Robust modeling of heating and cooling loads using partial least squares towards efficient residential building design

Kadir Kavaklioglu

www.elsevier.com/locate/jobe

PII: S2352-7102(18)30112-8
DOI: https://doi.org/10.1016/j.jobe.2018.04.018
Reference: JOBE463

To appear in: *Journal of Building Engineering*

Received date: 29 January 2018
Revised date: 16 April 2018
Accepted date: 19 April 2018

Cite this article as: Kadir Kavaklioglu, Robust modeling of heating and cooling loads using partial least squares towards efficient residential building design, *Journal of Building Engineering,* https://doi.org/10.1016/j.jobe.2018.04.018

Robust modeling of heating and cooling loads using partial least squares towards efficient residential building design

Kadir Kavaklioglu

Pamukkale University, Mechanical Engineering Department, Denizli, TURKEY

kadir.kavaklioglu@pau.edu.tr

Abstract

Partial least squares method was used to model residential building heating and cooling loads. These loads were modeled as functions of eight input variables such as relative compactness, surface area, wall area, roof area, overall height, orientation, glazing area and glazing area distribution. The data for the models were taken from the literature and they consisted of values obtained through a commercial software package. Model validation was performed using k-fold cross validation method. Model validation was also performed using an analysis of total sum of squares of the data explained by the partial least squares latent variables. Validated models were compared against ordinary least squares models for heating and cooling loads, respectively. These models were used to determine the most influential input variables so that efficient building designs can be made. The results indicated that it is feasible to apply partial least squares regression to heating and cooling loads; and significant reduction in dimensionality may be achieved using the importance information provided by this method.

Graphical Abstract: