IMPROVEMENT OF NEURAL NETWORK PERFORMANCE BY DATA SELECTION USING RADIAL BASIS FUNCTION AND HYBRID MULTILAYERED PERCEPTRON NETWORK

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ABSTRACT

This thesis presents the implementation of Radial Basis Function (RBF) and Hybrid Multilayered Perceptron(HMLP) Neural Network for a classical controller modeling. The word modeling means to develop or to model the controller by using the RBF and HMLP Neural Network that has the ability to predict the output just like the classical controller. The modeling of the classical controller is done through training process of RBFNN and HMLPNN. The purpose of training phase is to obtain the right NN model of the classical controller and it is done through error reduction. If the error cannot be satisfied, the existing network parameters such as weights are updated. In this research project, the input and output pairs of Feedback Modular Servo System Model (MS150) which is controlled by PID controller are taken to perform the simulation for RBFNN. The input of the classical controller is the position error and velocity error. The output of the classical controller is the input voltages that drive the motor. The total selected data is 156. Then 52 data is used for training phase, 52 data for the first testing phase and another 52 data for the second testing phase. The input and output pairs from existing controller was the input for the RBFNN and HMLPNN controller. The simulation involves several phase. The first phase is the training process which is to train the network to find the optimum weights while the error is zero. After the network has been trained, the second phase is the testing process which is to test the performance of the trained network. Different sets of data is used for the testing process and through this process, the performance of the RBFNN and HMLPNN model can be measured. The output of the RBFNN and HMLPNN then compared with the desired output of the classical controller. The simulation results showed that both NN controller can predict the output that similar to the desired output of the classical controller even though the output not exactly the same. It is important to remarks that, the testing data has not been seen at all during the training process. Showing that the training algorithm has the good generalization abilities to predict the output and the data that used during the training phase covers well all the appropriate zone of the input space.