Detection of Parkinson's Disease Using Deep Learning and Machine Learning

Accurately detecting Parkinson's disease (PD) at an early stage is certainly indispensable for slowing down its progress and providing patients the possibility of accessing to disease-modifying therapy. Towards this end, the premotor stage in PD should be carefully monitored. An innovative deep-learning technique is introduced to early uncover whether an individual is affected with PD or not based on premotor features. Specifically, to uncover PD at an early stage, several indicators have been considered in this study, including Rapid Eye Movement and olfactory loss, Cerebrospinal fluid data, and dopaminergic imaging markers. A comparison between the proposed deep learning model and twelve machine learning and ensemble learning methods based on relatively small data including 183 healthy individuals and 401 early PD patients shows the superior detection performance of the designed model. Besides detecting the PD, we also provide the feature importance on the PD detection process based on the Boosting method.

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