Fig1.   DepSigns home view.

DepSigns

DEPRESSION SIGNS DETECTION THROUGH SMARTPHONE USAGE DATA ANALYSIS

Even though people are generally more aware of physical age-related changes due to their external visibility, psychological age-related changes are equally, if not more, important. Events that occur with age and in seniors' daily life – retirement, the loss of loved ones, increased isolation, and medical problems – can lead to serious problems like depression. In fact, in the United States alone, depressive disorders affect over 6.5 million people aged 65 and older.

DepSigns is a tool that was developed to help caregivers and psychologists monitor seniors, detecting depression symptoms through smartphone usage data analysis.

Problem

Depression is one of the most common mental disorders among the general population and can be manifested from childhood to old age. This is a serious mental health problem that is even considered as the leading cause of disability related to illnesses. In Portugal, one in five Portuguese is depressed in the first meeting with a psychologist, and it affects more than 120 million people worldwide. Depression symptoms include, among others, insomnia or excessive sleeping, weight loss, fatigue, loss of energy, sadness, trouble thinking, concentrating, and isolation. However, an automated solution to detect depression symptoms is currently not available.

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Key features

- Statistical analysis to infer personal habits

- Machine Learning to infer behavioral patterns

- Predict depressive signs from untrained data

- Provide the caregiver with direct psychologist feedback

Fig2.   Statistical analysis and Machine Learning prediction.

Solution

DepSigns aims to detect depression signs through the analysis of the seniors' behavioral variance, using statistics techniques which result in a personal history of the seniors' habits. By analyzing these data it is possible to provide various alerts for several fields, such as activities, communications or mood swings. This information is essential for psychologists monitoring seniors and allows the caregiver to know the actual state of their cared one.

A Machine Learning algorithm learns with the experience of the psychologist's feedback based on previous analyzed statistics, which then allows predicting new possible depressive symptoms in unstudied cases and sends an alert to the psychologist and caregiver. DepSigns is a web service displaying a responsive user interface with the goal to have a multiplatform access everywhere.

Conclusion

We can conclude that it is a complementary study, matching personal habits inferred by statistical techniques with behavioral pattern detection extracted by Machine Learning algorithms. This solution offers a great support to psychologists and it is of great help to caregivers. More importantly, with an early detection of depression symptoms we hope to foster a prompt treatment to depression patients, easing their suffering.

Future Work

In the future, we plan to prioritize alerts – where the worst case is the first in a queue – and send alerts to the caregiver's phone. In the psychologist's view, it is possible to develop more features such as: events management led by Machine Learning predictions; a calendar to schedule a possible meeting with the senior or caregiver; and important notes.