In Built Stress Analysis in Mobile Operating Systems

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Abstract— In this paper we are providing an idea of implementing stress analysis algorithms in the basic user interface of the operating system. There are four methods provided from which the user can be analyzed for stress levels by using general usage of his/her cell phone. The mobile device not just performs the task of stress analysis but it also notifies the user if the stress levels go above a critical limit and also notifies the related doctor if the patient ignores the constant notification by the cell phone.

Index Terms— Stress, Android, IOS, Algorithm, Image processing, Face detection

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I. INTRODUCTION

Stress has become an increasing phenomenon these days. Main causes of the stress are individual life styles affected by juggling work, lack of job security, personal issues and ever-increasing work load. Stress diagnosis is difficult by the patient himself as compared to other illnesses such as flu. The standard procedure to diagnose stress in a patient is to plan a visit to a psychologist who performs physiological analysis of patient's condition. Self analysis of stress by patient is also possible by using stress analyzer web sites and mobile applications. Current mobile applications are not efficient to self-assess the stress level completely. Moreover, the person using the existing dedicated software applications, for the stress analysis, may tamper the results because of his mental awareness about the current analysis. However, normally a person is unaware of the fact that he is affected by stress. Now days it is common for an individual to use smart phones with android or IOS operating system. Therefore we are proposing the implementation of the stress analyzing algorithms in the general mobile operating system so that the user is constantly monitored for stress levels by his general cellular phone usage pattern without his special awareness. When the user stress level increases to a critical level the mobile phone notifies the user to lower his stress levels by relaxing and other techniques. Moreover, if the stress levels are still high the mobile phone notifies the corresponding doctor about the patient's status. The algorithm in mobile application system also monitors and provides a medical history to the doctor when the patient goes for a checkup.

II. STRESS

Mental stress usually referred to as stress is a mental illness which is a main source of triggering other illness in a chain reaction such as heart disease, asthma, obesity, diabetes, headaches, depression and anxiety, gastrointestinal problems, Alzheimer's diseases and premature death. Stress is caused by events which make us feel threatened or upset is some way like juggling work/ personal lives, lack of job security, people issue & work load.

III. ANALYSIS METHODS

There are many ways to analyze stress levels in a patient which includes monitoring heart rate [7] by using unobtrusive wearable sensors and identification technique known as principal dynamic modes (PDM), analyzing facial expressions using optical computer recognition (Image processing) [11], analyzing speech using a speech analysis library [13], oxidative stress analysis [10] which utilizes both blood and urine samples to analyze oxidative stress and antioxidant reserve.

IV. STRESS ANALYSIS AND MOBILE APPLICATIONS

Using the above mentioned analysis many mobile applications have been developed and are available on android and IOS store. Stress Check by AZUMIO [1] is an application developed by Azumio Inc. which utilizes camera and flash to measure heart rate and in turn calculates stress levels; moreover, it also helps to control stress and observe progress. Stress Check [2] is an application developed by wisdom at hand which uses researched based assessment tools in a form

of a questioner and displays the stress levels in graph form and monitors progress. Other applications like "Stress Test and CBT Self-Help" [3] developed by EXCEL AT LIFE, "Stress Meter" developed by ioPsicologo & "The Stress Management society" [4] utilizes questionnaire method to analyze stress. All these stress analysis tools have a common dilemma in them that the user has to use these applications consciously to find out his/her stress levels. In most of the scenarios the individual is not aware that he/she is affected by stress, so there is no chance of analysis and prevention of stress.

V. OPERATING SYSTEM IMPLEMENTATION

IOS [17] and Android [16] are two major operating systems used in mobile devices. IOS is used in Apple mobile devices and Android is an open source operating system used by many mobile companies. In the course of many years these operating systems have released numerous versions with addition of new features in every new version; however, up till now none of these version have included in built stress health analyzer [16] [17] which analyzes the person stress levels as he uses the mobile phone for his everyday use. Various concepts can be developed to perform this operation here are some of the concepts which can be used as individual or in combination to provide appropriate results.

A. Speech Analysis

Stress level can be analyzed by constantly monitoring the user's speech input as he speaks to a person on the cell phone. The voice [12] of the user will act as an input for the stress analyzing algorithm to calculate the stress levels in the person.

B. Facial Recognition

Now days many cell phones are equipped with front camera which can be utilized by the operating system to recognize stress levels by analyzing the facial expressions [11] of the user when the user is dialing a phone number, playing games or casually browsing the phone.

C. Touch Sensing

A person heart beat [7] can be analyzed for abnormality on a cell phone by using touch sensors [14]. It can be utilized on a cell phone by making an individual necessary to touch the sensors by both hands to unlock the cell phone and in turn monitor the heart rate.

D. Usage Pattern

Every individual has a unique cell phone usage pattern [15]. The operating system can analyze these patterns and then check for abnormality in the pattern which can indicate a person is in stress but this method cannot quantify the level of stress in a user.

VI. CONCLUSION

If the operating system developers implement some of the recommendations provided in this paper they can change mobile phones into a device which also provides health service other than communication and entertainment services.

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