Defesa de Tese: Pedro Almir Martins de Oliveira

Escrito por Secretaria MDCC

Título: HEALFUL - Internet of Health Things Platform to Monitor Quality of Life

Data: 29/09/2023

Horário: 14h00

Local: Sala de Seminários: Bloco 942-A e Videoconferência: (https://meet.google.com/nvn-jijm-rdp)

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 made possible advances in several domains, including healthcare. Internet of Health Things (IoHT) is the term used when IoT is applied to healthcare to provide solutions, 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, most of them are questionnaires, and their application is time-consuming, intrusive, and error-prone. Based on that and using IoHT, this work proposes to collect data from Smart Devices and apply Machine Learning techniques to infer users' QoL. To achieve that, an IoHT platform called Healful was developed to monitor users' QoL. This platform was inspired by the MAPE-K loop and supported by two literature reviews. Also, a case study with 44 participants was conducted for six months, and during this evaluation, health data were collected through smartphones and wearables daily. These participants answered the WHOQOL-BREF questionnaire weekly, and these data were processed and compiled into two datasets with 1,373 instances each. Next, five Machine Learning models were built using 10-fold cross-validation to estimate participants' QoL. Random Forest (RF) had the best results considering the Root Mean Squared Error (RMSE). RF got an RMSE of 7.8618 for the physical domain and 7.4591 for the psychological domain. The thesis findings showed that: i) it is possible to use IoHT to infer users' QoL, considering a certain margin of error; ii) RF had a reasonable performance for this problem; and iii) a decisive subset of features for the inference process was not found. This last point reinforces that QoL inference using IoHT is not trivial, and only the combination of a large number of features can give relevant insights into users' Quality of Life.

Banca examinadora:

- Profa. Dra. Rossana Maria de Castro Andrade (MDCC/UFC - Orientadora)
- Prof. Dr. Pedro de Alcântara dos Santos Neto (UFPI - Coorientador)
- Prof. Dr. Miguel Franklin de Castro (UFC)
- Prof. Dr. Ismayle de Sousa Santos (UFC)
- Prof. Dr. Tales Paiva Nogueira (UNILAB)
- Prof. Dr. Wanderley Lopes de Souza (UFSCAR)