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NEXT DAY LOAD FORECASTING USING ARTIFICIAL NEURAL NETWORK MODELS WITH AUTOREGRESSION AND WEIGHTED FREQUENCY BIN BLOCKS

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Abstract. *In this study, two different hybrid approaches based on Artificial Neural Network (ANN) models with Autoregressive (AR) method and Weighted Frequency Bin Blocks (WFBB), are used for next day load forecasting. To compare with the hybrid approaches and conventional models, the next day load forecasting is also performed by using AR and ANN models, separately. In the first hybrid approach, ANN model with AR method, the results of the AR method applied to all data taken from Turkish Electric Power Company and Electricity Generation Company, is used as an only additional input for ANN model. In this approach, the ANN structure has two layers composed of 49 and 24 neurons for input and output layers, respectively. In the second hybrid approach, ANN model with WFBB, the results obtained from WFBB are used for all inputs in the ANN model. In this approach, input and output layers in the ANN structure are composed of 48 and 24 neurons, respectively. Feed Forward Back Propagation (FFBP) is chosen for all neural network models in this study. The forecasting results obtained from AR, ANN and the two hybrid models are compared to each other in the sense of root mean square error (RMSE). It is observed that the RMSE values for the hybrid approaches are smaller than the conventional models. Then, the hybrid models forecast better than the conventional models.*

Keywords: Load forecasting, Autoregressive, Artificial neural network, Weighted frequency bin blocks

1. **Introduction.** Load forecasting is a very important issue in power system planning and operation. Accuracy in load forecasting can allow utilities to operate at least cost. The main problem of the planning is the demand knowledge in the future. Basic operating functions such as hydrothermal unit commitment, economic dispatch, fuel scheduling and unit maintenance can be performed efficiently with an accurate forecast [1,2]. Load forecasting is also important for contract evaluations and evaluations of various sophisticated financial products on energy pricing offered by the market. A wide variety of models have been proposed in the last decades owing to the importance of load forecasting, such as regression based methods [3,4], Box Jenkins model [5], exponential smoothing [6], and Kalman filters [7]. However, these methods can not represent the complex nonlinear relationships [8]. Also, these methods have higher load forecasting errors in some particular time zones. The computational intelligence techniques have been developed to overcome these problems [9-15]. ANN method is one of the load forecasting methods. ANN methods have two advantages: one is capability of approximating any nonlinear function and the other is model determination through the learning process.