Abstract

Alzheimer's disease is an irreversible, progressive brain disease. The symptom of the disease can appear in the form of cognitive difficulties and loss of memory. The number of patients with Alzheimer's disease is growing worldwide. Earlier detection of Alzheimer's disease and its treatment can reduce its effects. Many scholars have focused on implementing various technologies for detecting Alzheimer's disease. Convolutional neural network and other machine learning algorithm has shown remarkable result in the extraction of hidden patterns in imaging sans. Herein, Magnetic resonance imaging (MRI) scans has been used for the detection of Alzheimer's disease. Using MRI scans, this work proposes the implementation of a deep learning model based on a convolutional neural network to classify Alzheimer's disease. Convolutional neural network architecture such as googleNet and resNet34 has been applied to perform detection using transfer learning. This research work also proposes the implementation of hybrid quantum-classical transfer learning model to detect Alzheimer's disease using brain MRI images. In hybrid classical-quantum neural network, resNet34 is used as a pre-trained classical convolutional neural network and a variational quantum circuit is added to the network to classify Alzheimer's disease. In this work, different quantum simulators (Pennylane, Qiskit-Aer, and Qiskit-BasicAer) and pytorch deep learning framework has been used to perform Alzheimer's disease detection using quantum transfer learning method.