World Academy of Science, Engineering and Technology
International Journal of Civil and Architectural Engineering
Vol:18, No:02, 2024

Development of a Decision-Making Method by Using Machine Learning Algorithms in the Early Stage of School Building Design

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Abstract : Over the past decade, energy consumption in educational buildings has steadily increased. The purpose of this research is to provide a method to quickly predict the energy consumption of buildings using separate evaluation of zones and decomposing the building to eliminate the complexity of geometry at the early design stage. To produce this framework, machine learning algorithms such as Support vector regression (SVR) and Artificial neural network (ANN) are used to predict energy consumption and thermal comfort metrics in a school as a case. The database consists of more than 55000 samples in three climates of Iran. Cross-validation evaluation and unseen data have been used for validation. In a specific label, cooling energy, it can be said the accuracy of prediction is at least 84% and 89% in SVR and ANN, respectively. The results show that the SVR performed much better than the ANN.

Keywords : early stage of design, energy, thermal comfort, validation, machine learning
Conference Title : ICACE 2024 : International Conference on Architectural and Civil Engineering
Conference Location : Washington, United States
Conference Dates : February 26-27, 2024