Eye Tracking based Visualizations And Metrics Analysis For Individual Eye Movement Patterns

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Abstract- This project introduces new technologies used to communicate with people with severe neuro-locomotor impairment or motor speech impairment in people that may cause speech or voice impairment. The direction of the eyes is determined by the student's position on the image analysis. The proposed technology ensures the communication and movement of the patient's eye reader. Coding and recording of comments using tracking eye movements will be done using Python, OpenCV, and Kera's (Database). Development based on eye movement tracking using Haar Cascade algorithms and Eye Aspect Ratio based on detecting and detecting eye movements. This idea can be used to share complete information such as word formation. We build secure communication between users and caregivers. The simple user interface is designed to allow people with emergency information to be sent to caregivers using SMTP (simple email transfer protocol). At the end of the communication the system will be able to correctly display messages written in Morse and will generate a voice alert. The new technology is useful for patients who can communicate verbally, visually or in writing and is based on their ability to control eye movements, which often occur in people with severe locomotor impairment.

I. INTRODUCTION

The eye is the most remarkable feature used in communication. Eye tracking is a process of identifying a person's gaze. Digital images are analyzed and used in image processing. This procedure is a popular eye tracking solution. The physically disabled community needs inexpensive technology to connect with others. Learning the communication resources of such a community is a major challenge. Many different approaches are designed for written communication and oral communication. People with disabilities who wish to have eye contact and even other body parts are disabled. So eye tracking becomes very important. Eye tracking is the process by which the iris (center of the eye) is detected to interpret where the user is staring. This can be done using image processing. Many ubiquitous applications are designed to track human computer interactions. The main disadvantage of such programs is the need for expensive and dedicated hardware. Eye tracking systems often use sensors and infrared lamps that are harmful to humans. Some programs are based on ECG / EEG signals, but they are less accurate and easier to use. We propose a system that eliminates this evil completely, as we focus on processing the image in room light. The only hardware needed for the user's camera. There is no additional light beam of any kind directed to the user's eye. The system uses imaging technology where eye movements are captured by the camera and processed. Eye movements are found in successive images. The image is provided with algorithms, to detect the center of the eye and another to detect the blink of an eye. The estimated results are then processed to produce a voice command and sent in an email notification to caregivers using the SMTP protocol. The camera captures user images at the same times and processes with respect to the targeted data system. The student's institutional approach to corneal reflection became a key factor in finding people with different visual cues, although research technology for eye tracking has been around for a very long duration.

OBJECTIVE

- The main purpose of this project is to track eye movements using a haar cascade algorithm and based on eye movements instructions will be executed.
- Instant-based commands will be executed in voice format and send an email to the caregiver using the SMTP protocol.
- This program is very useful in solving the communication problems of people with speech impairments.

LITERATURE SURVEY

The outcomes are vital to decide gaze or studying patterns of the user. Personal preferences can be examined all through purchasing or analyzing brochures for activity corporations to make extra centered merchandise or classified ads primarily based on the accumulated purchaser data. Based on the evaluation of the eye movement, bodily kingdom of a driver can be assessed to warn drowsy drivers. [1]

This illustrates that members desired to focal point interest on reference snap shots and the check pics in contrast to different DSS features. When attending to reference images, individuals spent an equal quantity of time attending to the first-rate advice reference pictures in circumstance DSS4 and DSS5 and spent considerably much less time attending to the 2nd satisfactory reference image. Visit depend is additionally a pretty pertinent eye monitoring metric when inspecting the DSS features. Visit count number measures which aspects yield repeated interest and persevering with evaluation. [2]

Evidence from eye monitoring bolsters this assertion, considering screeners normally have longer gaze length when they appear at attributes of increased significance based totally on the screeners' dreams in contrast to facets that may additionally be extra visually salient. [3]

The domestic automation machine will manage fan, mild and different domestic appliances. The eye blink sign acts as enter in actual time and ship suitable manage sign to the controller. The controller takes splendid selection primarily based on a range of units of inputs and the output of the controller is used to manage the appliances. [4]

Feature Selection is a necessary section of this project. The aspects such as face and eyes detected must be correct and actual time. The threat of acquiring false detection such as detecting chin as eye is very excessive in case of some detection technique. This can definitely have an effect on the output of the system. In this task Face and Eye facets are detected the usage of Facial Landmark detection [5].

Eye moves are the foundation to get greater facts about an individual most lookup papers check out intentions, cognitive states workload and interest of a person. The eye actions are used to generate greater complicated aspects for desktop studying to classify or regress the preferred facts this understanding about an individual is necessary in a couple of fields, like automatic using and for measuring the work load of a surgeon.[6]

II. EXISTING METHOD & PROPOSED METHOD

EXISTING METHOD:

In this present application a thoroughly developed neural convolutional community has been developed, based totally on the UNET framework, which solves the trouble of discovery and matching in the face of false and non-existent ideas. Images of human eyes have been amassed in digital truth headsets the usage of a binocular eye monitoring module that comprises 5 infrared mild sources for every eye. In this system of diagnosing and matching corneal manifestations are created with a Virtual Reality (VR) headset, the use of an eye monitoring module developed by means of Pupil Labs. In this module, a diagrams(inside headset) factors to every eye, and 5 infrared mild sources illuminate every eye area. To educate the network, labels of the identical measurement as the enter are generated. Each pixel in the label pics is labeled as 1 or 0, relying on the pixel's reflection of the cornea. Since the labels are code zero and 1's, we additionally refer to them as binary masks.

DISADVANTAGES

• In the modern-day eye monitoring machine primarily based on infrared mild sources per eye, this device solely tracks the eye. No guidelines will be generated to talk with human beings with speech problems.

PROPOSED SYSTEM

• The proposed gadget for neuro-locomotor impairment or speech impairment in human beings to speak based totally on eye motion the usage of the haar cascade algorithm and the Eye Aspect ratio (EAR).
• In this venture Face and Eye elements are got the use of a haar cascade algorithm used to music eye moves (middle student).
• To decide the reader's eye motion of the factor the consumer is searching at, the extracted window pixels are used as inserts in the haar cascade separator.
• After acquiring an eye reader, the use of a haar cascade algorithm, Eye Aspect Ratio (EAR) is calculated electronically EAR is used as a measure of eye opening condition. Here the eye is represented by way of four (x, y) -coordinates, beginning at the left nook of the eye and rotating clockwise.
• When the eyes are open THE EAR is continually a steady price and zero when the eyes are closed. The charge right now falls to zero when the eyes are closed.
• After following an eye-tracking function primarily based on Eye Aspect Ratio, If left eye motion capability diet, proper eye motion capacity lavatory and blinking ability emergency, remedy guidelines will be generated the usage of a py synthesizer. The voice command will then be dispatched to the caregiver in a textual content message structure the usage of the SMTP (Simple mail switch protocol) protocol.

ADVANTAGES

- The essential benefit of our machine is that learner-based voice instructions will be accomplished for positive communication.
- Then the voice command that you ship additionally carries a textual content structure alert to the caregiver the usage of the SMTP protocol.
- Voice-based alert and eye-based e-mail signals are very beneficial and convenient to talk with humans with speech problems.
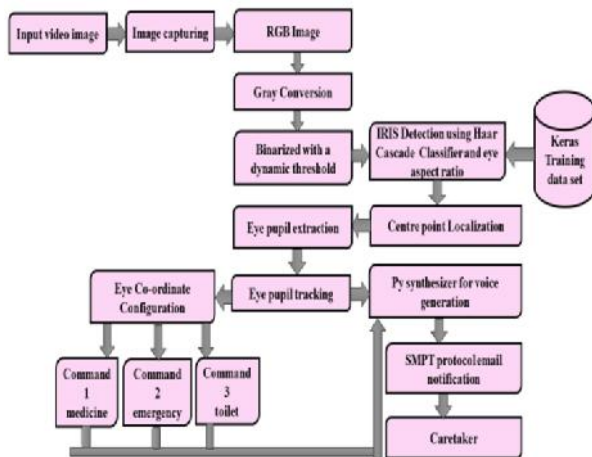
III. ARCHITECTURE DESIGN

Fig.no:1 Architecture Design

IV. MODULES

There are six modules in this system:
- Input video module.
- Conversion module.
- Face region detection module.
- Database module.
- Eyes pupil movement detection module.
- Voice and mail alert module.

STANDARD DESCRIPTION

Input video module:

In this module, the real-time camera is used to get input image, as the camera will capture live video streaming and convert the video into image frames by extracting the images from video.

Conversion module:

The extraction of the input RGB image can be converted into gray image by using gray scale process. Then

the gray scale image can be binaries based on the threshold value.

Face region detection module:

This module uses haar cascade classifier to detect and locate face region in the input face images.

Database module:

Here, the keras dataset can be used to pre trained model of eye images and stored in this database system. The eye pupil can be tracked by using haar cascade algorithm by comparing this keras training dataset.

Eye pupil movement detection module:

In this module, the eye pupil movement of the patient will be detected by determining the eyes aspect ratio. Eyes aspect ratio is calculated and by estimating the changes in the eye pupil position of the patient, then the haar cascade classifier will detect the eye pupil movement based on the eye pupil movements the commands will be generated.

Voice and mail alert module:

The eye pupil movement is detected then based on the eye movement the commands (food, medicine, emergency, and toilet) will be generated in the voice format by using py synthesizer. The voice commands also send has text message to caretaker by using SMTP protocol. In this module voice and mail alert to caretaker is very useful to communicating with this speech disorder people.

V. SYSTEM SOFTWARE

Python IDLE

IDLE is Python's Integrated Development and Learning atmosphere. Permits editors to simply write Python code. Like Python Shell, IDLE is wont to build one statement and build, modify, and use Python scripts.

IDLE provides a totally integrated text editor to make Python scripts that embrace options like syntax light, auto-completion, and intelligent retrieval. It additionally encompasses a programmer with traction options and breakpoint. This makes debugging easier.

Collaborative Interpreter

The most effective place to check Python code could be a cooperative interpreter, additionally referred to as a shell. The shell could be a basic Read-Eval-Print Loop (REPL). It reads a Python statement, evaluates the result of that statement, and prints the result on the screen. Then, she goes back and reads consequent statement.

The Python shell is a superb place to check captions for tiny codes. You'll access it through a terminal or program line application on your machine. You'll change your progress with Python IDLE, which is able to now begin the Python shell after you open it.

PYTHON LANGUAGE

Python could be a dynamic, instructive language (integrated with computer memory unit code). There is not any variety of declarations, restrictions, functions, or ASCII text file modes. This makes the code shorter and additional versatile, and you lose the temporal order of the ASCII text file time. Python tracks all kinds of values during operation and flags a code that doesn't add up because it works.

• Python will be used on a server to form internet applications.
• Python will be used next to package to form work flow.
• Python will connect with internet systems. It also can scan and convert files.
• Python will be accustomed handle huge knowledge and perform advanced calculations.
• Python will be used for quicker prototyping, or package development prepared for production.
• Python is employed for internet development, AI, machine learning, applications, mobile application development, and video games. An acquaintance of the first rudiment programming language, Python could be a high-quality, powerful written language developed by Guido Van Rossum within the early Eighties.
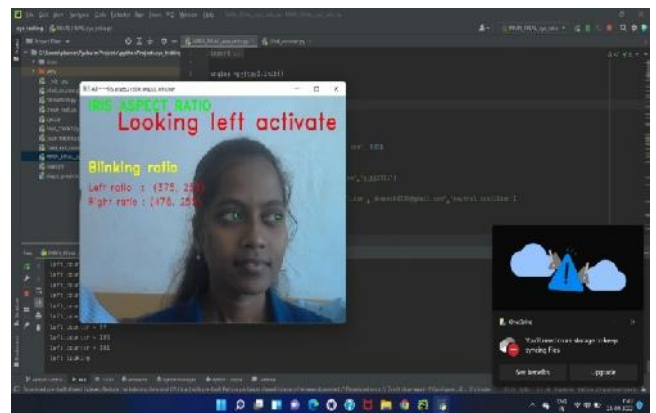
VI. RESULTS

The results section is where you report the findings of your study based totally upon the methodology applied to gather data. Confirm commandsdetails regarding your data gathering and interpretation.
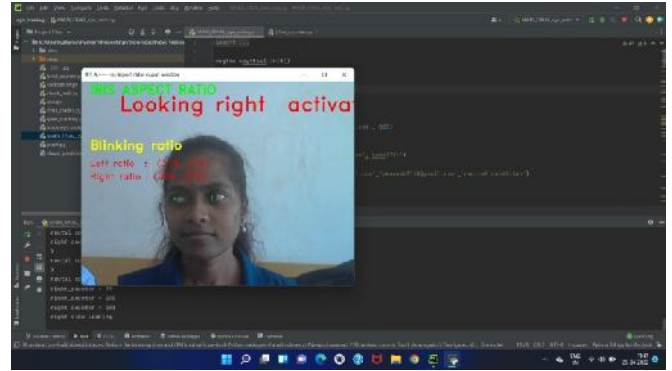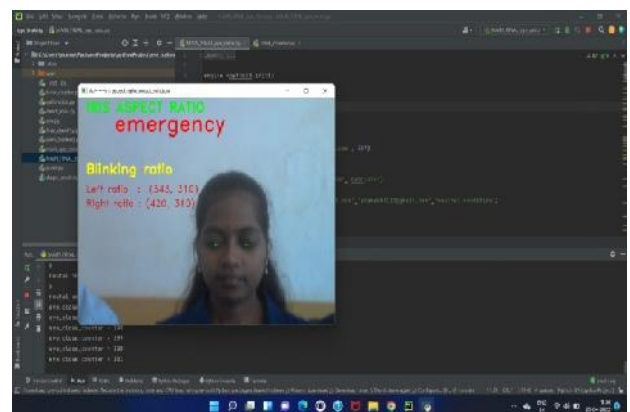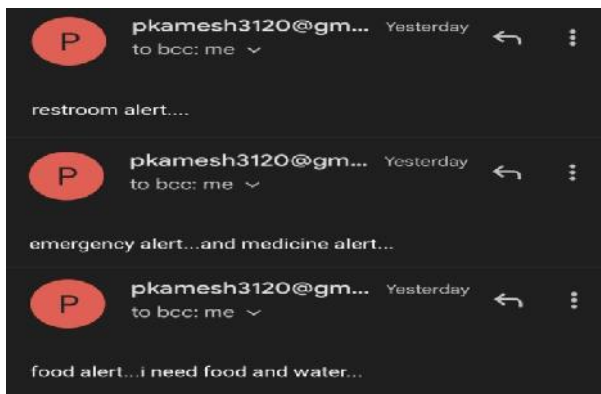

Fig no 6.1 Looking right side activate
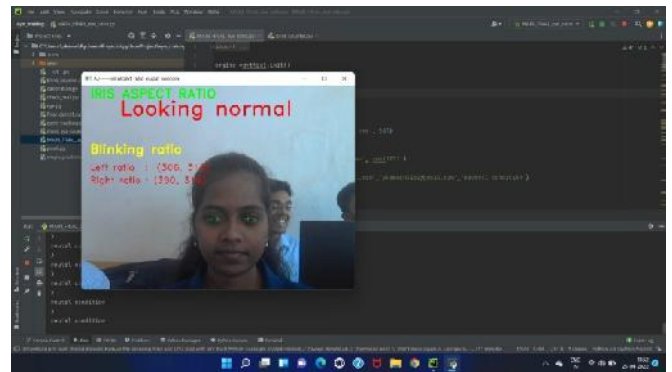
Fig no 6.2 Looking normal

Fig no 6.3 Looking left side activate

Fig no 6.4Emergency alert

Fig no 6.5 Mail alert

VII. CONCLUSION

This project introduced the production of eye-based instructional instructions with a voice warning and an e-mail warning for an effective communication system for speech-impaired patients. It is a cheap device for communicating with the system through eye movements. This project is based on the detection of eye movement signals by calculating the eye aspect ratio. For eye contact, Haar cascade separators are used that give the most accurate result. A major challenge involved in implementing this program is the development of real-time eye tracking system. Using the links found in the haar cascade classifier eye tracking was able to use very accurately and real-time processing was also easy.

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