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Iris Movement Detection using Facial Features Algorithms

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ABSTRACT: There are different reasons for which people need an artificial of locomotion such as a virtual keyboard. The number of people, who need to move around with the help of some article means, because of an illness. Moreover, implementing a controlling system in it enables them to move without the help of another person is very helpful. The idea of eye controls of great use to not only the future of natural input but more importantly the handicapped and disabled. Camera is capturing the image of eye movement. First detect pupil center position of eye. Then the different variation on pupil position get different command set for virtual keyboard. The signals pass the motor driver to interface with the virtual keyboard itself. The motor driver will control both speed and direction to enable the virtual keyboard to move forward, left, right and stop.

Keywords: Iris Movement, Feature Extraction, wrinkle features, confusion matrix,

I. INTRODUCTION

Nowadays personal computer systems are carrying a huge part in our everyday lives as they are used in areas such as work, education and enjoyment. What all these applications have in common is that the use of personal computers is mostly based on the input method via keyboard and mouse. While this is not a problem for a healthy individual, this may be an insurmountable bound for people with limited freedom of movement of their limbs. In these cases it would be preferable to use input methods which are based on more abilities of the region such as eye movements. To enable such substitute input methods a system was made which follows a low-price approach to control a mouse cursor on a computer system. The eye tracker is based on images recorded by a mutated webcam to acquire the eye movements. These eye movements are then graphed to a computer screen to position a mouse cursor accordingly. The movement of mouse by automatically adjusting the position of eye sight. Camera is used to capture the image of eye movement. In general, any digital image processing algorithm consists of three stages: input, processor and output. In the input stage image is captured by a camera. It sent to a particular system to focus on a pixel of image that's gives, its output as a processed image

II. RELATED WORKS

FER combines three inherent tasks: detecting face area, extracting and representing data of interest, and recognizing the expression. Machine Learning models of FER have two phases; a training phase and a testing phase. Two approaches have been adopted for data representation, viz., the feature-based geometric and the appearance-based approaches. During the implementation of the feature-based geometric approach, image processing techniques to extract vital facial points (i.e., corners of the lip, middle of the eye, the ends of the eyebrows, and the tip of the nose). The resulting coordinates are used to construct a facial geometry made of the extracted characteristics vectors. The appearance-based approach examines video frame by frame and generates an attribute vector using an image filter. Recent studies have added on more facial emotion, contempt, which makes interest seven (7)[11]. Facial Emotion Recognition is a typical classification problem that can be solved using several classification methods such as k-Nearest Neighbours (KNN), Decision Tree (DT), Learning Vector Quantization (LVQ), and multilayer Feed- forward Neural Network (MFFNN) [12].

In recent years ANNs such as Convolution Neural Network (CNN) and Deep CNN have been used for image classification with very high accuracies. ANNs are systems inspired by the brain's biological neural networks. They are made up of a collection of artificial neurons which are interconnected. Each neuron can send signals to another connected

neuron which can also process the signal received and transmit it after that. Neurons are arranged in layers, and each layer may perform a different type of transformation on the receiving input signal. Some ANNs are capable of Backpropagation which allows the data to flow backward in the network to adjust the network's effectiveness. Deep Learning (Deep Neural Network) is based on ANN.

III. PROPOSED METHODOLOGY

This paper provides an overview of the current state of AI applications in iris movement based on feature extraction algorithm.

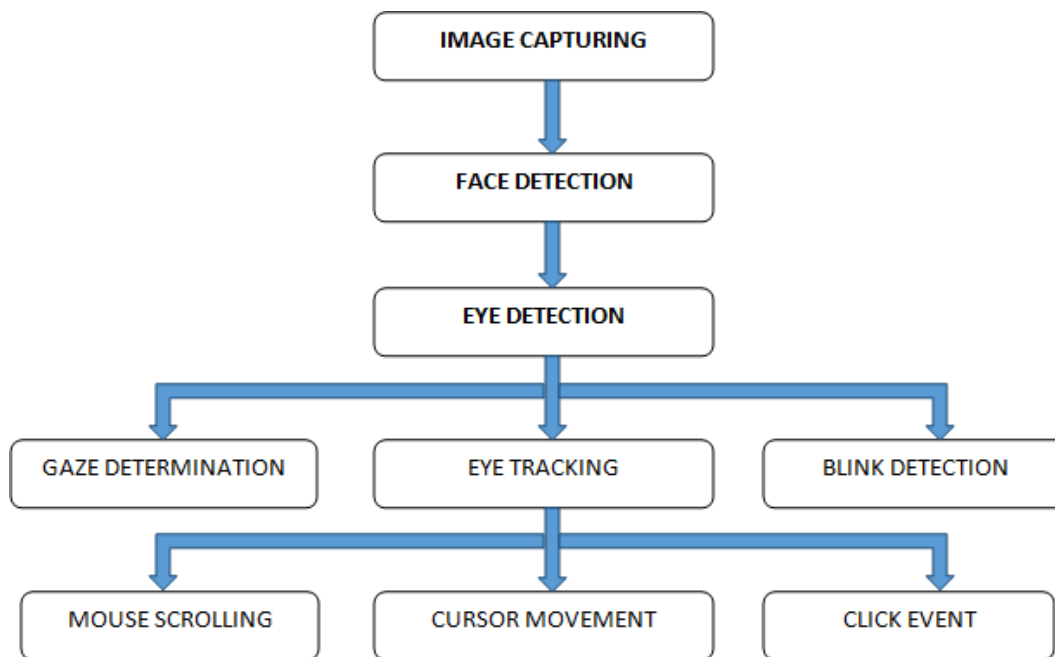


Fig-1 System Architecture

In recent years ANNs such as Convolution Neural Network (CNN) and Deep CNN have been used for image classification with very high accuracies. ANNs are systems inspired by the brain's biological neural networks. They are made up of a collection of artificial neurons which are interconnected. Each neuron can send signals to another connected neuron which can also process the signal received and transmit it after that. Neurons are arranged in layers, and each layer may perform a different type of transformation on the receiving input signal. Some ANNs are capable of Backpropagation which allows the data to flow backward in the network to adjust the network's effectiveness. Deep Learning (Deep Neural Network) is based on ANN. The term 'deep' is derived from the multiple layers in the network. The convolutional layers of CNNs extract feature from the input images for the other layers (i.e., pooling, dropout).

Convolutional Neural Networks (CNNs), also known as ConvNets, have significantly impacted computer vision tasks, leading to state-of-the-art results in image classification, object detection, and image generation. They are specialized artificial neural networks designed for structured grid data, primarily images. Below is a concise introduction to CNNs: Inspired by the Human Visual System: CNNs are inspired by the hierarchical and localized processing of visual information in the human brain. They utilize a layered hierarchical structure to effectively learn patterns and features from input images. Convolutional Layers: The fundamental components of CNNs are convolutional layers. These layers apply learnable filters or kernels to input images, detecting specific patterns or features. Convolution captures local relationships within the data.

IV. RESULT & DISCUSSION

Change the current working directory before starting the Python software, and then launch the Python software

by entering the commands in the terminal as shown in Figure 2. We obtain a frame window after typing the commands in the terminal, and the camera starts capturing the face that reads the input. When the user opens their lips, the input begins to be read, and if the user wants to move the cursor upward, the Anchor point should be moved to up.

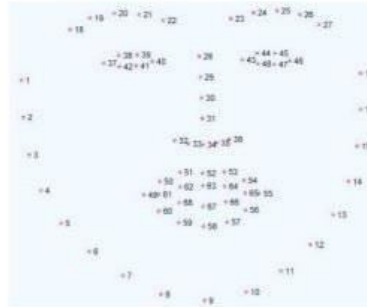


Fig-2 Facial Landmark points

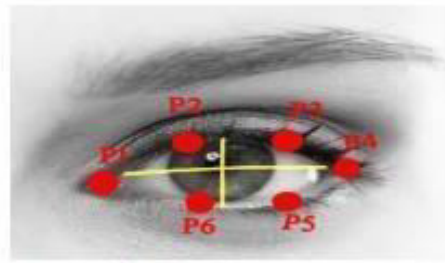


Fig-3 Eye Landmark points

Based on the study work done in real-time Eye Blink Detection utilizing Face Landmarks system, an equation can be derived that satisfies the relationship between all 16 facial co-ordinates known as eye aspect ratio and may be computed as follows:

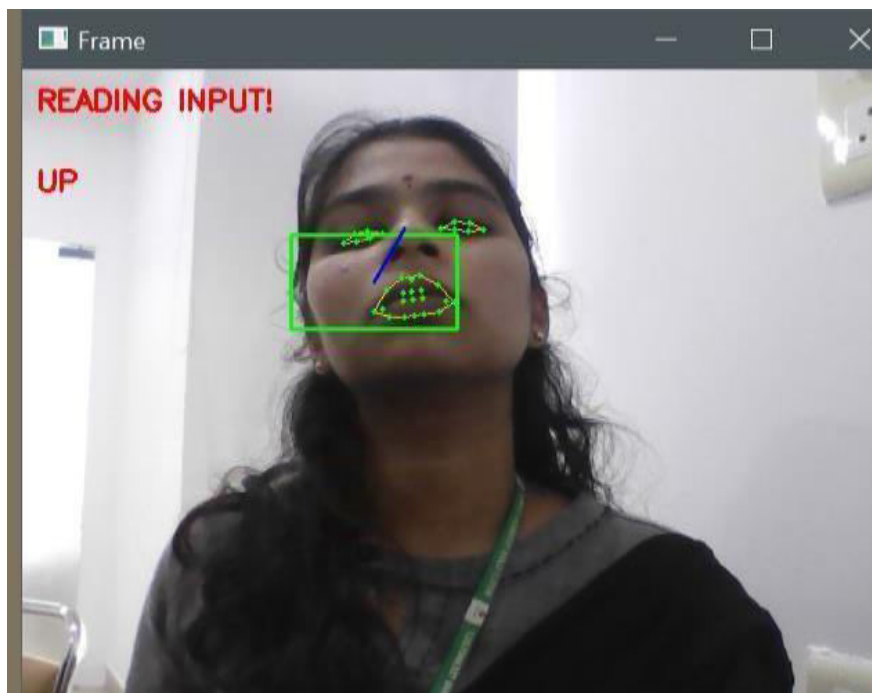


Fig-4 Sample results



Fig-5 Sample results

IV. CONCLUSION

In this paper, a Human Computer Interaction application is developed using concept of Eye Gaze Tracking. The main objective of testing the potential of eye gaze as a possible means of interaction and to develop an eye-gaze based interaction application using built-in camera available in computing devices is accomplished. Eye gaze tracking is a complex problem and there can be many solutions to address this problem. In this paper a computer vision algorithms based solution is implemented.

Accuracy for facial features extraction algorithms depend on image quality and lighting conditions. Algorithm performance drops down in poor lighting environment i.e. light coming from back side of user causing shadow, low light intensity on face. Algorithm accuracy deteriorates in lighting variant environments. Computer Vision algorithms are employed for features detection and they don't perform well in lighting environments discussed earlier.

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