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27

Name : Noraini Binti Seman, *PhD*
Title : Coalition Of Genetic Algorithms And Artificial Neural Network For Isolated Spoken Malay Speech Recognition
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The automatic speech recognition (ASR) field has become one of the leading speech technology areas using artificial intelligence (AI) approaches. Despite all of the advances in the speech recognition area, the problem is far from being completely solved. Various methods have been introduced to develop an efficient ASR system. A variety of automatic knowledge acquisition or learning and adaptation concepts need to be established in speech recognition using AI approaches. These key concepts can only be implemented using artificial neural networks (ANNs) approach. However, traditional ANNs have many fundamental problems regarding a long and uncertain training process, which in most cases learning or training of a neural network is based on a trial and error method. Genetic Algorithm (GA) based learning technique provides an alternative way that involves controlling the learning complexity by adjusting the number of weights of the ANN. However, due to the stochastic nature of this algorithm, the learning process can reach an optimal solution with much higher probability than many standard neural network techniques. In this research, coalition of AI learning techniques for the training of a feed-forward ANN has been proposed to increase the speech recognition performance for an isolated spoken Malay speech recognition system. The data collections contain manual segmentation signals of 5,000 (100 words with 50 repetitions) isolated Malay words which are most frequently uttered by the committee members of Parliament of Malaysia. The data collection is used to create an automated dataset through three different speech endpoints detection (SED) methods. Out of 5,000 words, 60% were used for training and the remaining 40% is divided equally for validation and testing purposes. The approach combines GA with second order gradient based learning algorithms, namely conjugate gradient (CG) methods to achieve optimum weights for hidden and output layers. The proposed method is to apply GA in the first layer and CG in the second layer of the ANN. The methodology also proposed to find optimum number of hidden neurons (HNN) using a hierarchical and dynamic connection strategies for combining weights in ANN architecture. Result shows that the network with coalition of mutation GA (mGA) and CG method produces 98.93% in terms of recognition accuracy and show more than 10% improvement when compared with standard GA and conventional ANN based learning algorithm. From the overall experiments, it can be concluded that the coalition of AI approach, which combines GA and CG algorithm gives highest improvement results in terms of recognition accuracy and less learning time performance for isolated spoken Malay speech recognition system respectively.