

ABSTRACT

Voice over Long-Term Evolution (VoLTE) is an advancement in 4G (Long term Evolution) technology that enable users to experience internet and voice services simultaneously with the help of internet protocols and internet multimedia systems, that leads to data connectivity issues. In this research, a method using ANN modelling has been adopted to predict the data connectivity issues which appear in terms of ping, jitter and latency during the VoLTE voice calls. Two neural network models have been proposed, one for caller end and other for receiver end. Each model has two hidden layers with 10 neurons present in each layer with tan-sigmoid as an activation function. The networks consist of six inputs and three outputs. The training of both models is carried out using Bayesian regularization (BR) technique. Three different types of data transformation i.e. clustering, non-clustering and normalization of data points have been explored in order to find the most optimized/or suitable data points which lead to implement this models in resource constrained embedded systems for on-chip training and testing. It has been observed through experiments that for both cases i.e. caller and receiver end network, the relative error for all data types (clustering, non-clustering and normalized) gives $< 1\%$. However, the mean square error (for caller and receiver end) for the case of normalized data points are 1.26×10^{-6} and 4.47×10^{-6} with training time of approximately 15 seconds. While the other type of data i.e. clustering and non-clustering points for both caller and receiver end network are much higher as compared to normalized data points. This makes the normalized data more suitable when on-chip training is necessary to predict data connectivity issues (ping, jitter and latency) for VoLTE voice call and also for systems where self-calibration are required.