upload Video (Stream, URL)

Cloud Based Analytic tool

- Get video Feed
- Convert it into shards
- Comparing (shard, source)

Comparing (shard, source)

- Analyze shard and compare with source
- Request Rekognition API (Target Image, Source Image)

Rekognition API (Target Image, Source Image)

While (Target Image Matched Source Image):

- **If** Target Image Matched Source Image, **then**
 Return the matched confidence level
- **Else, then**
 target image = next->target image

END OF While

Return Unmatched Face

Frontend:

- **If API return** matched faces:
the individual allowed
- **If API return** unmatched faces:
the alarm is raised

Key Terms:

URL – the url of cloud analytical tool for uploading video stream.

Shards – smallest unit of a stream.

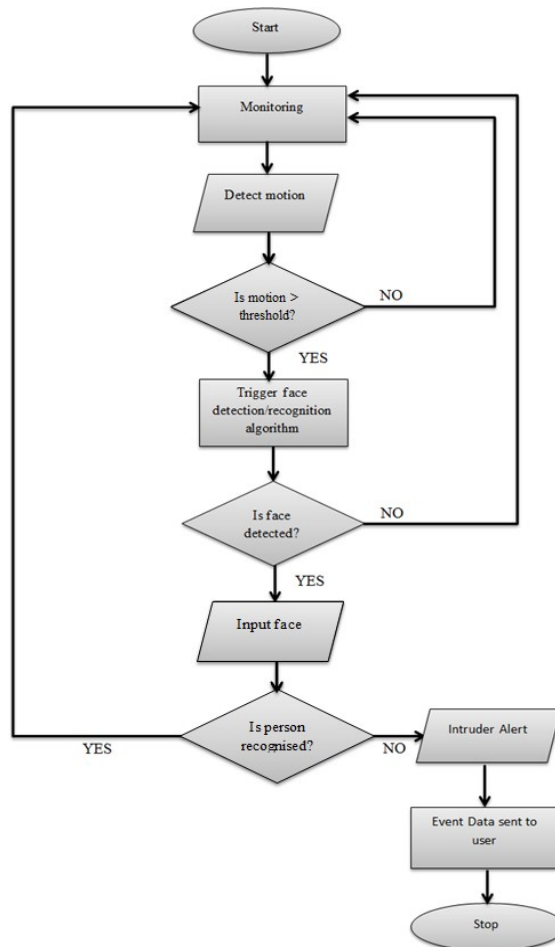
Source – standard dataset uploaded by authorities.

Target Image – image from the dataset.

Source Image – image to be matched with target image.

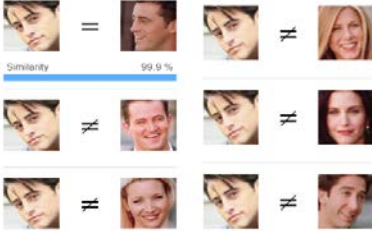
Next->target image – next image in the dataset for comparing.

V. DESIGN AND IMPLEMENTATION



VI. EXPERIMENTAL RESULTS

The output of some experimental test cases are as follows:



```
{
  "SourceImageFace": {
    "BoundingBox": {},
    "Confidence": 99.99798583984375
  },
  "FaceMatches": [
    {
      "Similarity":99.94828796386719,
      "Face": {}
    }
  ],
  "UnmatchedFaces": [
    {
      "Similarity":1.315213680267334,
      "Face": {}
    },
    {
      "Similarity":0.4368317723274231,
      "Face": {}
    },
    {
      "Similarity":0.08990144729614258,
      "Face": {}
    },
    {
      "Similarity":0.0049819787964224815,
      "Face": {}
    },
    {
      "Similarity":0.0018634782172739506,
```

```
"Face": {}  
  }  
}
```

As we can see the face of the source image is only matched with one face in the target image and the similarity level of the face is high, so we can say the face is matched successfully with the target image. As in the target image there are 5 unmatched faces with negligible similarity index. Now we take an image of a men with beard and without beard, as test case:



```
{  
  "SourceImageFace": {  
    "BoundingBox": {},  
    "Confidence":99.96416473388672  
  },  
  "FaceMatches": [  
    {  
      "Similarity":99.99954223632812,  
      "Face": {}  
    }  
  ],  
  "UnmatchedFaces": []  
}
```

As we can see the similarity is high in this case also, so the face is matched successfully.

VII. SCOPE

The system fits the requirement for any organization/institute/firm for such intrusion in the premises.

This system can also be used by the local administration and the police for identifying a particular person, suspect or criminal. The system will easily identify the possible range of area for searching that person from the last 20 min as the comparisons are higher, so the response can be slow but it can limit down the search area.

As home security is also a major concern nowadays, so our system can even be used as a home surveillance system for preventing theft using facial recognition on thief.

In any institution, our system can be used for attendance as it will reduce the cost of maintaining the data. And it works as a more secure and it stands up for today's technology.

For defense ministry, this system can be used for any motion detection at our borders, with the image captured of our enemy for any further requirement.

A major time is wasted in the verification at the centers of our major examinations for identifying the candidate. Our system just requires a dataset and the verification is done within no time.

VIII. FUTURE WORK

The technology is emerging all over the globe and in the coming years, facial technology is expected to grow and will create enormous revenues. As our system is working on most of the requirement for now, we have thought to increase the concern about security even more than this.

As theft is a major concern in a mall/shopping centers, we think that the facial recognition with live stream can even detect shoplifting.

We are seeing that there are vehicles everywhere now and by means of that, the accidents are also aggregating, so our concern here is that sometime on a low rush highway these accidents are not spotted, the system will send the data to the nearest hospital and police station for health and security issue.

IX. CONCLUSION

The point of this examination was to build up a coordinated gatecrasher framework by joining live stream with face acknowledgment. The face acknowledgment recognizes approved people and gatecrashers to wipe out bogus alarms. The framework has been tried, all things considered, situations and this ease observation framework shows great execution. The proprietor gets an email with the caught outline as connection when a gatecrasher enters the premises and an alert is raised. The framework can be improved by adding more cameras so that for various individual it works with less idleness. Nonetheless, extra work is needed for the face acknowledgment module to build its acknowledgment proportion and to make it less delicate to varieties in different factor

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