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Colour model selection for segmentation of the eyes

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ABSTRACT

Millions of people suffer from paralysis and Motor Neuron Disease. The main problem they face is that they cannot speak. Currently, all they can do is depend on nurses or they need to buy extremely costly equipment like Stephen hawking to communicate. In this paper we propose a method to perform communication using the eyes. In order to do the same the main objective is to extract the eyes. The experiments conducted to do the same and the suitable colour model found has been explained in this paper.

Keywords- *MND, Colour conversion, Blink recognition, Eye detection.*

I. INTRODUCTION

Communication is the imparting of information which actsas conveying meanings from one group to another group through the use of signs, semiotic and symbols rules. Communication is a means of connecting people for mutual exchange of information. It makes people understand what you want to express, it plays a vital role in human life.

Motor Neurons is a nerve cells that sends electrical output signals to muscles which forms a pathway along which impulses passes from brainstem to a muscle and glands, effecting the muscles ability to function.Theseare responsible for the muscle moments in the body and also responsible for the activities such as walking, speaking, gripping ,breathingand swallowing.

The most common type of Motor neuron disease(MND) is also known as Amyotrophic Lateral Sclerosis (ALS), affecting muscles of mouth, legs, arms and respiratory systems. MND causes movement related symptoms mainly muscle weakness. MND is a rare condition that progressively damages parts of the nervous system which occurs when specialist nerve cells in the brain and spinal cord motor neurons progressively lose function.

MND causes weakness in tongue, lips,vocal chords and chest making the speech faint, slurred or unclear. It can also affect gesture and facial expressions. The person's voice can also become weaker if respiratory problem mean they do not have enough breath to help them produce strong sounds.The eye muscles appear to be better equipped to maintain their muscle-nerve contacts and are thereby less affected. Thus inorder to help such patients, we plan to design a communication system which can use series of blinks or winksin order to speak out sentences.

II. LITERATURE SURVEY

Through research of IEEE papers and other articles makes it evident that Communication system which can use series of blinks/winks in order to speak out sentences to help MND patients.

2.1 2012, Eye-blink detection system for human–computer interaction: A vision-based human-computer interface is presented in the paper. The interface detects voluntary eye-blinks and interprets them as control commands. The employed image processing methods include Haarlike features for automatic face detection, and template matching based eye tracking and eyeblink detection. Interface performance was tested by 49 users. Test results indicate interface usefulness in offering an alternative means of communication with computers. The users entered English and Polish text and were able to browse the Internet. The interface is based on a notebook equipped with a typical web camera and requires no extra light sources. The interface application is available on-line as open-source software.

2.2 An Eye Tracking Algorithm based on Hough transform: Iris localization is an active area and complicated task in computer vision systems. This article presents a description of an eye tracking algorithm based on Hough transform.

2.3 A New Directional Intention Identification Approach for Intelligent Wheelchair Based on Fusion of EOG Signal and Eye Movement Signal: In this paper a method of combining electro-oculogramsignal and eye movement signal is proposed. According to the tracking of eye movement track, the invalid electro-oculogram signal can be removed.The accuracy of electro-oculogram signal is improved and the accuracy of classification recognition is improved. Finally, the correctness of the view is proved by experiments.

III. SETUP

Patient Web camera Laptop

A camera will be fixed on a cap which will capture the images of eye blinking. The patient is made to wear the cap. The camera is then connected to a laptop. The laptop has Matlab software running, where you will design a video processing algorithm. The algorithms main function is to identify where is your face, where are your eyes, and also to identify whether you winked or not. We use various video processing techniques to detect the whether the wink is true or whether it is right or left wink. If you have winked, it will store in an Array(in the form of 0's and 1's) whether it was a Right wink or a Left wink.

After some amount of time, the algorithm will check the array as to what series of winks you did. For example. if you did Right wink, then left wink and then right wink we will map that to a sentence - I am hungry. In this

way the patient can do any number of combinations. Millions of sentences and combinations are possible. The sequence you did will be converted to a number . For example. RLR can be coded as a 1 or a 2... This number will be sent via Bluetooth modem to an Arduino. Arduino will receive the array of 1's and 0's and based on that it will choose the sentences stored in database. The sentence will then be sent to a MP3 player which will play it out loud conveying the message of the patient.

IV. PROPOSED METHODOLOGY

Image processing: Image processing is a process to process an image either to enhance the image or extract image. It has 5 steps, they are:

1. Image acquisition: The real time image acquisition involves retrieving image from a source which automatically captures images. It creates a stream of files that can be automatically processed, queued for later work. One common technology that is used with real time processing is a background image acquisition, which describes both hardware and software that can quickly preserve the images flooding in to a system.
2. Colour Processing: A digital colour image contains information about each pixel. Three colour channels or samples are provided for each pixel. They are interpreted as coordinates in some colour space. In computer displays RGB colour space is commonly used and other colour modules such as YCbCr, HSV and GRAYSCALE are used in other contexts.
3. Segmentation: Segmentation is a technique of partitions and image into small parts containing each pixel with similar attributes. It is the first step from low level image processing transforming a grey scale into one or more other images to high level image description in terms of features like pixel intensity values, colour, texture etc…,.The success of image analysis depends on segmentation.
4. Noise Removal: Noise will produce at the time of image capturing or image transmission. Noise means the pixels in the image of different intensity values instead of actual values. Noise removal algorithm will remove or reducing the noise from the image. For image noise removal we will use filtering technique.
5. Feature Extraction: Feature Extraction is related to dimensionality reduction. We use algorithm to detect and isolate various portions and sizeof an images or video stream.

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V. RESULTS

Fig 1.Image of eye sampleFig 1.a Brightness colour model

Fig 1.b Chroma Blue colour model

Fig 1.c Chroma Red colour model

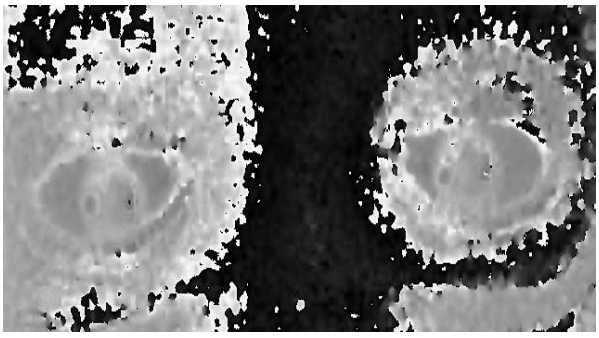

Fig 1.d Hue colour model

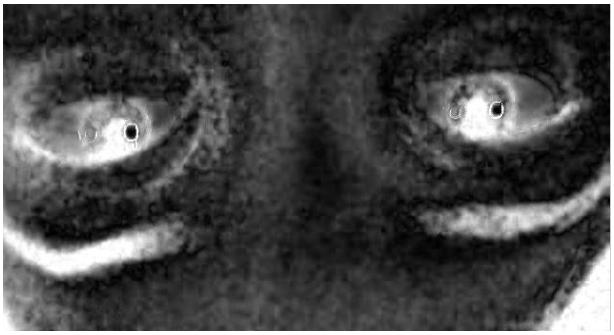

Fig 1.e Saturation colour model

Fig 1.f Value colour model

Colour chart prepared to select suitable colour model

Image	Y colour model	Cb colour model	Cr colour model	H colour model	S colour model	V colour model
11-46-19	√√	×	√	×	√√	√√

Based on all these images we have obtained as above, We have chosen the suitable colour model to further process the images.

VI. CONCLUSION

In this paper, the acquisition, processing, feature extraction and pattern recognition of the eye blink/wink signals are introduced. By combining the eye blink/wink signals and the electro-oculogram signal, the invalid noise signal is removed, and the accuracy of the electro-oculogram signal is significantly improved. Based on the series of blinks and winks made by the patient, the corresponding sentence will be spoken out.

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