ABSTRACT

CHAGAS, Amanda de Oliveira Sabino das. *Fall Risk Detection in Hospitalized Through Wireless Channel State Information.* 170 f. Dissertação (Mestrado em Engenharia Eletrônica) - Faculdade de Engenharia, Universidade do Estado do Rio de Janeiro (UERJ), Rio de Janeiro, 2021.

Channel Status Information (CSI) is available on IEEE 802.11 wireless networks. The CSI carries information regarding the propagation environment through the amplitude and phase of the OFDM subcarriers. In this study, CSI is used to detect the risk of falling in hospitalized patients. CSI is applied to detect changes in the wireless signal propagation environment and, regarding this non-intrusive principle, fall risk detectors are implemented in a hospital environment. The proposed detectors detect fall risk as anomalies in the environment from changes in the propagation environment. We propose three detectors using different machine learning algorithms: kNN(k-*Nearest Neighbors*), PCA (*Principal Component Analysis*) and Autoencoder. For each of them, the cutoff points are chosen based on the technique of tests and diagnostics of the ROC Curve, obtaining accuracies up to 87.33% for kNN, 93.00% for PCA and 90.92% for Autoencoder. For this work, a database of normal condition and fall risk is developed. In addition to the global analysis of the fall risk detector due to anomalies, we evaluated how different types of falls compromise the functioning of the anomaly detectors, using them to classify situations as risky or without risk of falling.

Keywords: Fall detection. classifiers. anomaly detection. CSI.