FACEDOX

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Abstract – The rapid growth of technology has made our lives easier in multiple ways. This growth has also affected our lives both in many positive and negative ways, in some cases technology is the main reason behind various cybercrimes around the world and researchers have also predicted the chances cold war in future but on the other hand in many other cases modern technology is the reason various crimes could now be put to an end with just a click. This project is an approach to help people stay in a safer society by minimizing the risk of criminal activities around them and helping researchers understand the state of mind of the criminals when the crime had been committed. Project FACEDOX is a Facial Recognition system based on Facial Recognition and Deep Learning technology which uses Neural Networks to determine the facial match. It also makes the use of the vision technology to get a sense of the environment the entity whose face has to be recognized is in and then passed through tensor models. The data collected by the facial recognition system is transferred to a set of neural networks which find the nearest match, after the match is found vision technology helps to analyze the environment and predict possible cases of scenario that might occur. Voice based Artificial Intelligence communicates with the analysts discussing about the pros and cons of having the entity in the current environment, when any notorious activity is monitored the predictive algorithms determine the risk level and rapid response is taken. The body language of the entity and other physical characteristics helps to determine the state of the mind of the entity committing the crime which can be used by researchers to find a pattern of criminal minds and use it to come up with techniques to prevent happening of such crimes in future. The analysis might also help counsellors to understand several aspects that can be kept in mind after or before the prosecution of the entity. FACEDOX is built upon high end programming languages such as Python and libraries such as Tensor Flow, Google Vision and Deep Learning. These languages and libraries provide the substantial support to the whole framework of FACEDOX. Thus giving an effective solution to minimize the rates of crimes which happen in the world around us.

Keywords – Facial Recognition, Deep Learning, Neural Networks, Tensor Flow.

I. INTRODUCTION

Due to the increase in criminal activities in our country India, there is a huge need to come up with solutions to minimize the crime rates. This has led to many new fields in technology which focuses to developing solutions for the cause. By the time a crime happens in a place it is too late for the authorities to take any advance precautions. The Primary goal is to establish a faster link to stop the prevent such case scenarios with the help of the branch of technology known as the Facial Recognition and Machine Learning. The overall function of FACEDOX application is based upon the transmission of data such as facial match and vision analysis during critical scenarios. It consists of Deep Learning Neural Networks. After a criminal is detected by the application in any environment, The Data is matched to the Criminal databases which maintains the criminal records including their photos then an alert is sent to the local authorities who can closely monitor the activities of the criminal and determine the Risk levels of having them in the current environment, If any notorious activity is monitored the physical Characteristics help to determine the state of the mind of the person committing the crime and their pattern of crime is recorded

and analyzed. The Artificial Intelligence helps to determine that what possible case scenarios might occur next based on any similar patterns and help the authorities to think of the countermeasures that can be taken rapidly to prevent the occurrence and the whole analysis is stored in the database.

Scope of FACEDOX is not just limited to facial detection and immediate response, but FACEDOX also instructs the analysts and counsellors with the set of data required to understand the mind of the criminal.

FACEDOX is a wonderful example of the applications of Machine Learning and Facial Recognition. Each data set of FACDOX is trained under tensor flow models to provide the best experience results to its users. FACEDOX can recognize the emotions such as Humour, Rage and other basic emotions of the criminal during the state of the crime.

Future versions of FACEDOX would be able to start a casual conversation with the criminals to counsel them. Functionalities such as Natural Language Processing would be included.

A. Features of Facedox

- Facial Recognition
- Prediction of possible risks
- Better Analysis of Criminal Minds
- Pattern determination between multiple crime scenarios.

II. RELATED WORKS

With the introduction of the high efficiency Neural Network Models and Facial Recognition Algorithms many systems have been developed that helps the machine to find the details about any person, many examples of such technologies exist in the market today.

The Facebook AI lab performs tasks such as automatically tagging uploaded pictures with the names of the people in them with the help of Deep Learning Models.

Time & Attendance company known as Clocked In released the facial recognition technology as an application for attendance tracking for businesses and organizations looking to have a an automated system to keeping track of hours worked as well as for security and health and safety control.

The United States of America, Department of State operates one of the largest face recognition systems in the world with a database containing records of 117 million American adults, with photos typically drawn from their driver's license photos.

In Russian states there exists an app 'FindFace' which can identify faces with about 70% accuracy using the social media app known as VK.

Google Vision Cloud Video Intelligence makes videos searchable, and discoverable, by extracting metadata present in the frames through the use of REST API. Once can now search every moment of every video file. It quickly annotates videos stored in Cloud Storage, and helps to identify key entities within the video. It also separates signal from noise, by retrieving relevant information within the video, by processing it shot-by-shot, or by frame-by-frame with easy processing.

III. SYSTEM DESCRIPTION

A. Facial Recognition

The Facial Recognition Algorithms are used to determine the face of the person in the frame which is then matched with criminal record databases simultaneously. If any criminal is found in any place a positive match alert is generated and the details of the criminal is pulled up from the Database.

B. Vision

Using Vision Technology, the current state of the environment is determined and every frame is closely monitored.

C. Deep Learning

Using Deep Learning neural networks techniques, the positive ID is measured with high accuracy ratios. Emotions, actions and other physical aspects are detected.

D. Tensor Model

The Tensor model helps in calculating the risk factors of having the entity in the environment and come up with the complete analysis of the situation.

IV. SYSTEM IMPLEMENTATION

A. Support

To execute the overall project, the need of many supporting background to it is required. In project FACEDOX high end Neural Networks are trained with the help of Tensor Models. Video Frames consisting of Noise are processed under the action of VISION API's helping to come up with clean video models to deliver the best results.

B. Working

Firstly, the facial recognition algorithm is written using Principal Component Analysis. Then the results are Trained with Deep Learning models to search for accurate set of results and matched with the criminal databases. When a match is found the Vision Technology is brought into use to determine the state of the environment such as surrounding objects, behaviour of the entity and other physical features. Tensor Models determine the risk factors of the person by reviewing their activities, if the risk factor is too high possible case scenarios are predicted based upon previous Crime Patterns, countermeasures for each data set is prepared. If any notorious activity is detected the local authorities are informed immediately with the help of a voice based Artificial Intelligence bot.

After a crime occurs the same data set is analyzed which helps researchers to have a deep insight of the crime pattern and furthermore can be used by counsellors to get a read on the criminal mind before they are sent to prison.

C. Limitation to the Existing Systems

- Current facial recognition algorithm only helps authorities to find a positive match of the entity.
- Video footages with noise require external noise removal procedures to get efficiency.
- The Environment object metadata cannot be extracted.
- Similarity can't be matched based on crime patterns recorded in footage.

V. EXPERIMENTAL RESULTS AND EVALUATION

A. Experimental Data

- Case 1: A situation considering the scenario of a person holding a knife. His emotion levels are detected. The experimental results of case 1 are shown in Fig I.
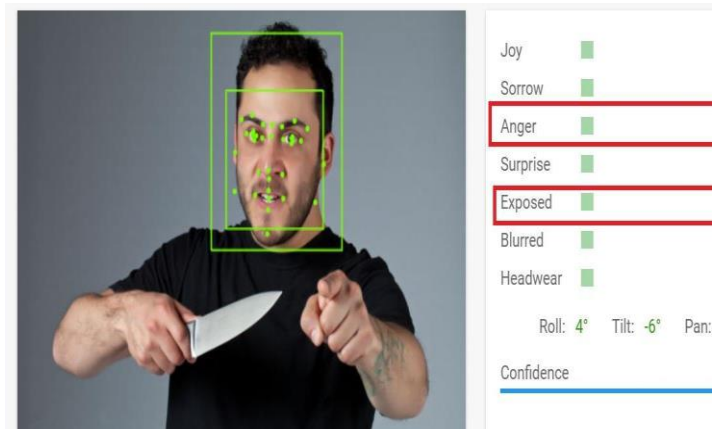

Fig I: Emotion Detection.

- Case 2: Analyzing basic characteristics. The experimental results of case 2 are shown in Fig II.

Fig II: Characteristics Detection

- Case 3: Analyzing the objects in the environment. The experimental results of case 3 are shown in Fig III.

Fig III: Object Detection

- Case 4: Analyzing the risk detection levels. The experimental results of case 4 are shown in Fig IV.

Fig IV: Risk Detection

B. AI Testing

- Case 1: Normal Greetings

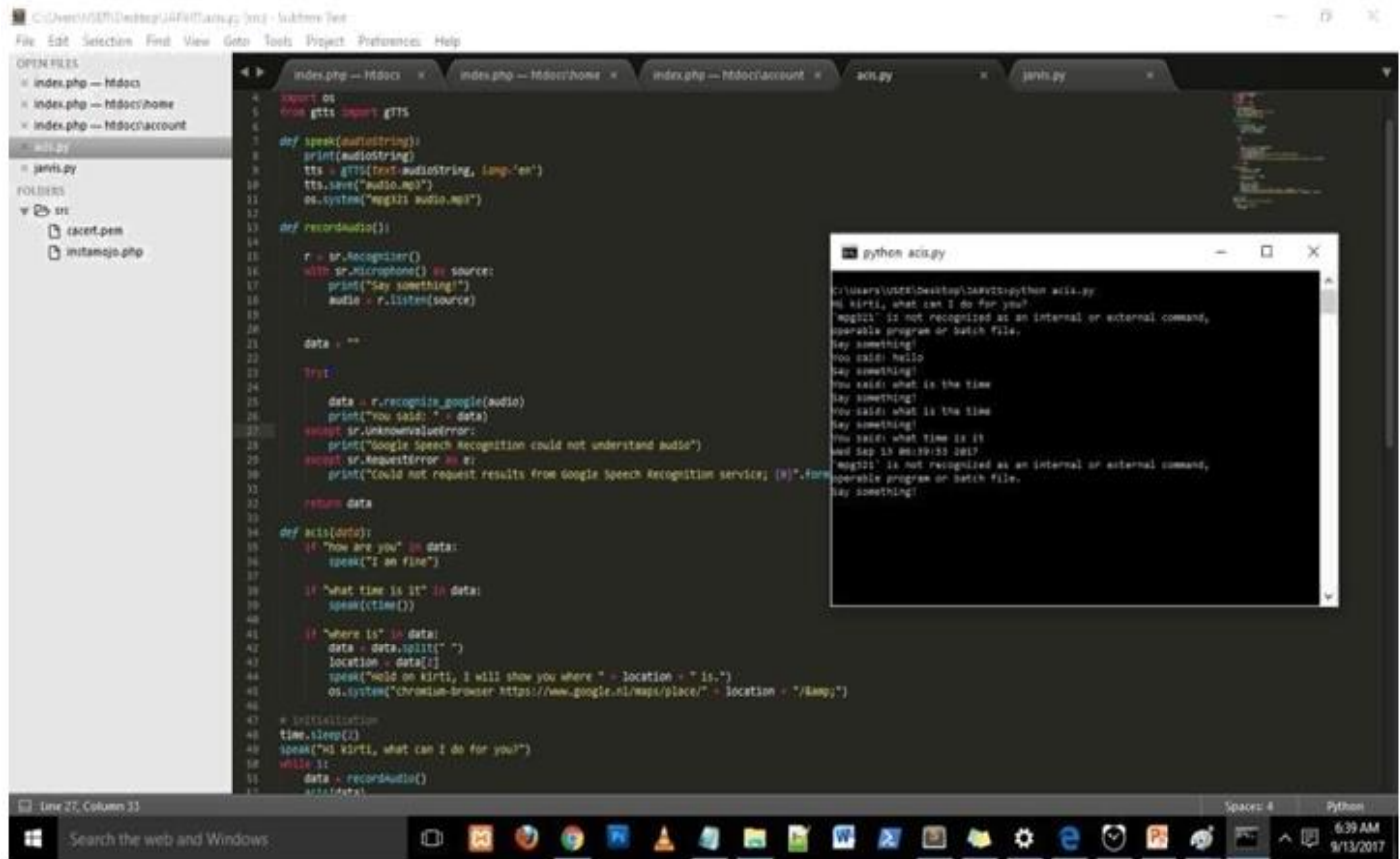Hello and Hi as input were tested for which the AI responded with the desirable answer.

Fig V: Voice Based AI output

- Case 2: Location Match

After the determination of the person the AI is able to tell their current location using Google Maps.
The AI was asked to show the location of a place in the map, the location was displayed over the Google Maps.
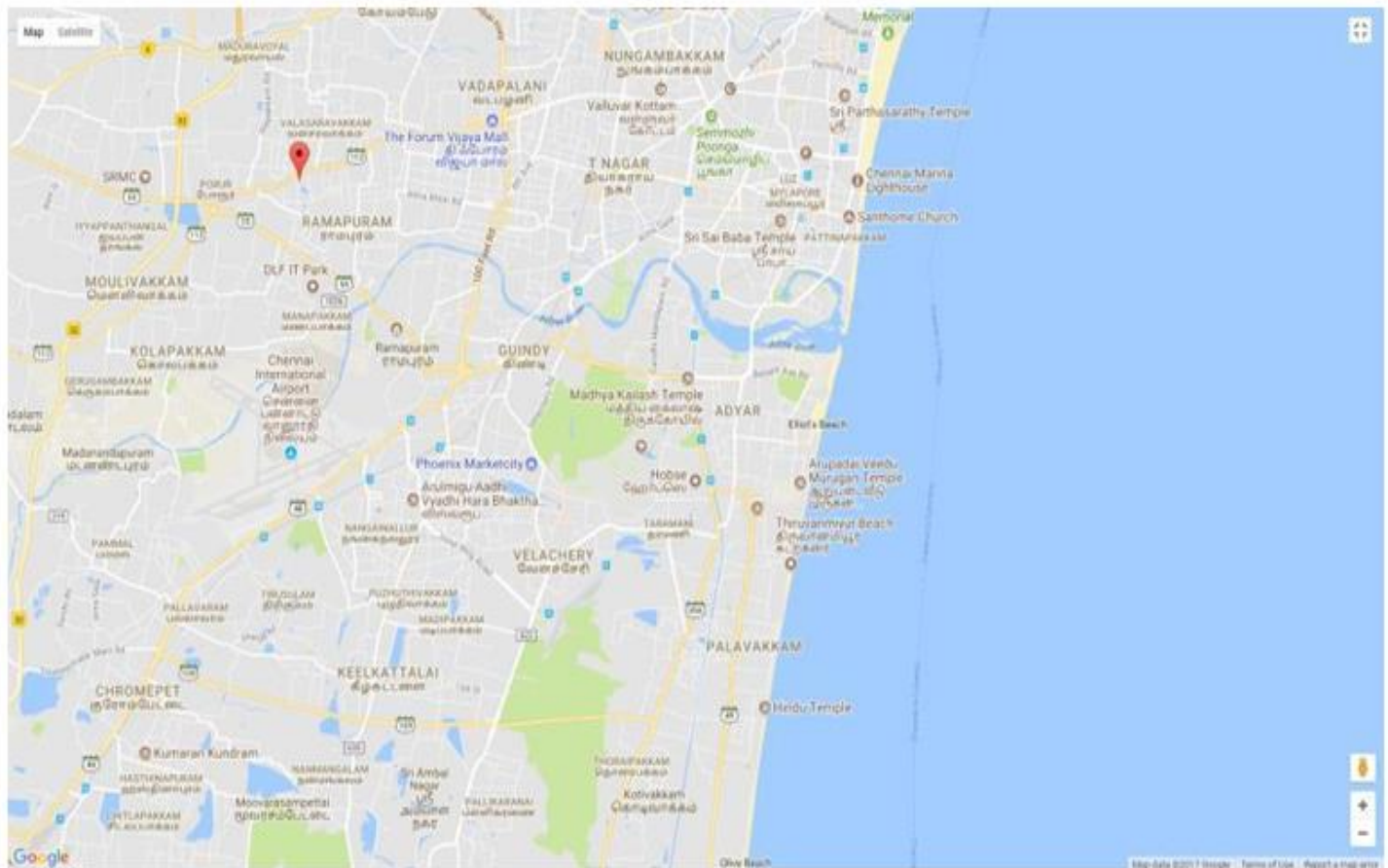
Fig VI: Voice Based AI Saying Accident Has Occurred in the Following Location

VI. CONCLUSION

At first, the research experience took me in several directions until getting acquainted with the variety of methods that can be employed within the current facial recognition technology. As explained throughout this report, Facial Recognition, Deep Learning, Neural Networks, TensorFlow was the preferred tool to dive into, as it provides the right abstraction from the details and presents a uniform API to the user. As a Computer Engineering major, I found myself deeply interested in swimming across this abstraction layer – where the requirements of this project meet. There is more to be done to achieve a more polished functionality in FACEDOX and I feel that leaving this report at hands of the faculty can assure that this goal is reached at some point by the joined efforts.

With FACEDOX the society can be kept safe by the use of modern technologies such as Artificial Intelligence and Machine Leaning.

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