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A Wearable Emotion Detection and Video/Image Recording System

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Abstract

A system for sensing an important event/occasion and automatic capturing of video/image is disclosed. The system detects important event/occasion by analyzing physiological signals and derives corresponding emotional state of a user. The system includes a wearable computing device having an emotion recognition system, a sensor array and a capturing device. Alternatively, the sensor array may be attached to the arm of the user when it is not integrated with the wearable computing device. The capturing device starts recording a video/image of surroundings if an event/occasion is detected. The user presets settings of the capturing device, which includes shutter speed, aperture, ISO, autofocus, and white balance. The video/image of the surroundings is captured basis the pre-selected settings. Finally, the captured video/image files may be transferred to the user's profile on a website or his/her personal computer over a Wi-Fi connection.

Problem

Every user is interested to capture memorable and important life moments/events. During these times, the user is busy in activities of the event, which is taking place and manually pulling out a digital camera or a smartphone camera every time there is a moment to capture might distract her/him from the ongoing event. Also, the user might be more interested in enjoying the moment rather than capturing the moment. The present disclosure endeavors to address this by automatically capturing video/images of important life events using a wearable capturing device, which will be triggered based on emotional changes as detected by a sensor array attached to the user or integrated with the wearable capturing device. The wearable capturing device mitigates an overhead of pulling out the camera and setting it up for capturing video/images of the surroundings.

Description

System and working

The present disclosure relates to a system that enables a wearable computing device to capture a video/image of important life events automatically basis detected emotional state(s) of a user. The wearable computing device, as illustrated in Figure 1, is worn by the user as an arm band, a watch, or a hat and includes:

i. A sensor array,
ii. A capturing device, and
iii. An emotion recognition system

Alternatively, the sensor array can be a separate wearable entity and not be integrated with the wearable computing device.

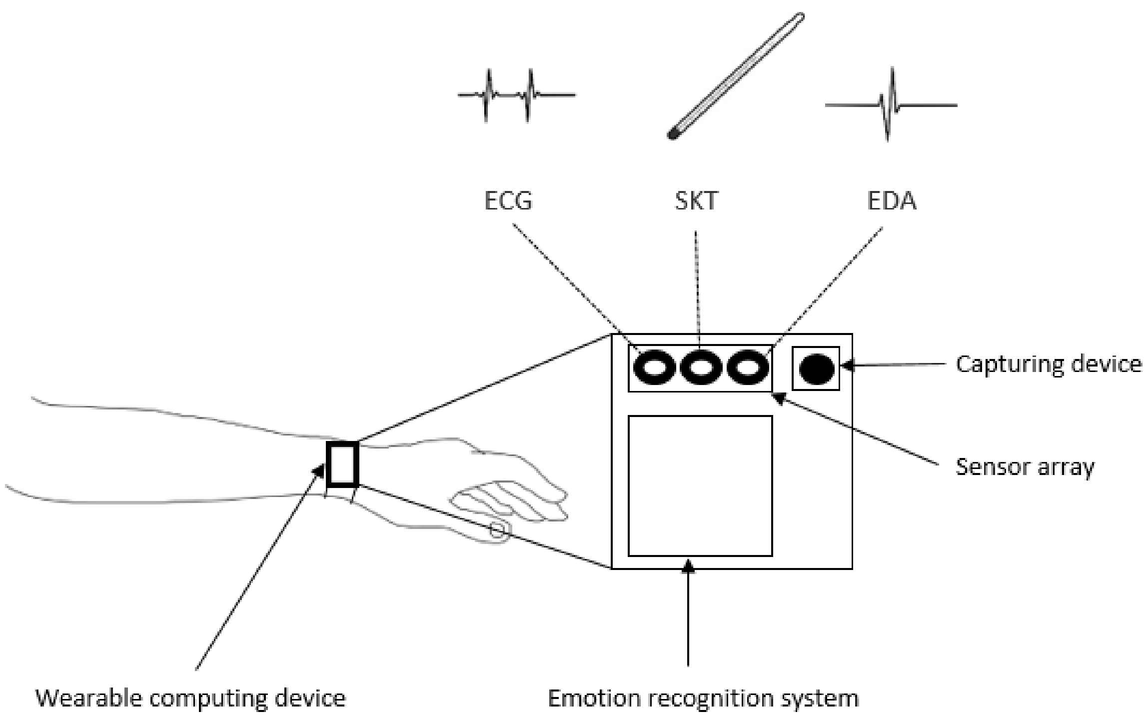

Figure 1: System architecture of a wearable computing device

The sensor array measures physiological parameters of the user, where different ranges of values of the parameters correspond to different emotional states of the user. The correspondence with the emotional states is determined based on empirical studies, case studies, historical data, theory or other similar secondary information.

As shown in Figure 2, the emotion recognition system includes an emotion perceiving unit and a comparator. The emotion perceiving unit includes

i. a feature analyzer,
ii. a plurality of subtractors, and
iii. a Support Vector Machine (SVM) classifier.

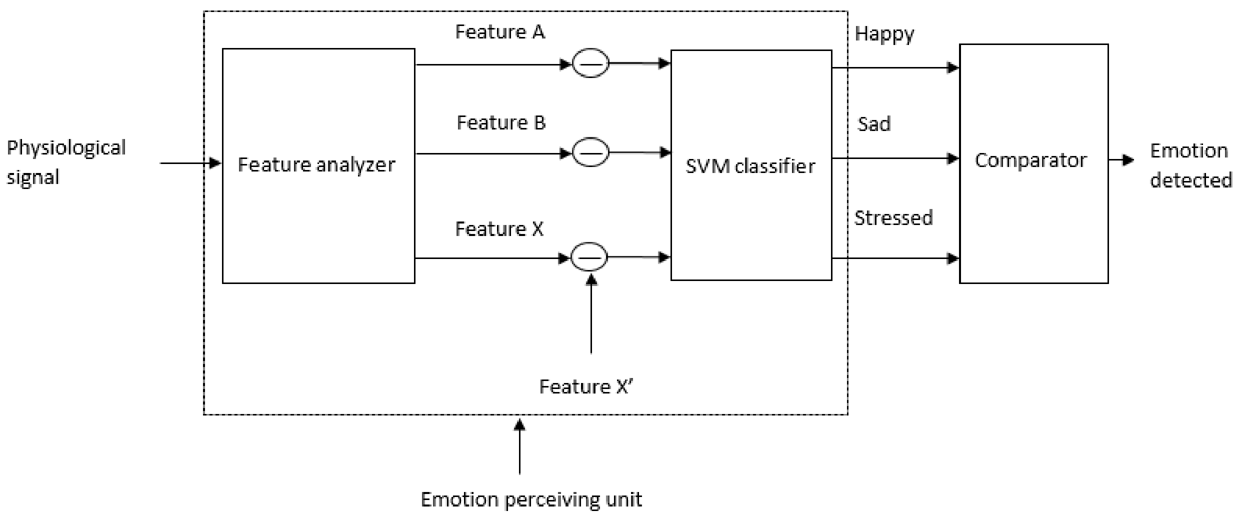

Figure 2: Architecture of the emotion recognition system

The feature analyzer includes a heart rate analyzer, a Skin Conductance Rate (SCR) analyzer and a Skin Temperature (SKT) analyzer. The heart rate analyzer extracts values from heart beat signals (ElectroCardioGram ECG or PhotoPlethysmoGram PPG), the SCR analyzer extracts values associated with ElectroDermalActivity (EDA) signals and the SKT analyzer extracts values related to skin temperature signals.

The emotion recognition system stores reference values for emotion states in a database (present at backend and not demonstrated in Figure 2), where the reference values are collected from different experiments, studies, or from third party data providers. The feature analyzer is adapted to analyze the values of the physiological parameters, acquired from the user, and generate feature values. The plurality of subtractors are adapted to obtain differences between the feature values generated by the feature analyzer and the reference values to perceive an emotional state of the user. The SVM classifier analyzes the differences obtained by the subtractor and classifies the emotion into a plurality of emotional categories, where intensity level of each emotion category is assigned a numerical value. For example, the intensity level corresponding to emotion sadness is 0.4 (or 40%), the intensity level corresponding to emotion happiness is 0.5 (or 50%), the intensity level corresponding to emotion surprise is 0.1 (10%), etc. The intensity levels of the plurality of emotion categories are provided as inputs to the comparator. The comparator analyzes the inputs to calculate which emotion category has the highest intensity level. The emotion category with the highest intensity level is perceived as the emotion of the user and provided as an output by the comparator. If a positive emotion such as happiness, joy or surprise, etc. is perceived, the system sends a command to the capturing device to start recording a video/image of the surroundings based on pre-selected settings and heuristics like shutter speed, aperture, ISO, autofocus, and white balance. The process flow of the working of the system is illustrated in Figure 3.

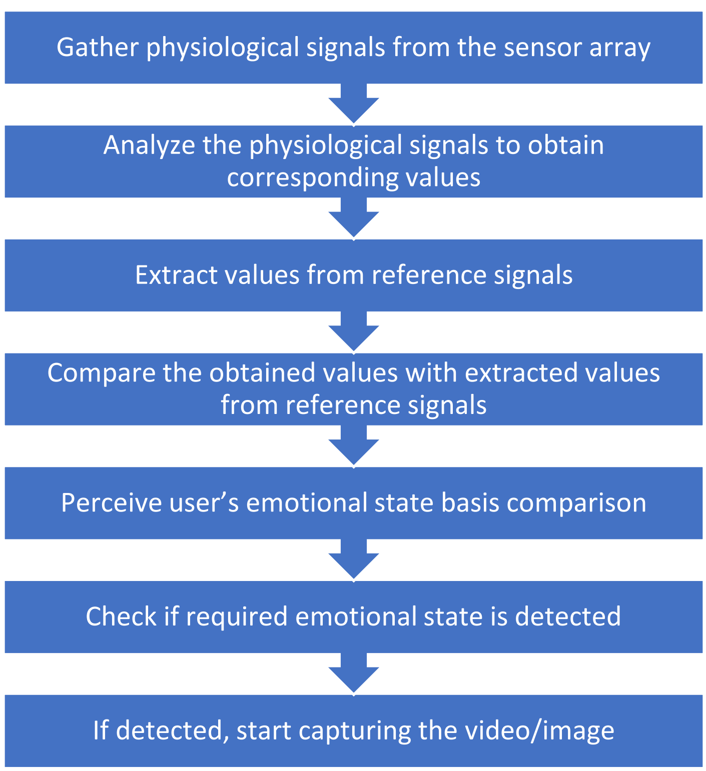

Figure 3: Process flow for capturing the video/image automatically

Additional Embodiments

In one embodiment, the system includes a microphone attached to the wearable computing device for detecting sound signals. The system uses pattern matching to compare the detected sound with a library of sounds. The library can be maintained in the database. If the detected sound is classified as a voice, speech recognition is performed. The system conducts sentiment analysis on the recognized speech to identify emotional sentiments in the speech. The emotional sentiments include happiness, sadness, laughter, pleasure, gladness, cheerfulness, sorrow, grief, and the like. The sentiments in memorable events are usually happiness, pleasure, gladness, cheerfulness, or laughter, etc. and if such sentiments are identified, a command is sent to the capturing device for capturing a video/image of the surroundings.

In yet another embodiment, the system includes a sensing module, an analysis module and a communication module. The sensing module senses objects, people and scenes in its surroundings. Pre-existing compositional models are stored in the database as reference. The analysis module analyzes the captured video/image and compares the objects, people and scenes in the video/image continually with the compositional models stored in the database for pose, stereo correspondence and background correspondence. If the analysis shows that the pose, stereo correspondence or background correspondence are out of synchronization, instructions are received by the communication module of the system for orchestration to correctly fit objects/people/scenes in a frame of the video/image. The capturing device automatically captures the video/image once the orchestration is complete.

In another additional embodiment, the system is Wi-Fi enabled and includes a switch that enables a Wireless Local Area Network (WLAN), making a network accessible to the system. The captured video/images can be wirelessly transferred from the system to a profile associated with the user. Transferring of the video/image files to the user’s profile requires a manual selection. In an alternate embodiment, the video/image files are transferred automatically when a Wi-Fi hotspot is located.

The disclosed idea can further be extended to be utilized in sensing suspicious activities, recording video/image and reporting such activities.

Conclusion

With the advancement in technology, capturing devices are becoming compact, automatic and convenient to handle. The present disclosure introduces a wearable computing device that integrates sensing, analyzing and capturing into a single unit. Such a device avoids burden of carrying a bulky camera and requires least user intervention in handling and for pre-setting the capturing device.