

Eye Blink Based Typing Software for Paralyzed Patient

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ABSTRACT—In the world lot of people have physical disabilities. Like many people have paralysis, So these people are not communicate with other people well. The people had accident and are some trauma those people are also not communicate to other people. And also it is impossible for paralyzed people to communicate with people. It also leads to weakness of muscles with respect to hand, feet or voice. Because of this, the patient cannot perform his voluntary actions and it is very difficult for patients to express is needs. So in the project system permits various physically handicapped patients to convert their intent to text using their eye-blink in order to use a computing system. However, people under paralysis can use their eyes. A natural motion of the eye is an eye-blink. This eye-blink can be efficiently used to communicate information.

Keywords—Paralysis, Eye-Blink, Physical Disabilities, Patients, Haar Cascades, Blink To Text.

I. INTRODUCTION

In the community, lot of people are disable completely. Some people are physically disabled due to paralysis and some people are having accident. This time the movement is impossible for disabled people to communicate with others. These people are also dependent on other people for day by day activity and cannot contribute to the community. These people may not be able to move their arms or legs but they can certainly think. If their ability to think and make decisions can be utilized in decision making situations. One of the major challenges of involving these people in such processes is making a low cost device that is affordable by the mass, made with locally available components and also interprets the person's choice accurately. Humans obtain

considerable information through their eyes. For eye typing, the Internet and other digital and information technologies continue to enhance our experience as humans, providing new ways to communicate with friends, colleagues, and loved [13] ones. These technologies have tremendous potential for disabled persons whose conditions hinder their ability to communicate and threaten isolation.

The software platform converts eye blinks to text. Every feature of the software can be controlled by eye movement. Thus, the software can be independently operated by paralyzed people. patients can record messages, recite those messages aloud, and send the messages to others. The software uses computer vision and Haar cascades to detect eye blinking and convert the motion into text. The program uses language modelling to predict the next words that the user might blink. The software can be easily customized for each patient as well. BlinkToText is free open source software.

II. LITERATURE SURVEY

1. A report by Brijil Chambayil, Rajesh Singla, R. Jha was published in 2010 named as "Virtual keyboard BCI using Eye blinks in EEG" A Brain Computer Interface (BCI) provides a new communication channel between human brain and [10] the computer. This paper is concentrated on developing a BCI system, a Virtual Keyboard using the LabVIEW platform.

2. A report by Lamiya Rahman, Jannatul Adan, Quazi Mutasim Billah, Md Kamrul Islam was published in 2019 named as "A low cost Human Computer Interface for Disabled People based on Eye Blink detection using Brain Signal" As these people are physically disable, comprehending their electroencephalogram (EEG) signal for blink

detection can be an effective solution for translating their choices. EEG-based controlling devices are mobile and can serve as powerful aids for severely disabled people in their daily life.

3. A report by Md. Talal Bin Noman, Md. Atiqur Rahman Ahad was published in 2018 named as “Mobile-Based Eye-Blink Detection Performance Analysis on Android Platform” The paper presents a vision-based system for detection of long voluntary eye blinks and interpretation of blink patterns for communication between man and machine.

4. A report by Ashtiani, B., & MacKenzie, I. S. was published in 2010 named as “An Improved Text Entry Method Using Eye Blinks” For eye typing, the Internet and other digital and information technologies continue to enhance our experience as humans, providing new ways to communicate with friends, colleagues, and loved ones.

III. PROPOSED SYSTEM

In proposed system, develop the system using Python and OpenCV library. Use the camera

for capturing the face, if image will get then image preprocessing techniques are used. Using haar cascade features for detecting face. Once detect the face then it will detect the eye and eye pupil. Then it will classify blinking of the eye. Then it show the result.

Advantages of Proposed System:

1. Big benefit of disabled people to communicate with other people.
2. Paralyzed people also can use this system.

Methodology

This project is developed using python and web technology. Capturing the image using web camera. Then used the image preprocessing techniques like grey scale conversion, edge detection etc. after that using haar cascade fetures detect the face and eye then classify eye blink using classification methods. flask based application in which it shows face of person in camera. Then it gives the proposed result. These all purpose are using python as backend which is flask based application, Mysql is database and for frontend html, css, javascript etc.

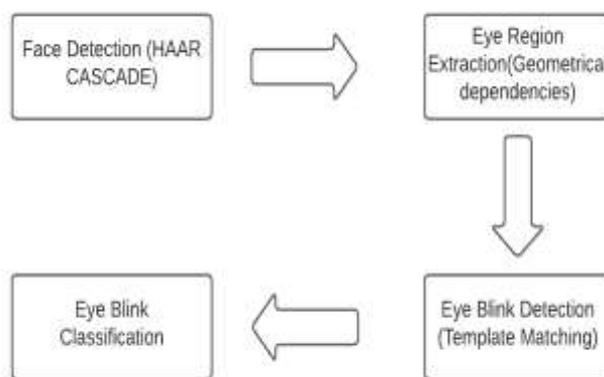


Fig 1: Block Diagram

IV. DESIGN AND IMPLEMENTATION

A. Technology

Python:

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python

supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

Often, programmers fall in love with Python because of the increased productivity it provides. Since there is no compilation step, the edit-test-debug cycle is incredibly fast. Debugging Python programs is easy: a bug or bad input will never cause a segmentation fault. Instead, when the interpreter discovers an error, it raises an exception.

When the program doesn't catch the exception, the interpreter prints a stack trace. A source level debugger allows inspection of local and global variables, evaluation of arbitrary expressions, setting breakpoints, stepping through the code a line at a time, and so on. The debugger is written in Python itself, testifying to Python's introspective power. On the other hand, often the quickest way to debug a program is to add a few print statements to the source: the fast edit-test-debug cycle makes this simple approach very effective.

MySQL:

MySQL is well known as world's most widely used open-source database (back-end). It is most supportive database for PHP as PHP-MySQL is most frequently used open-source scripting database pair. The user-interface which WAMP, LAMP and XAMPP servers provide for MySQL is easiest and reduces the work to a large extent.

B. Algorithms

i) Haar Cascade Classifier –

In proposed system, used Haar Cascade Classifier(HAAR CC) for [14] facial recognition.Object detection using Haar feature-based cascade classifiers is an effective object detection method proposed by Paul Viola and Michael Jones in their paper Rapid ObjectDetection using a Boosted Cascade of Simple Features in 2001.This is basically a machine learning based approach where a cascade function is trained from a lot of images both positive and negative. In the proposed method used Haar Cascade Classifier(HAAR CC) for eye detection. In order to detect the eye for that have also imported the haarcascade_eye.xml file.Once get the x-coordinate, y-coordinate, width (w) and height(h) of the detected feature of face using the detectMultiScale function, create 2 numpy array.The reason created this is to pass this gray channel version to the detectMultiScale function while extracting the features (ex,ey) of the eyes.Once extracted the features of the eye (ex,ey) it will loop through them and create a oval by passing the numpy array. The reason behind passing roi_color and not roi_gray is roi_color is the array for the actual RGB(Red Green Blue)scale image whereas roi_gray is the gray scale of the image which used in code for faster processing while extracting the dimensions/coordinates of the image and then use those dimensions to pass it in the original array which is roi_color in this case. The classifier outputs '1' when it catches an object and '0' otherwise.The necessary applications for implementing a Haar classifier are included in

OpenCV and these can be used to train a classifier for detecting objects in animage.

ii) EAR (Eye Aspect Ratio) –

There are various ways to detect eyes in a video. Different methods were researched, all of which have their own pros and cons. The proposed system uses a facial training set to understand where certain points exist on facial structures. If they exist, the program plots the same points on regions of interest in other images In Real Time Eye Blinking Using Facial Landmark, Soukupová and Čech derive an equation that represents the Eye Aspect Ratio. The Eye Aspect Ratio is an estimate of the eye opening state..For eye blinks need to pay attention to points 37-46, the points that describe the eyes.The EAR is mostly consistent when an eye is open and is getting close to zero while closing an eye. The proposed system can determine if a person's eyes are closed if the Eye Aspect Ratio falls below a certain threshold.Frame differencing is another blink detection technique that are used in proposed system. Essentially, a proposed system compares subsequent video frames to determine if there was any movement in a select eye region.The proposed system then analyses this region of interest for eyes using similar detection tools. The proposed system places a bounding box on any regions of interest.The proposed system then compares the difference between eye regions of interests in subsequent frames. It generally does not grip that low value of the EAR means that a person is blinking. A low value of the EAR occurs when a person closes his/her eyes intentionally for a longer time.

V. CONCLUSION

Eye Blink Based Typing Software for Paralyzed Patientcan be a helpful tool for those who cannot use the keyboard by their hands due to a number of reasons. It can be used by the paralyzed and differently able people to effectively communicate with the outside world through the use of this software.The eye blink based typing system is developed using OpenCV library [12] for disabled people. For thisOpenCv library and Haar cascade classifier is used. In this project, First detected the face from camera and then detects the eye region and then eye blink and classify the eye blinkkng. For developing this project used python.

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