ABSTRACT

This final project examines effort setting for AC using the Support Vector Machine (SVM) to classify the level of cooling load based on room conditions. The data used in this study were generated dummy with three categories of conditions which are the room with low-density, medium-density, and high-density. The low-density room is occupied by one employee, the medium-density room is occupied by five people and the high-density room is occupied by eight people. The low-density and medium-density room size are both 14 m^2 and high-density is 15 m^2.

The input data that will be processed by SVM are the number of people in the room, indoor temperature, outdoor temperature, and target air conditioner's temperature. SVM adopts a Structure Risk Minimization which can reduce generalization of errors in several training data and can solve high-dimensional non-linear problems to give a better classification accuracy. The SVM output category in this study is divided into four types, called 1,2,3,4 which corresponds to effort-off, low, medium, and high types. This effort is a category of the air conditioner's setting to reach the target temperature. The training process with the SVM parameter configuration using a gamma value = 0.3, the Gaussian RBF kernel function, and a smoothing factor value of C = 1 giving the highest accuracy of 96.9%. With the data tested in this final project, the results obtained for the accuracy of a room with a low-density is 87.8%, medium-density is 96.4%, high-density is 98.8% and the average computing time is 0.46 second.

The results of the efficiency in the room tested with the SVM algorithm were low-density reached 48,9%, medium-density reached 40,1%, and high-density reached 49,5%. Computing time for this simulation with computer specifications: AMD Ryzen 5 2500 U processor, 2 GHz, 4 GB RAM, 0,14 seconds. Thus, this research can provide an efficiency between 40-49,5%.

Keywords: *energy efficiency, air conditioning, machine learning, support vector machine, AC setting effort*