ABSTRACT

Resting tremor in Parkinson’s disease (PD) is one of the most distinctive motor symptoms. Appropriate symptom monitoring can help to improve management and medical treatments and improve the patients’ quality of life. Currently, tremor is evaluated by physical examinations during clinical appointments; however, this method could be subjective and does not represent the full spectrum of the symptom in the patients’ daily lives. In recent years, sensor-based systems have been used to obtain objective information about the disease. However, most of these systems require the use of multiple devices, which makes it difficult to use them in an ambulatory setting. This paper presents a novel approach to evaluate the amplitude and constancy of resting tremor using triaxial accelerometers from consumer smartwatches and multitask classification models. These approaches are used to develop a system for an automated and accurate symptom assessment without interfering with the patients’ daily lives. Results show a high agreement between the amplitude and constancy measurements obtained from the smartwatch in comparison with those obtained in a clinical assessment. This indicates that consumer smartwatches in combination with multitask convolutional neural networks are suitable for providing accurate and relevant information about tremor in patients in the early stages of the disease, which can contribute to the improvement of PD clinical evaluation, early detection of the disease, and continuous monitoring.