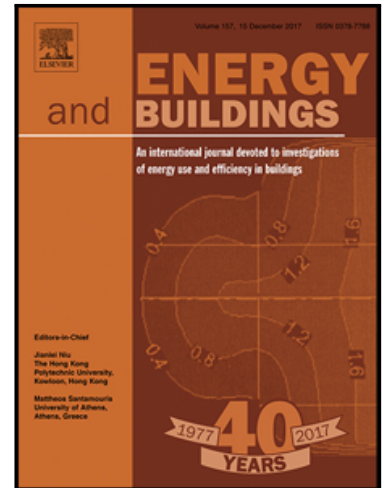


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Random Forest based Hourly Building Energy Prediction

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Abstract

Accurate building energy prediction plays an important role in improving the energy efficiency of buildings. This paper proposes a homogeneous ensemble approach, i.e., use of Random Forest (RF), for hourly building energy prediction. The approach was adopted to predict the hourly electricity usage of two educational buildings in North Central Florida. The RF models trained with different parameter settings were compared to investigate the impact of parameter setting on the prediction performance of the model. The results indicated that RF was not very sensitive to the number of variables (*mtry*) and using empirical *mtry* is preferable because it saves time and is more accurate. RF was compared with regression tree (RT) and Support Vector Regression (SVR) to validate the superiority of RF in building energy prediction. The prediction performances of RF measured by performance index (PI) were 14-25% and 5-5.5% better than RT and SVR, respectively, indicating that RF was the best prediction model in the comparison.

Moreover, an analysis based on the variable importance of RF was performed to identify the most influential features during different semesters. The results showed that the most influential features vary depending on the semester, indicating the existence of different operational conditions for the tested buildings. A further comparison between RF trained

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