

Constructing domain ontology for Alzheimer disease using deep learning based approach

ABSTRACT

Facts can be exchanged in multiple fields with the help of disease-specific ontologies. A range of diverse values can be produced by mining ontological approaches for demonstrating disease mechanisms. Alzheimer's disease (AD) is an incurable neurological brain illness. An early diagnosis of AD can be helpful for better treatment and the prevention of brain tissue destruction. Researchers have used machine learning techniques to predict the early detection of AD. However, Alzheimer's disorders are still underexplored in the knowledge domain. In the biomedical field, the illustration of terminologies and notions is essential. Multiple methods are adopted to represent these notions, but ontologies are the most frequent and accurate. Ontology construction is a complex and time-consuming process. The designed ontology relies on Disease Ontology (DO), which is considered the benchmark in medical practice. Ontology reasoning mechanisms can be adopted for AD identification. In this paper, a deep convolutional neural network-based approach is proposed to diagnose Alzheimer's disease, using an AD dataset acquired from Kaggle. Machine learning-based approaches (logistic regression, gradient boosting, XGB, SGD, MLP, SVM, KNN, random forest) are also used for a fair comparison. The simulation results are generated using three strategies (default parameters, 10-cross validation, and grid search), and MLP provides superior results on a default parameter strategy with an accuracy of 92.12%. Furthermore, the deep learning-based approach convolutional neural network (CNN) achieved an accuracy of 94.61%. The experimental results indicate that the construction of ontology, with the help of deep learning knowledge, can produce better results where the robustness and scalability can be enhanced. In comparisons to other methods, the CNN results are excellent and encouraging.