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CPE32S3
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Title 1: *Application of Multilayer Perceptron Method on Heat Flow Meter Results for Reducing the Measurement Time*
Author: *S. Gumbarević, B. Milovanović, M. Gaši, and M. Bagarić*
Date of publication or conference: *14 November 2020*
Title of publication or conference proceeding: *7th Electronic Conference on Sensors and Applications*

What is the problem being solved in the research?
The research is addressing a problem of assessing building envelope performance, based on existing buildings, in which the European Union mandates for Near zero-energy buildings.

What is the proposed solution of the author/s?
The researchers proposed solution is to use artificial intelligence and multilayer perceptron methods to speed up the determination of in-situ U-values using the Heat FLux Method. And by using AI and MLP they aim to streamline the measurement process and improve the efficiency of evaluating building envelope thermal transmittance, which will lead to renovating of building stock to meet energy efficiency standards.

How did the author/s solve the problem/s? Provide a summary of the methodology
According to the methodology of the research paper, they first focused on the heat flux method where they measure the heat flux density by the heat flow sensor, and on measuring the interior and exterior air temperatures using thermocouples. And by using Artificial Neural Network Multilayer Perceptron, they used a two input neurons for internal and external air temperatures, where one hidden layer with 3 perceptrons, and 1 output predicting the heat flux, the network is trained on subsets of data points using the mean squared error to the cost function and stochastic gradient descent, optimizing for minimization, which aims to predict the U-value with improved efficiency.

Provide a summary of the results.
Based from the results gained by the researchers they had 3 cases that were analyzed on one measurement dataset, where the first case is their ANN prediction model trained on ¼ of the data points which they compare the predicted results and there gathered measurements, the second case was they using ½ of the data and the last trained model case was ⅔ of the data, in to summarize the results the researchers concluded that the best prediction is achieved for the ANN trained on 1/2 of the total data points with a relative difference between the measured U-value and the predicted U-value of 0.78%, with the RMSE, MSE and MAE: 1.195, 1.428 and 0.826.

What is the conclusion of the author/s and provide your own recommendations on the paper.
According to the research authors, their findings “showed promising results for the application of the MLP method on the heat flux rates measurement results in order to decrease the time needed to carry out the measurement when one heat flux sensor must be used.” For my recommendation and insights to their research paper their research and findings are very useful to the overall problem and solution, furthermore the research can somewhat be improved in using other different methods or more tuning of the data and network to increase the accuracy of the model.

Title of the research: *Improvement of Marine Steam Turbine Conventional Exergy Analysis by Neural Network Application*
Author: *S. B. Šegota, I. Lorencin, N. Anđelić, V. Mrzljak, and Z. Car*
Date of publication or conference: *5 November 2020*
Title of publication or conference proceeding: *Marine Power Systems*

What is the problem being solved in the research?
The researchers want to address the need for efficient analysis of marine steam turbine performance, focusing on reducing the number of required measurements, while maintaining high accuracy and precision.

What is the proposed solution of the author/s?
The researchers proposed that by utilizing the Multilayer Perceptron neural network to perform exergy analysis of marine steam turbines, they aim to reduce the number of required measurements, maintaining accuracy and precision in analyzing the overall turbine performance. Through that approach their research and finding can offer potential benefits in optimizing control and measurement equipment in marine steam power plants.

How did the author/s solve the problem/s? Provide a summary of the methodology
The researchers focused first on the Description and Operation Principle of the Analyzed Main Marine Steam Turbine where the main marine steam turbine is analyzed, according also to the chronological order of their methodology they also focused on Conventional Exergy Analysis of Main Marine Steam Turbine and Each of its Cylinders where they characterized the main marine steam turbine and its cylinders to prove the fact that three steam operating parameters steam temperature, pressure and mass flow rate must be measured in each operating point. Then they analyzed the Exergy of Main Marine Steam Turbine and Each of its Cylinders by applying a multilayer perceptron neural network, providing more analysis and prediction based on the gathered data and training model. Lastly the researchers search for the Steam Operating Parameters that is required for the Exergy Analysis of the MLP neural network application.

Provide a summary of the results.
Based on the researchers findings it demonstrates R2 scores of 0.99 for exergy destruction and efficiency models, with satisfactory error ranges during their cross-validations. Their hyperparameter analysis revealed a tendency leaning towards larger hidden layer sizes and high regularization values, in which it indicated the complexity of their regression problems and effectives of their activation function and equations in all models.

What is the conclusion of the author/s and provide your own recommendations on the paper.
The authors conclude that MLP effectively calculates marine steam turbine exergy parameters with complex architectures yielding optimal results. They proposed reducing measurement equipment by selecting a subset of inputs and plan to further optimized operating points and investigate performance degradation coefficients for broader applications.