Autism Spectrum Disorder Classification Using Deep Learning

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Abstract—The goal of this paper is to evaluate the deep learning algorithm for people placed in the Autism Spectrum Disorder (ASD) classification. ASD is a developmental disability that causes the affected people to have significant communication, social, and behavioural challenges. People with autism are saddled with communication problems, difficulties in social interaction and displaying repetitive behaviours. Several methods have been used to classify the ASD from non-ASD people. However, there is a need to explore more algorithms that can yield better classification performance. Recently, deep learning methods have significantly sharpened the cutting edge of learning algorithms in a wide range of artificial intelligence tasks. These artificial intelligence tasks refer to object detection, speech recognition, and machine translation. In this research, the convolutional neural network (CNN) is employed. This algorithm is used to find processes that can classify ASD with a higher level of accuracy. The image data is pre-processed; the CNN algorithm is then applied to classify the ASD and non-ASD, and the steps of implementing the CNN algorithm are clearly stated. Finally, the effectiveness of the algorithm is evaluated based on the accuracy performance. The support vector machine (SVM) is utilised for the purpose of comparison. The CNN algorithm produces better results with an accuracy of 97.07%, compared with the SVM algorithm. In the future, different types of deep learning algorithms need to be applied, and different datasets can be tested with different hyper-parameters to produce more accurate ASD classifications.

Keywords—Autism Spectrum Disorder, classification, deep learning, Convolutional Neural Network

1 Introduction

Human cerebrum is a very complicated biological organ because the neural congregations inside the cerebrum synchronise and shape practical affiliations that can be designed into a system. The formed systems share highlights with different systems from organic and physical frameworks, and thus inalienably can be delegated complex systems (Jamal et al., 2014). ASD is known as a brain disorder, and here are the symptomatic characteristics: difficulties in social communication; exhibiting restricted, stereotypic patterns, and repetitive behaviours; a lack of interest in social activities (Zaky, 2017). Autism is no respecter of people; it occurs in all socioeconomic, ethnic, and