Título: Internet of Health Things Platform to Monitor and Improve Quality of Life

Data: 07/12/2022

Horário: 10h00

Local: Sala de Seminários: Bloco 942-A

Resumo:

Advances in the Internet of Things (IoT), such as sensor miniaturization, efficient communication protocols, expansion in data processing capacity, and

application of intelligent algorithms, have profoundly transformed healthcare. In this context, the term Internet of Health Things (IoHT) emerges from the application of IoT in healthcare, for example, non-invasive Quality of Life (QoL) sensing, older adults' fall detection, and gait analysis. Monitoring people's QoL has attracted interest due to the health benefits of an accurate QoL analysis, such as disease detection and early healthcare interventions. These benefits also have individual impacts by increasing well-being, economic impacts by improving the cost-effectiveness of healthcare resources, and social

impacts by promoting better living conditions. Although many instruments for QoL assessment have been proposed, unfortunately, most of these instruments

are questionnaires, and their application is time-consuming, non-transparent, and error-prone. Based on that, this work proposes the use of IoHT to collect

data from smart environments and apply machine learning techniques to infer QoL measures. Then, an IoHT platform was designed inspired by the MAPE-K

loop and supported by two literature reviews aiming to monitor users' QoL. Also, a longitudinal study with 21 participants for three months was conducted and, during this evaluation, health data were collected daily through smartphones and wearables. These participants answered the WHOQOL-BREF questionnaire weekly and we processed and compiled these data into a dataset with 720 instances. Next, four Machine Learning models were created using

10-fold cross-validation to estimate participants' QoL. Random Forest (RF) had the best results considering the Root Mean Squared Error (RMSE) and computational cost. RF got an RMSE of 7.2215 □ 3.0008 for the physical domain and 6.8838 □ 2.2436 for the psychological domain. The findings showed that: i) it is possible to use IoHT data to infer users' QoL, considering a certain margin of error; ii) RF had a reasonable performance for this problem; and iii) it was not found any decisive feature for the inference process. This last point reinforces that QoL inference using IoHT data is not trivial, and only the combination of a large number of features can give relevant insights into users' QoL.

Banca examinadora:

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