ABSTRACT

This research is about the prediction of the use of electrical loads in a building with the prediction techniques of the Least Mean Square (LMS) and Compressive Sensing (CS). The prediction of electricity loads is important because the use of electrical energy is a major factor in energy waste in many offices and buildings, especially in rooms with high-power electronic devices such as computers, air conditioners and dispensers. The results of the prediction can be used as an anticipation measure, in particular for those generating energy to plan for future investment and diversification of energy sources. In this research, the choice of the LMS technique, the simplicity of this prediction technique, and the popularity of this technique in many signal processing areas, including prediction. On the other hand, the CS technique was chosen because it has not been widely used for prediction purposes.

In this research, prediction using LMS and CS was carried out with the initial stage of data acquisition, followed by processing the data. The data processed comes from the actual use of electrical loads in the P Building of the Faculty of Electrical Engineering which is taken in a span of 31 days in the period 16 April 2020 to 16 May 2020 with the observed magnitude is Time Average Energy (TAE) with acquisitions carried out every minute for 24 hour. Furthermore, this data is totaled for each day for 31 days. With several parameters, namely filter order and adaptation coefficient (μ), prediction using LMS is accomplished. In CS, observations were performed by changing the parameter of the sparsity level (k). The performance of the system was evaluated with root mean square error (RMSE) and time of computation.

With the data tested, the results show that for data prediction systems with an RMSE value of 3.19, the CS method is better compared to an RMSE of 10.59 in the LMS. On the other hand, the computation time for CS is 0.0025 seconds in terms of computation time, compared to 0.0029 seconds for LMS. The LMS is more accurate is 14.15 kWh compared is 18.2 kWh in CS in terms of predicting the electrical load on the 32nd day, with actual data at 14.93 kWh on the 32nd day.

***Keywords**: Electrical energy, Prediction, LMS, CS.*