**ABSTRACT**

The development of computational tools to recognize Autism Spectrum Disorder (ASD) originated by genetic mutations is vital to the development of disease-specific targeted therapies. Identifying genes causing the genetically transmitted ASD is still a challenging task. As genomics data is dependent on domain specific experts for identifying efficient features and extracting hand-crafted attributes involves much time, an alternate effective solution is the need of the hour. The rapid developments in the design of deep architecture models have led to the broad application of these models in a variety of research areas and they have shown considerable success in sequential data processing tasks. The primary goal of this work is to classify the ASD gene sequences by employing a Deep Neural Network based model. This in turn will enable effective genetic diagnoses of this disease and facilitate the targeted genetic testing of individuals. This work utilizes codon encoding and one hot encoding technique to transform the mutated gene sequences which are exploited for self learning the features by deep network. Experiments showed that the performance of the proposed model was better than that of the conventional Multilayer Perceptron with promising accuracy of 77.8%, 80.1% and 81.2% for three different datasets.