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Títol de la tesi	MONITORIZACIÓN AMBULATORIA DE FLUCTUACIONES Y SÍNTOMAS MOTORES MEDIANTE ACELERÓMETROS: CONTRIBUCIÓN A LA DIAGNOSIS Y SEGUIMIENTO DE LA ENFERMEDAD DE PARKINSON
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(Mínim 1 i màxim 4, podeu veure els codis a http://doctorat.upc.edu/gestio-academica/impresos/tesi-matricula-i-diposit/codis-unesco)

Resum de la tesi de 4000 caràcters màxim (si supera els 4000 es tallarà automàticament)

Parkinson's Disease (PD) is a neurodegenerative disorder that currently does not have any known cure. Although there are treatments that enable patients to have a good quality of life over many years, adverse effects, from taking the medication which appear after several years of treatment, affect them deeply. These adverse effects are manifest by patients with fluctuations presented throughout the day between periods or motor states called ON and OFF. The knowledge of how these fluctuations evolve during the day and throughout the disease yield valuable information, not only because neurologists could then effectively tailor medication but also patients could also understand their disease and know precisely its evolution. In this regard, their involvement and understanding of the disease and its development are of vital importance in improving the quality of life of the patient and their surroundings.

This thesis is a contribution to the ambulatory monitoring of motor fluctuations and motor symptoms in PD using accelerometers, and aims to design a sensor system that is able to monitor objectively these fluctuations. A device of this kind would be a significant advance in the clinical practice, as it would allow a personalised monitoring and medication adjustment to the individualised needs of patients. In addition, it would open the possibility for further improvements in the treatment and diagnosis of PD, such as the closed loop control for the continuous administration of medication, the use of technological walking aid guides (using cues, both haptic and sound) or continuous monitoring and the generation of automatic reports and alarms.

Based on this overall objective, which arises from a medical problem, a solution is proposed based on a methodological approach from an engineering world. This methodology enables modelling and, in many aspects, automating the necessary steps to develop technological solutions to problems related to health monitoring. The main contributions of this thesis are within the field of algorithm developments in which, from the generated data bases, a series of classifiers have been developed based on supervised learning techniques that are the "core" of the system.

These contributions are divided into four structured algorithms as a single hierarchical classifier. Among these four classifiers, three of them are responsible for the detection of specific motor symptoms, which represent a yield of valuable information by itself in the monitoring and diagnosis of PD. In this dissertation, it is further proposed to combine this information with that provided from the fourth detector, which enables us to obtain a very precise map of the presence of motor fluctuations throughout the day. These algorithms are based on Support Vector Machine (SVM) classifiers and in the extraction of frequency and temporal characteristics. The validation of these detectors provides values of over 90% accuracy in the detection of motor fluctuations and dyskinesia in more than 20 patients studied. Furthermore, the whole process has been designed under the supervision of medical professionals who directed the research so that the information that the group of algorithms provide is useful and effective in routine clinical practice. Finally, one can say that this whole system is a major advance forward; as currently there does not exist on the market any system with a single sensor with these characteristics that allows neurologists to objectively detect the presence of PD symptoms and, moreover, enables a long-term objective diagnostic method.

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