EFFICIENT EYE BLINK CHECKING AND SHOCKING SYSTEM

JOEL JOSE, P.SAI.PAVAN VARMA, K.SATYA TEJA, V.AKILA
STUDENT, STUDENT, STUDENT, ASSISTANT PROFESSOR
COMPUTER SCIENCE AND ENGINEERING
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY, CHENNAI, INDIA.

Abstract : Nowadays Facial paralysis is a common disorder which causes people to lose their facial motion due to nerve damage. This may occur on one or both sides of the face, which has significant impacts on the quality of life of the individual. This is even worse than eye loss and even blindness can be caused by facial paralysis because it is difficult to close the eyelid completely on the affected face, which leaves the eye swollen and filled of debris. The most usual form of facial paralysis is known as Bell's palsy, which affects 40,000 people every year in US itself where the main symptom is muscle stiffness on a particular portion of the face. Here we are coming with a proposed eye blink detection tool based on raspberry pi for the machine consumer. Raspberry pi is a device that contains one USB camera and this camera is used to monitor the person's eye blink count. Eye Blink's clear and simple concept is that it will monitor the normal side of the face with a camera and trigger the paralyzed side so the blink on both sides of the face will become symmetrical. Haar cascade the algorithm used to detect particularly eye blink count of a user is the Haar Cascade algorithm. When the person will not close the eye continuously, then the controller will check and activate the small shocking system in the user's face. This shocking system contains a small automatic stimulation circuits. This circuit provides an electric impulse to the user's face,thereby causing the user to blink his eye.

I.INTRODUCTION

Facial disability is a common condition due to nerve damage that causes people to lose their facial shapes. It can happen on one portion of the face, or on both.

Common causes of facial palsy include:

- Infection of the facial nerve, or inflammation
- Face injury
- Tumor in the head
- Stroke
- Facial paralysis may occur spontaneously (in the case of Bell's palsy, for example) or gradually over months (for a tumour in either the head or neck). The paralysis will last for a short or prolonged duration depending on the cause.

1.1Causes:

Bell's palsy: According to National Center for Metabolic abnormalities and Paralysis, Bell's palsy is by far the most severe form of neurological issues. Around 40,000 People experience involuntary facial paralysis every year because of Bell's palsy. This condition causes inflammation of the facial nerves that typically causes the muscles to collapse on every part of the face. Nobody knows precisely why Bell's paralysis is happening. It may be linked to facial nervous viral infection. The great news is that, after about six months, most of the person who suffers from Bell’s palsy recovers fully.

1.1.1 Stroke:

Stroke is a more severe cause of facial paralysis. Faial paralysis happens during a stroke through brain damage to the nerves that regulate the muscles in the face. Brain cell damage is caused by either lack of oxygen or undue pressure on the brain cells caused by bleeding, depending on the type of stroke involved. In any scenario, brain cells can be put to death within minutes.

1.1.2 Other causes:

Any sources of face issues or other defects are:

- A facial or skull fracture
- Head or neck tumour
- Inflammation of the median ear or other damage to the ear
- LYME disease, a infectious infection spread to humans through a tick bite

- Ramsay – Hunt syndrome. This is a viral deactivation that induces autoimmune diseases in the facial nerve, including muscular dystrophy, which affects the spinal cord and affects the nervous system.

Temporary facial paralysis may cause in some babies during birth. Nevertheless, with this case of damage, 90 per cent of babies survive without treatment. And for other congenital syndromes like Mobius syndrome and Melkersson-Rosenthal syndrome, you can also be facially paralyzed at birth.

1.2 SYMPTOMS:

- Bell's palsy
- While facial paralysis is often upsetting, this does not always mean that you have a stroke. Bell's palsy signs may include a type of facial paralysis on one side (rarely on both sides of the affected face)loss of blinking function on the affected side
- reduced weeping
- Mouth falling to the leg that is affected
- Altered taste sense
- Slurred sentences
- Doodling
- Eye ache or back pain.
- On the affected hand hearing hyper sensitivity.
- Trouble Stroke

Individuals with a stroke also experience the same symptoms as in Bell's palsy. A stroke, though, produces usually a few new signs that are not consistent with Bell's palsy. The following symptoms could indicate a stroke, along with the symptoms of Bell's palsy:

- Changes of Consciousness
- Confusion increases
- Bubbling
- Lower level of coordination
- Capture
- Vision moves
- One part of your body, arms or legs are low

People who suffer a stroke will always be able to smile and motion their foreheads to the affected side most of the time. For Bell's palsy that is not the case. Because it is often difficult to differentiate between a stroke and other types of facial paralysis, should you experience facial paralysis it is a wise idea to get your loved one to a hospital immediately.

II.LITERATURE SURVEY

2.1 Title: Driver Drowsiness Detection Using Eye Blink Monitor

Description: Eye-blink sensors are used to prevent injuries due to driver drowsiness. It is assumed that the driver will wear the eye blink sensor brace during the driving phase and that blink will have to be for a few seconds to detect drowsiness. Any sudden changes in steering motion lead to reduced axle velocity. The level of the oscillation detector may be varied, and action may be taken as necessary. The result is that if the driver falls asleep the vibrator attached to the eye blink sensor frame vibrates and the alert messages are still displayed on the LCD. The axle is slowed or halted depending on the situation.

2.2 Title: Prediction of diseases based on Retinal images using classification of the neural network.

Description: Eyes used to assess someone's health. There are many diseases in humans, such as vascular diseases, which leave telltale marks within human eye retina. The image of the retina will be taken compared with a camera now every day with digital imaging technology is abundantly advanced within the computer analysis technology of the retinal images used to detect the effects of diseases such as cardiovascular diseases on the human body. A retinal image offers details on what will happen within a human's body.

2.3 Title: Disease Prediction Based on Retinal Images using Deep Neural Networks

Description: Methods of image recognition and perception are becoming highly important in all areas of medical science as it is beneficial to understand visual signals. The retinal arteries are primarily impaired by various diseases including diabetes, hypertension, and artery disease. Blood cells at the retina display differences in the blood vessels of certain areas of the body, such as the heart, brain, kidney, etc. The eye's veins are broken down into two types: arteries & veins. Dividing the vessels into arteries & veins first. CRAE & CRVE, which is associated with stroke & heart disease, checks the main arteries & veins is more important for the diagnosis of multiple diseases.

2.4 Title: A Study on Retinal Disease Classification and Filtration Approaches

Description: Image Processing has significance for disease identification in medical imaging. These approaches to defining and classifying disease are specific to human organ and picture type. One such form of illness requires diagnosis of the retinal condition such as recognition of glaucoma or diabetic detection. The paper presented a analysis of disease detection methods, such as SVM, DCT, HMM and PCA strategies. Article also specified the image analysis processes that are used to filter the diagnostic picture as well as to segment the disease area.

2.5 Title: Diagnosis of diabetic retinopathy using machine learning classification algorithm

Description: Diabetic Retinopathy is a human eye condition that causes damage to the retina of the eye and can eventually lead to full blindness. It is important to diagnose early stage diabetic retinopathy to prevent complete blindness. Few clinical tests can be used to diagnose diabetic retinopathy, such as visual acuity check, dilation of the eye, tomography of optical accuracy, but they are time consuming and even impact patients. This study paper focuses on disease presence judgments by applying classification algorithms for machine learning to features extracted from the results of various retinoic image process, such as optical disk diameter, lesion-specific (microaneurysms, exudates), image standard (pre-screening, AM / FM, accuracy assessment). The decisions were made using an alternating decision tree, AdaBoost, Naive Bayes, Random Wood, and SVM to determine the presence of diabetic retinopathy.Y

III.EXISTING SYSTEM

The working is planned and implemented in this current program based on I Blink, with a set of smarts goggles which provide protection of eye for patients who are facially paralyzed. We have also proposed eye movement to be detected that is based on the SVM architecture used in the context of Machine Learning. This helps us to recognize asymmetric eye movements of a patient under various light conditions. The eye movements are recorded by the camera module. This current device has pre trained data sets used to track eye movement.

3.1 DISADVANTAGES:

- Using trained data set for checking eye movement.
- If any abnormal movements of the eye are not trained in the data set, the system will not stimulate an electric pulse.
- Accuracy depends on the atmosphere.

IV. PROPOSED SYSTEM

In the proposed system, raspberry pi is used to detect eye blinking counting. This system uses a semi Supervised Cascade Algorithm for checking eye movement and also the eye count. The main aspect of the Cascade Classifier methodology is to use a basis classifier to maximize function space by either applying the prediction class or probability class distribution of the initial results. If the person is not blinking, the eye system will stimulate the electric pulse in the user's face.

4.1 BLOCK DIAGRAM :

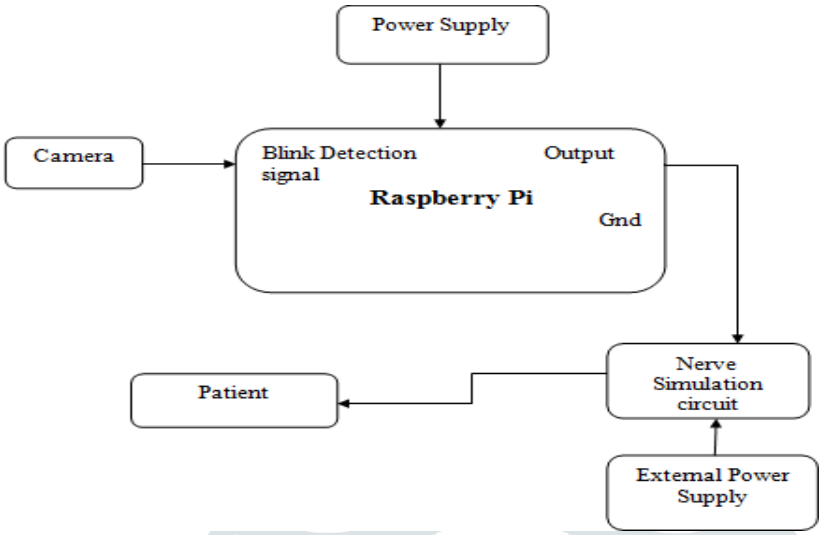

Fig 1: Block diagram includes all the components used in the system

4.1.1 Description of block diagram:

The diagram above includes raspberry pi, USB camera, shocking device, and power unit. The USB camera connects to the raspberry pi USB port. The shocking machine is connected with a raspberry pi GPIO pin. The Power Unit provides system control. Cascade algorithm is used for detecting the user's eye count.

4.2 SYSTEM REQUIREMENTS :

Hardware Requirements:

- USB camera
- Raspberry pi
- Electric signal stimulating circuit
- Power Supply

Software Requirements:

- Python language

4.3 ALGORITHMS USED:

1. HAAR CASCADE(HCC) Algorithm

HAAR Cascade is a machine learning algorithm used to detect artifacts in a picture or video.

The algorithm has four stages:

- HCC Feature Selection
- Creating Integral Pictures
- Ad boost Training
- CASCADE Classifiers

It is well for being able to detect face and body parts in an image but can be trained to recognize nearly any object. As an example, let's take face detection. Initially, to train the classifier, the algorithm requires a lot of positive facial images and negative images without facets. Then we need to remove from the functionality. Collecting the Haar Features is the first step. A haar function in a location recognition frame takes into account neighboring rectangular areas, lists the segment intensities in each zone and tracks the variations.

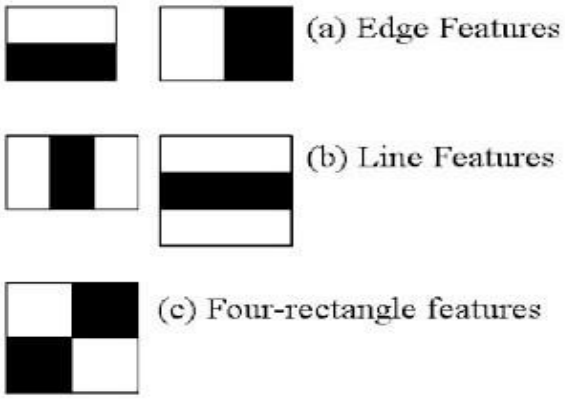

Fig 2: Different features that are used in the system

Essential pictures are used to make process super fast. The algorithm also creates a "strong" classifier as a linear combination of simple weighted "weak" classifiers. A frame of the target size is placed over the input image during the detection process, and the face and haar features are measured for each segment. This difference is then compared to a threshold known, which distinguishes non-objects from objects. Since every haar feature is a "weak classifier", in order to define an object with sufficient accuracy, a large number of haar features are required and are therefore grouped into cascade The cascade classification system includes of a series of stages, in which each stage is a weak learner ensemble. The weak learners are basic classifiers which are called decision stumps. A Boosting technique is used to train each level. Boosting offers the chance to train a highly accurate classifier by taking a weighted average of the decisions made by the bad learner.

4.4 ARCHITECTURE DIAGRAM :

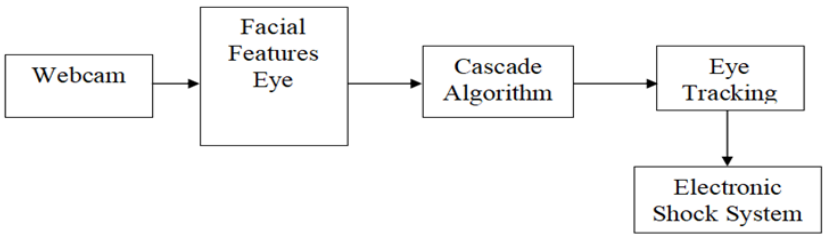

Fig 3:Architectural diagram for eye blink checking and shocking system

4.5 FLOW DIAGRAM :

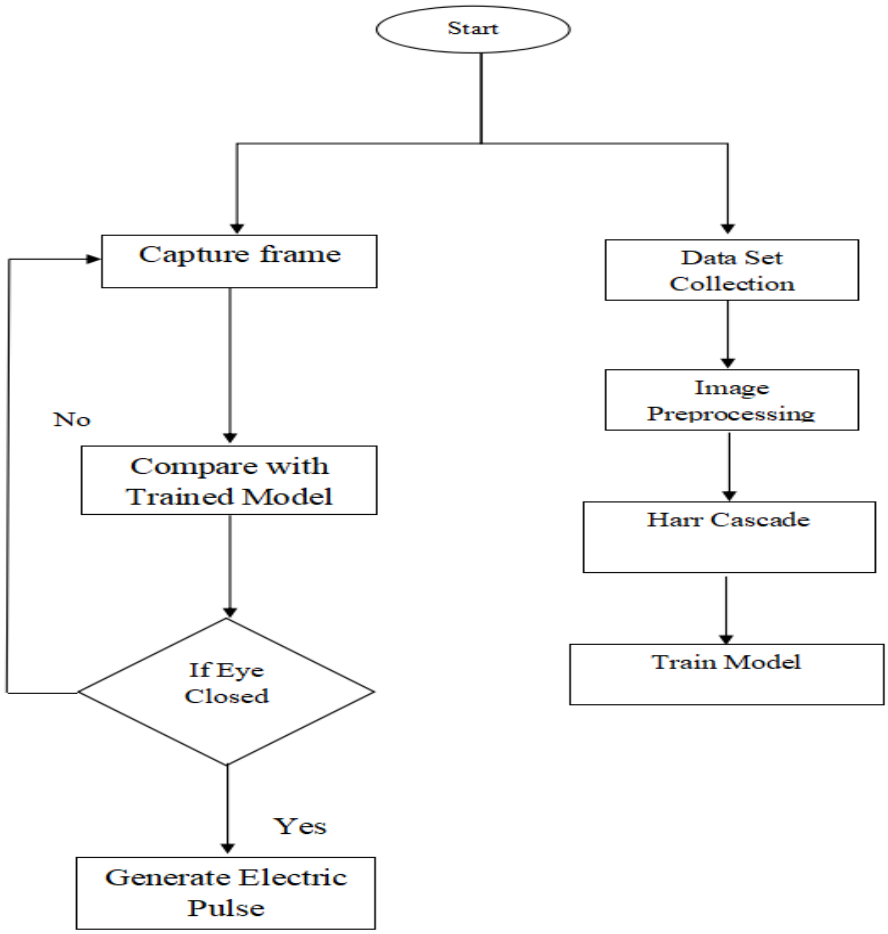

Fig 4:Flow diagram for algorithm and process of eye blink checking and shocking system.

4.5.1FLOW DESCRIPTION:

At first, the data sets are trained with sample sets. The training involves an image processing algorithm. The algorithm converts the large matrices into small matrix size which makes the comparison easier. After the training, data sets are stored. Then the USB camera captures the sample data sets which are fed into raspberry pi for comparison. If the sample image matches the pre-trained data sets then the Electric pulse is generated. If it's not, then the process starts from the beginning and goes infinite.

4.6 CIRCUIT DIAGRAM FOR SHOCKING PADS :

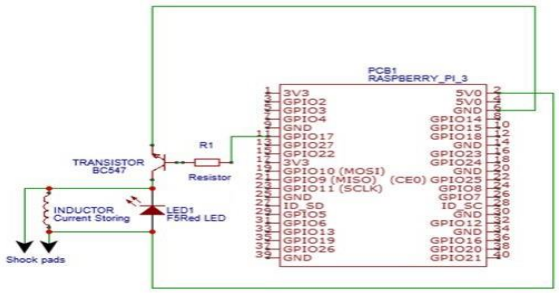

Fig 5:Total circuit diagram for the eye blink shocking system

V.RESULTS

5.1 MODULE IMPLIMENTATION OUTPUT-I :

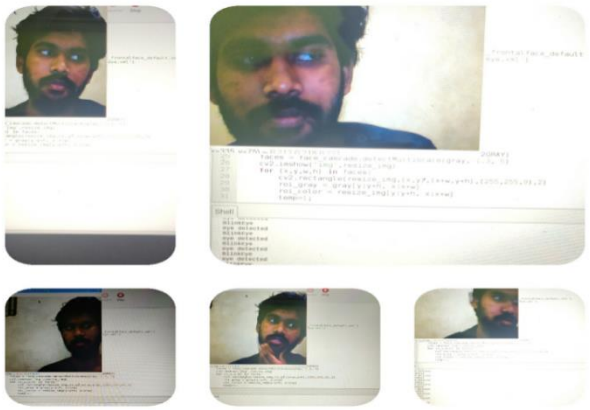

Fig 6:Video streaming using Webcam

5.2 MODULE IMPLIMENTATION OUTPUT-II :

Fig 7:Detection of Face and Eye.

5.3 MODULE IMPLIMENTATION OUTPUT-III :

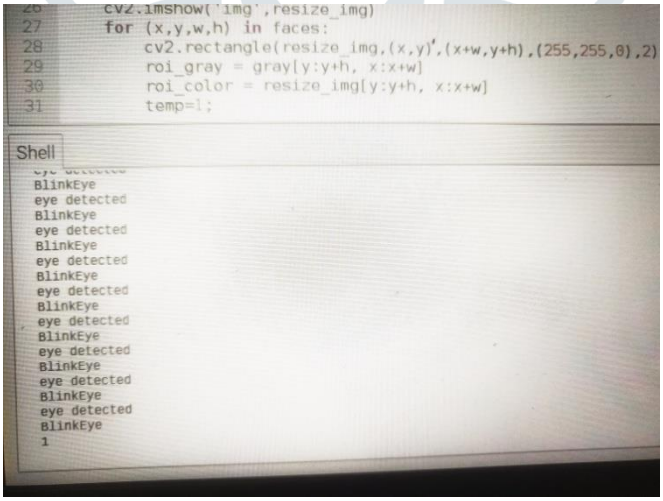

Fig 8:Generation of shock if eye is not blinked.

VI.CONCLUSION :

Thus, the proposed system will have more accuracy than the existing system. The comparison process becomes super fast with the Haar Cascade algorithm by combining the convolution conversion with image processing. The data sets are trained based on haar cascade which is a deep machine learning algorithm and this makes the image detection possible at ease. The facially paralyzed people's images are continuously live fed into the USB camera and the Pi-3 does the predictions and simulates electric pulse when needed.

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