A STUDY OF THE ENERGY EFFICIENT BUILDING DESIGN TO PREDICTING HEATING AND COOLING LOADS BY ADVANCED DATA MINING APPROACH

A STUDY OF ENERGY CONSERVING BUILDING DESIGN TO PREDICT HEATING AND COOLING LOADS BY ADVANCED DATA MINING APPROACH

Tác giả: *Pham Anh Duc; Le Thi Kim Oanh; Ho Thi Kieu Oanh*

Tóm tắt bằng tiếng Việt:

Advanced data mining (DM) approaches are potential tools for solving civil engineering problems. This study investigated the potential use of advanced approaches and proposes a hybrid meta-heuristic optimization algorithm - based prediction model that integrates artificial firefly colony algorithm and machine learning prediction model. The proposed model were constructed using 768 experimental datasets from the literature with 8 input parameters and 2 output parameters including heating load (HL) and cooling load (CL). Compared to previous works, the proposed model further obtained at least 33.8% to 86.9% lower error rates, respectively, for CL and HL prediction. This study confirms the efficiency, effectiveness, and accuracy of the proposed approach when predicting CL and HL in building design stage. The analytical results support the feasibility of using the proposed techniques to facilitate early designs of energy conserving buildings.The analytical results support the feasibility of using the proposed techniques to facilitate early designs of energy conserving buildings.

Từ khóa: cooling load; heating load; energy performance; energy-efficient building; swarm intelligence; data mining.

Tóm tắt bằng tiếng Anh:

Advanced data mining (DM) approaches are potential tools for solving civil engineering problems. This study investigates the potential use of advanced approaches and proposes a hybrid meta-heuristic optimization algorithm - based prediction model that integrates artificial firefly colony algorithm and machine learning prediction model. The proposed model was constructed using 768 experimental datasets from the literature with 8 input parameters and 2 output parameters including heating load (HL) and cooling load (CL). Compared to previous works, the proposed model obtained at least 33.8% to 86.9% lower error rates respectively, for CL and HL prediction. This study confirms the efficiency, effectiveness, and accuracy of the proposed approach when predicting CL and HL in building design stage. Therefore, the analytical results certainly support the feasibility of using the proposed techniques to facilitate early designs of energy conserving buildings.

Key words: cooling load; heating load; energy performance; energy-efficient building; swarm intelligence; data mining.