

Public Abstract

First Name:Elena

Middle Name:Victoria

Last Name:Florea

Adviser's First Name:Mihail

Adviser's Last Name:Popescu

Co-Adviser's First Name:

Co-Adviser's Last Name:

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Title:PREDICTION OF MEDICAL EVENTS IN ELDERLY USING SENSOR DATA: A CASE STUDY ON PULSE PRESSURE

The use of technology can help older people who experience deteriorating health to live independently. Supporting the idea of early identification of changing conditions, the primary goal of this research was to find a link between abnormal levels of daily activities, captured by a unobtrusive sensor monitoring system, and vital signs, especially pulse pressure, using data mining algorithms. A widened pulse pressure is associated with cardiovascular risk factors such as diabetes, hypertension, and smoking. It also predicts a higher risk of subsequent cardiovascular events, coronary heart disease, renal disease, heart failure, and mortality, particularly in the elderly. Furthermore, after identifying if this relationship exists, it seemed reasonable trying to predict the pulse pressure and compare the predicted pulse pressure trend with the measured pulse pressure trend. Different classification algorithms including neural network, robust regression, and SVM have been applied to two data sets corresponding to a male and female living at TigerPlace. The results suggest that the bed restlessness and motion levels may be used to predict high pulse pressure in elderly and also by taking into consideration the low heart rate led to an improved prediction rate. The robust regression proved to be the best algorithm. Keeping the robust regression as the choice of the algorithm and choosing the day and night motion as features for the pulse pressure trend calculation, we were able to obtain the predicted pulse pressure trend. We think that differences between the two might be able to provide a hint about the possibility of upcoming abnormal clinical events. Surprisingly, the medication influencing the motion and sleep pattern did not alter the pulse pressure prediction but the predicted pulse pressure trend was able to capture the influence of hyper- and hypotension medication, such as Lopressor and Lasix.