IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Vol. 9, Issue 1, January 2020

Review on Human Performance Measuring and Analysing System

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Abstract: The most important thing in this world is time management. And the most difficult task is to save time. The conventional performance analysing and measuring techniques takes more time for testing. So we introduce a new method which has a reduced testing time when compared to conventional testing time. This project aims at measuring and analysing the human performance and thereby making it suitable for various industries to sort out the individuals with best performance. The performance is based on calculating various attributes such as vision, hearing ability, intelligent quotient (IQ), etc. It can be used for recruiting the best individuals for an industry or company by analysing the overall performance based on the attributes derived through various calculations of an individual. It can also be used for self-assessment.

Keywords: Smartphone, Digital camera, Machine Learning, Earphones or Hearing aids

I. INTRODUCTION

Time is world's most important thing. And the most difficult task is to save time. The conventional methods for measuring and analysing the performance of a human being takes more time. Because, its more time consuming when comapred to other methods. The main problem of the conventional methods was it was done with human support and supervision. We introduce a new technology for measuring and analysing human performance .This device can be used in organizations to assess employee performance, and to weed out the best performing employee or individual. The company can also hire workers based on the performance evaluated. This system can also be used to auto-assess. The performance is based on calculating different attributes such as vision, ability to hear, intelligent quotient (IQ), etc. It can be used by evaluating the overall performance based on the characteristics obtained from various individual assessments to recruit the best candidates for a sector or organization.

II. THEORY

- Self-hearing diagnosis: In order to test the audibility problem of a person using smart phone application and earphones or hearing aids. And to analyse the audibility problem with the help of the audiogram that is generated as a result of the audibility test.

- Eye disease diagnosis: To capture the image of the eyes we use a digital camera. FCM clustering and morphological operations are performed for extracting blood vessals and texture features like energy, correlation, homogeneity can be extracted by using SVM (Support Vector Machine) classifier.

III. RELATED WORKS

In [1] this system we propose a self hearing diagnosis method using smartphones and hearing aids which is connected to the smartphone using bluetooth technology. There will be a pair of hearing aids which is connected to the smart phone using Bluetooth technology. And the smart phone will be installed with the hearing diagnosis application. And the wide-to-thin algorithm is used to reduce the test time when compared to the traditional testing methods. The wide-to-thin algorithm consists of two models, the wide model and thin model. At first the hearing aid plays a pure tone of 15dB HL at 1000Hz for 0.8 seconds. If the person does not hear the sound then, the sound level will be increased by 5dB HL to play for 0.8 seconds. But in the thin model the approximate auditory threshold will be reduced by 15dB HL and to play it for 2 seconds. This process is repeated at several frequencies. Thus this method can be used for reducing the mean test time rather than the conventional methods which uses the conventional up-5-down-10 algorithm which uses a long test time. The output is generated as an audiogram.

[2] Hearing impairment is the most widespread physical disabilities in the world. These done by different researchers. All of this shows most of the deaf people are interested in environmental sounds and it want to be listen them at all places.In [1] tells using auditory cues the people get information about events outside of their field. This auditory cues only partially benefit for the deaf people ,it lead to low quality of life. Here introduce a smart phone, that is flexible and mobile assistive device. It is very beneficial for deaf people. That smart phone detect and recognize acoustic event from the environment of the deaf people. With the help of pattern recognition algorithm ,the people can define the sounds from the devices. The smart phone are already used by the deaf people for communication .so there is no need for other special expensive devices. Smart watch is already used for this purpose. Ancillary icons are used to indicate the sounds. In homes there are different devices are available to support the deaf people. But these devices are not supported the environmental sounds. The smart phones are capable of computational tasks with low power consumption. This capability is used to in the new assistive devices. The battery life time of this device is at least one day.

[3] The hearing impaired people are very difficult to hear the telephone listening. Because of the limited bandwidth of the telephone. The hearing impaired listeners cannot be accessed the acoustic output level of the handset. The self contained acoustic amplifiers are used to overcome the problem. The intelligibility of face to face is higher than the intelligibility of telephone speech. In [2] shows these telephone communication problems are arises due to lack of visual cues, limited telephone bandwidth, and also the background noise. This introduce a wireless phone adapter. This adapter based on thebluetooth technology, to route the audio signal directly to the hearing aid or cochlear implant processor. This new technology is higher than the traditional listening devices. This adapter provides mobility to the users. There is no need of long cables to connect them. The wireless assistive phone adapter using the Bluetooth connection and routes the telephone audio signal to the CI processor.

[4] Korean phonemes which are similar to English phonemes /a/,/i/,/sh/, and /s/. The four Korean phonemes are used for smartphone based self hearingassesment. The phoneme based self hearing assessment is sufficiently reliable in estimating the hearing impaired subjects. 5.6 dB HL on average is the difference between hearing threshold obtained through conventional pure-tone audiometry and those obtained using our method. The proposed hearing assessment reduces the mean test time. This method is implemented on smartphone and allow to perform self hearing tests for hearing impaired people. The phoneme based self hearing assessment is suitable for estimation of audiograms with accuracy and reduced testing time.

[5] In the day-to-day life of a human being many things plays an important role. Sound is one of them. It is through sound one is able to communicate with one another easily. With the help of sound one can have contextual awareness about certain events and information. Problem arises for those who are deaf or hard-of-hearing because these sounds or information they give may not be easily available to them. Support can be provided in a calm environment but it is difficult when it comes to public places. In the proposed system a mobile transcription tool called scribe4me is introduced. It helps the deaf and hard-of-hearing by providing transcription of the lost 30 seconds of sound surrounding them through a text message with the push of a button. The transcription gives dialog and descriptions. The main advantage of the tool explained in this paper is that it improves awareness of sound based information.

[6] The holistic management of Hearing Loss[HL] needs adequate public health policies for HL prevention, early diagnosis, long term treatment and rehabilation, cognitive decline identification and prevention, noise protection and socioeconomic integration of HL patients. The evidence base for developing these policies is currently, however limited. Holistic HL management policies require heterogeneous data analysis including use of Hearing Aid(HA), noise episodes, audiological, physiological, cognitive, clinical and medicinal data, personal behaviour, lifestyle, occupational and environmental data.Use of these data to formulate systematic HL management policies. In this paper, introduced EVOTION. The main overall contribution of EVOTION to existing research will be the development of a novel model driven platform for establishing public health policies for management of HL, based on evidence arising from the analysis of static and dynamic health data.

[7] In this paper aims to design a smart earplug system with non- invasive bone conduction. It has the capability for doing some advanced audio processing to provide the voice enhancing, noise filtered audio for the hearing impaired people. Typically the low quality analog hearing aids are used by people with hearing loss problem. This hearing aids are simple analog audio amplifier or a passive audio Reinforcement system. To overcome the drawback of this system in this paper they are designed a system to work as an embedded music player, a life activity tracker and smartphone companion. So that it has the ability to read the SMS that is received on your smartphone into the ear of the user. This project proposed a method for the effective noise reduction and magnification of speech signals of mobile phone by installing bone-conduction system. That can be installed with the ordinary phone by adding bone-conduction speakers.

[8]in this paper a 3D visible articulation system which utilizes developed a 3D visible articulation system which utilizes audio-visual data to accurately simulate the 3D articulatory motion.3D articulatory shape is constructed by manually labeling and the articulatory contours in sagittal and transverse MRI images. The EMA data defines some parameters which concontrols the Articulatory movements of specific articulators. a collision handling method is proposed for avoiding the occurrence of the penetration problem. for calculating the shape accuracy of deformable articulatorsframe by frame a shape based evaluation method is developed.for the purpose of solving the penetrationproblem during simulation here the collision between the tongue and other articulators. A e articulatory database is used. It includes a staticMRI database, EMA database, and an X-ray film. finally the results shows that the system can simulate articulatory animation accurately.

[9] In the world, there are more than 360 million people have disability to hear. So there is the increased need for develop a method for helping them. In early days, hearing aids cannot automatically distinguish noise from a mixture of signal. A hearing aid is worn in or around a users ear. In this paper, a smart hearing helpful device is developed, it consist of a module that has an acoustic capability, another module used is acoustic separation module. This method also make use of source identifying module. In developing method, there is a solution that can automatically distinguish an acoustic source, this will increase the destination speaker's sound also distinguish from other sound. In order, for better working of system firstly a sound model library consist of all occurable sounds is developed offline and when a on-time mixed sound signal is get into hearing helpful system, it will automatically distinguish into unique sound signals according to their various directions and intensities. At last, depending upon comparing properties in model library, destination signal that the user is needed with is get taken, other sound signals are blocked.

[10] This paper introduces developing a cheapest wearable device for the hearing impaired. It uses an arduino, a personal area network with ZigBee nodes and a smartphone to do the processing of speech. The system not depends on speakers. The smartphones are used for speech processing. The main hardware components of this system is ZigBee node, Bluetooth module, display. ZigBee is a low data rate, short distance wireless network. It is easy to transmit indoors and transmission dependent of obstacles. This system can be divided into Reduce Function Device(RFD) and Full Function Device(FFD). And the Bluetooth module can be connecting mobile phones using a short radio link. It operates on ISM band of the frequency system. The 16x2 LCD display is used in this system. The system checked for data corruption due to noise, interference and the range. The noise enter the system through the microphone of the smartphone. The noise cancellation algorithms can be used to reduce the effect of noise. The communication of this module was possible till 300m without any error. From 300m to 500m range, transmission shows few errors. Beyond 500m, transmission failed. The system helped to be self-reliant and decreased some difficulties they faced. The hardware components is not faulty or dangerous and the software is user-friendly and helps to hearing impaired to lead a real normal life.

In [11] we are calculated contrast sensitivity function on large no of adult samples.unlike most of the previous studies we are specifying here how much samples we are consider with. Here the considering subjects are persons between the age range 18 and 87 years.60 of them are age above 60 years and 31 of them aged below 60 years. And all of the subjects are free from occular pathology. We know that two ofthe major things which will effect contrast sensitivity are acuity and refraction, hence we are calculate them by some kind of systems.spherical and cylindrical components are measured by standard subjective refraction and static retina scopy. Here projected scharts includes "Baush and lomb compact chart" and "Bailey-Lovie distance chart" has a huge role in examination of eye. Although the central part in calculating contrast sensitivity is "Optronix vision tester".here we are using surrounding frequency of 2cd/m^2. "vonBeskeys" is a method used for procedure following purpose here.

In[12] explains how the aging will effect the Retinal image quality with the help of Modular Transfer Function[MTF] and Dopble pass system. We are considering here two age groups(age above 20 as one group and 21 to 60 age as another group) as subject.Double pass system includes two parts an short exposure point object image. And another part is an occular media of eye. The image of the object double pass through the occular media of the eye. Both are used to obtain single pass MTF. Same experiments are performed for both of the age groups for reducing spatial frequency uncertainity grating was used.Here test grating initially selected by random order. After selecting it will increase in linear manner. Contrast at any given time is defined by the following formula C=T^2/5825.Here a spectactor need to hold a button as pushed as long as a pattern visible on the screen. Whenever the pattern become invisible they are instructed t release the same button. Whenever button is released contrast of the screen increased automatically. And the cycle repeat 8 times. Monocular contrast sensitivity for both eyes are calculated. Both moving and stationary grating are considered here for testing.

In [13] calcualting the point at which older adults lost their contrast sensitivity at a photopic level to nueral changes in the aged visual system.Here we are using laser interferometry for measuring purpose. It also used to generate interference fringes which passes through the eye occularemedia and create an image of the grating on the retina.by

measuring understanded that older adults are effected more. Even though if the adult person have good eye health also he was exhibited significant loss in the contrast sensitivity.Here the subject consist of 35 young adults and 29 old adults. Both males and females are included in the subject. Here contrast threshold intent on all spatial frequencies which are using here. But for each subject it is randomly given. Instead of following the same pattern.By using conventional direct-viewing technique we get a conclusion that loss in contrast sensitivity for interference fringes accounted are very much less than photopic contrast sensitivity loss at higher frequencies reported for older adults.Here optics of the aged eye are not bypassed.Here we get a clear conclusion that neural changes in an aged visual system have a rather minor contribution to older adult's loss in spatial contrast sensitivity at photopic level.

In[14] Modular Transfer Function(MTF) and double-pass filter are used to measure the average optical performance of the human eye. Here, an apparatus for measuring eye MTF was constructed, based on the recording of images of a green, 543-nm laser-point source after reflection in the retina and double passage through the eye media.On average, mtfs were measured from three 4-second-exposure double-pass photos captured by a slow-scan, cooled charging-coupled system sensor.The eye MTF was assessed for three artificial pupil diameters (3 mm, 4 mm, and 6 mm) with paralysed accommodation under the optimal refractive adjustment in 20 subjects for each of three age categories: young subjects aged 20 to 30 years, middle-aged subjects aged 40 to 50 years, and older subjects aged 60 to 70.The subjects chosen passed an ophthalmological test, except subjects with any type of ocular or retinal disorder, spherical or cylindrical refractive errors above 2 D, and visual acuity corrections smaller than I (0.8 in the older age group).Here it is concluded that average optical performance of the human eye gradually decreases with age. These MTF results can serve as a reference for the age-specific determination of mean eye optics.

In[15]The optical quality of the eye was measured at eight pupil sizes between a diameter of 1·5 and 6·6 mm by recording the faint light emerging from the eye; this light was reflected from the bright image of a thin line on the fundus.The essence of fundus reflection was examined; it was observed that while maintaining polarization the fundus behaves much like a natural diffuser.The reported line images were examined by Fourier to provide modulation transition functions using the finding that the fundus behaves like a diffuser. Both features suggest a considerably higher optical efficiency than that observed in previous physical research.Line propagation profiles were then derived from the transfer functions of modulation.Our results show that similar estimates of optical quality may be given by physical and psychophysical studies. It discusses the influence of optical factors which are not common to both techniques. It reviews evidence of the existence of mechanisms for neural ' image sharpening.

In[16] this paper, Navarrow et al(1993;journal of the optical society of America A, 10,201-212) used the double pass technique to calculate the human eyes monochromatic Modulation Transfer Function(MTF) as a function of retinal excentricity. We call circumstances as similar as possible to thus present in natural viewing. Instead of improving the retinal image quality, we record new measurements obtained with conditions chosen: we paralized lodging, used a 3mm pupil, and fixed defocus and oblique astigmatism at each retinal place. MTFs were calculated at the tangential emphasis, least confusing circle, and sagittal focus created by oblique astigmatism. While optical blur is well known to have little impact on peripheral visual acuity, receptoral and post-receptoral special sampling can still significantly reduce aliasing.

In [17] this paper, we propose a method for detecting diabetic retinopathy by preprocessing using structural elements and blood vessel segmentation. The RGB image of the eye is captured by a digital fundus camera. Then the captured image is converted into gray scale image. The gray scale image will increase the contrast of the eye image. So any minute parts in the eye can be visible in detail. The next step is removing the central reflex from the blood vessel by applying morphological opening operation. This light reflex always accompanied on blood vessels, by removing this brightness in the image can be increased. Then the background lightning variation in the gray image is removed by applying average filtering methods. This is done for avoiding variation in the intensity. The enhancement of blood vessels is done by using Top-Hat transformation along with morphological opening on structuring element. Segmentation of blood vessel is carried out by using entropy thresholding techniques. The preprocessed image is the input for segmentation phase. Perform some entropy calculation technique over the pixel value of the eye image. It needs hand held clinical vasculature.

In [18] this work, we propose a new method of blood vessel, a new method of hemorrhages detection and classify the retinal cases using a back propagation method with higher classification accuracy. This work followed by image enhancement and denoising using Gabor filter detect blood vessel and identify optic disc and vessel parameters and classify different stages of diabetic retinopathy into mild, moderate, severe non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR).The Gabor filter is used for edge detection. A real and an imaginary component representing orthogonal directions constitutes the filter. There will be two components which may be formed into a complex number or used individually. CLAHE is improve the contrast and reduce the noise in the eye image. Identification of disk and blood vessel parameter are done by binarization, skeltenization ,vessel thickness

measurement etc. Classification is carried out by Back Propagation Network (BPN) that runs by its training algorithm. But this process is little time consuming one.

In[19] this, we are proposing a method in which we train individual classifier algorithm and not the ensemble of that. The following methods are used for this. Logistic regression, Neural network and Support Vector Machine (SVM). In logistic regression the output variable is categorical not continuous valued, n different class are represent by output variable. The value will be either 0 and 1. Depending on this the image is classified either diabetic retinopathy or non diabetic retinopathy cases. Neural network is similar to human brain. They will classifies the examples in to multiple classes. A multi-layer neural network will be used where the first layer is the input layer and the last layer is output layer and the other layers are known as the hidden layers. Each layer has units known as the artificial neurons and the sigmoid activation function is used to activate units. Support Vector Machines are the classification algorithms that are used to classify the examples when the number of features are very large. It give better result compared to other classifier for small data set. In some cases target classes are overlapping.

In [20] this paper, they present an algorithm for the detection and counting of the Diabetic retinopathy lesion 'Microaneurysms' by using image processing techniques. The steps that required are, on high resolution fundus images the preprocessing operations are performed, Detection the Microaneurysms, Morphological activity on high-resolution fundus images along with some enhancement techniques such as histogram equalization and strength transfo rmation method and segmentation to identify boundaries of microaneurysms removed. Green channel is taken for better intensity in preprocessing. The value of green channel is calculated by some mathematical calculation. Microaneurysm is enhanced by using intensity transformation function.For enhancing the intensity of transformation image histogram equalization function is used. Using morphological Top-Hat transformation Blood vessels are extracted. This system reduces the noise in the eye images.

In [21] this paper presents the implementation of the screening system as a four stage process. In the first step, the retinal images are normalized via bi-cubic interpolation, local contrast enhancement and background subtraction.The second step is to automatically locate regions of optical disks and blood vessels. The third step is to recognize signs of Diabetic Retinopathy, namely red and white lesions. Finally, the information from both fields are accumulated and the retina is classified as DR or non-DR.To obtain uniform brightness in the fundus image, we applied a scheme of brightness correction using hue saturation value (HSV) space .White lesion is detected by gamma correction techniques. To distinguish red-lesions and blood vessels, a morphological top-hat transform was used. This operation is based on morphologically opening the pre-processed image with a linear structuring element at different orientations. Waterfall model based classification approach is used for classified the image as DR and Non DR. It requires long training time.

In [22] this paper describes entirely an efficient method for detecting and classifying the image as diabetic retinopathy or non diabetic retinopathy. Mainly two methods are proposed Fuzzy C-mean clustering and Morphological operations. The segmentation of Blood vessels is first carried out using the Fuzzy C-Means (FCM) clustering and then to remove noise the fine tuning is performed by using Morphological operation. Euclidean distance between the feature vectors and the cluster centers are used to define similarity. Extraction of blood vessel ,micro aneurysms are done through some morphological operations. This system calculates texture features like energy, contrast, correlation etc by using Gray Level Co- occurrence Matrix (GLCM) . The classification is done depending on the area of blood vessel, area of microaneurysms, area of exudates, the values of texture features namely contrast, correlation, energy and homogeneity using SVM classifier. The result has high accuracy and 100 % sensitivity. By adding more number of features we can improve the system performance.

In [23] this paper, an Assistive Intelligent Hearing Aid System is proposed(AIHAS). AIHAS is proposed to detect multiple ear damages and to check the degree of the patient's reasoning loss etc. Here patients can choose two types of filtering options to calculate their earing abilities. Quiet room (QR) and Noisy room (NR) is used as filters. The AIHAS also provide interfacing with a smart-watch. The proposed system is very useful, less cost, flexible to use. The invented AIHAS system provides ear patients a contemporary style of earing ability.

In [24] this paper about 360 million people world-wide live with a crippling hearing loss. The most severe conditions – sensor neural hearing loss induced by age and noise — are both progressive and, for the foreseeable future, neither curable nor reversible. Since they find it difficult, if not impossible, to disagree with what others say, people with severe hearing loss are becoming increasingly isolated from families, friends, and colleagues. Although hearing aids are the most popular instruments used to correct for the bulk of hearing loss, they are widely available only in the most advanced countries. Even in the United States, only 16 per cent of adults 20–69 and 30 per cent of adults over 70 who could benefit from hearing aids currently use them, and the rate of use for hearing aids has slowly increased following remarkable technical advances in the field. Although there are many causes for their underuse, including high costs and

misunderstanding, I agree that one major reason is that hearing aids simply do not work very well in certain noisy environments where they are most needed. For improved integrated wireless audio interconnectivity and better overall sound quality, the output of hearing aids can be significantly increased from the engineering and design standpoints.

In [25] this paper the Sound Source Localization (SSL) increases the output of hearing aid aids (HAD) for patients by identifying the path of arrival (DOA) of source signals. In this article, we present a suggested SSL algorithm-' Dictionary-based Singular Value Decomposition (SVD) for Principal SL ' using the Non-Uniform Non-Linear Microphone Array (NUNLA) that's accessible on the smartphone as an HAD assist. Compared to Uniform Linear Arrays (ULA), and popular DOA estimation algorithm, the proposed NUNLA algorithm has superior performance. The benefits of using the suggested SSL approach are provided using low Signal To Noise Ratios (SNRs) Polar Directivity Patterns (PDP) and Root Mean Squares Error (RMSE) values using single speech references of Additive White Gaussian Noise (AWGN). The PDP and RMSE values show that, unlike other techniques, the proposed method is capable of reliable SSL over a complete 360 ° inspection, with low average RMSE at very low SNR.

IV. CONCLUSION

This paper discuss about the various methods that can be used for human performance analysing and measuring system. This system have wide variety of applications. In industries this system can be used for evaluating the performance of employees and sort out the employee or person with best performance. The industries can also recruit employees based on the evaluated performance. This technology can also used for self-assessment. This system uses various technologies which reduces the test time when compared to the conventional analyzing and measuring methods.

ACKNOWLEDGMENT

We utilize this opportunity to convey our gratitude towards all those who have helped us directly or indirectly for the completion of our work. We deeply and wholeheartedly thank **Mr. Sanal Kumar T S -HOD**, Computer Science and Engineering for his extreme valuable advice and encouragement. We especially thankful to our guide and supervisor **Mr. Deepak K N** -Assistant Professor, Computer Science and Engineering for giving me valuable suggestions and critical inputs in the preparation of this paper. We would like to extend our sincere gratitude to all faculty of Computer Science and Engineering department for the support and suggestions that helped us in the development of our work to what it is now. We thank our parents and friends for the mental support provided during the course of our work at the times when our energies were the lowest.

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