

Automatic Classification of the Stand-to-Sit Phase in the TUG Test Using Machine Learning

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Abstract : Over the past several years, researchers have shown a great interest in assessing the mobility of elderly people to measure their functional status. Usually, such an assessment is done by conducting tests that require the subject to walk a certain distance, turn around, and finally sit back down. Consequently, this study aims to provide an at home monitoring system to assess the patient's status continuously. Thus, we proposed a technique to automatically detect when a subject sits down while walking at home. In this study, we utilized a Doppler radar system to capture the motion of the subjects. More than 20 features were extracted from the radar signals, out of which 11 were chosen based on their intraclass correlation coefficient (ICC > 0.75). Accordingly, the sequential floating forward selection wrapper was applied to further narrow down the final feature vector. Finally, 5 features were introduced to the linear discriminant analysis classifier, and an accuracy of 93.75% was achieved as well as a precision and recall of 95% and 90%, respectively.

Keywords : Doppler radar system, stand-to-sit phase, TUG test, machine learning, classification

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