Sensing Technologies for Monitoring Serious Mental Illness

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Abstract Mental illness is often known as mental disorder. It can be defined as a behavioral or mental state that can cause some significant amount of distress or impairment of personal functioning. It is a global issue. Most people in the world will be affected by mental or neurological disorder at some point in their lives. Around 450 million individuals have been affected from mental illness. Wearable devices and smartphones may soon be able to help people who suffer from depression, bipolar disorder, schizophrenia, suicidal thoughts and other disorders by monitoring their activity physical symptoms and social interactions for early warning signs of trouble. In this report we have described how sensing technologies can be useful to monitor and diagnose patients and their behavior. So that it would be easy to detect mental illness.

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1. Introduction

In our day to day lives we come across many people who live or know who are suffering with some kind of mental health issues. Individuals who are suffering from a mental crisis be it be a result of a examined mental illness or a series brought by mental instability have had negative social stigmas placed on them from almost entire societies. These discrimination come from the lack of knowledge and negative data , which has been placed, on individuals who indeed suffer from some form of mental illness.

2. Behavioral Signals

2.1. Location And Mobility

The way we behave in our day to day lives are being characterized by similar patterns and traces of the location. Location can be traced by using GPS sensor present in a mobile phone. Mobility traces from GPS data from phones were taken to monitor depression. Location features are the most important for the prediction of stability in bipolar disorder.

2.2. Pattern and Speech

The characteristics of speech can be used as an crucial signal of mental health issues. The individuals who are suffering from depression and other kinds of mental disorders. Studies also shows that people suffering from mental disorders have a range of lower frequency as well as a slower rate of speech.

2.3. Technologies Used

The way we behave in our day to day lives are often being communicated through technology. The patterns used in phones can be associated with sleep and wake up behaviors. By tracking an individual's sleeping behavior important information into a list of mental illness can be provided.

2.4. Activity

The level of physical actions serve as an indication of mental health. Smartphones having sensors like accelerometer and gyroscope can be used to monitor the activity of the user. Most of the recent studies data were associated with bipolar disorder, depression, and schizophrenia.

3. Physiological Signals

3.1. Facial Expression

Our facial expression always play an important role in conveying our emotional state. In this way facial activities and expressions can be used to detect mental illness.

3.2. Variability of Heart Rate

It gives important information about mental health issues. People who suffer with mental illness have a much greater risk of cardiac arrest as compared to normal individuals. Patients with schizophrenia die premature death due to coronary heart diseases. The heart rate variability is usually measured by ECG data.

3.2. Movement of Eyes

Small changes in eyes movement can provide important information about mental health problems. People who suffer with schizophrenia have a consistent trait of eye tracking dysfunction. Patients with pensive depression show rapid movement of eyes as compared to normal people. Wearable glasses can be used to detect the movement of eyes for examining mental illness.

4. Social Signals

4.1. Interaction Based on Social Media

Sensing technologies can be used to cluster data regarding social interaction that cannot be noticed. Devices like Wi-fi, Bluetooth, near field communication (NFC) can be used to indicate the proximity of the location. The following signals can be used as a substitute for measuring social relationships and interactions.

4.2. Social Media

Social media have been evolved with time according to our social engagement and communication behaviors. Everyone surf internet to use social media to share their views, thoughts and emotions. Recent studies are focusing on extracting and collecting useful signs from non-textual content in social media platform.

5. Conclusion

In this paper we have provided a short or precise overview of technologies for sensing mental illness. We focus on certain technologies that can provide advantage for widely used commercial devices. As we can see that from current studies, sensing technologies can be advantageous in collecting or in providing smaller pieces of information relevant to mental illness. However few more works is needed to be completed before the technologies can be fully merged in the existing healthcare centers. We should focus on numerous challenges which includes the lack of evidence on the basis of clinical reports, blended multimodal data streams.

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