

عنوان مقاله:

Hybrid Artificial Intelligence Model Development for Roller-compacted Concrete Compressive Strength Estimation

محل انتشار:

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خلاصه مقاله:

This study implemented the artificial bee colony (ABC) metaheuristic algorithm to optimize the Artificial Neural Network (ANN) values for improving the accuracy of model and evaluate the developed model. Compressive strength of RCC was investigated using mix design materials in three forms, namely volumetric weight input (cement, water, coarse aggregate, fine aggregate, and binder), value ratio (water to cement ratio, water to binder ratio, and coarse aggregate to fine aggregate ratio), as well as the percentage of mix design values of different ages. A comprehensive, proper-range dataset containing ۳۳۳ mix designs was collected from various papers. The accuracy of the research models was investigated using error indices, namely correlation coefficient, root-mean-square-error (RMSE), mean absolute error (MAE), and developed hybrid models were compared. External validation and Monte Carlo simulation (MCS)-based uncertainty analysis was also used to validate the models and their results were reported. The experimental stage of the prediction of compressive strength values showed significant accuracy of the ANN-ABC model with (MAE=۱۱.۴۹, RMSE=۰.۹۲, RME=۵.۲۱) compared to other models in this study. Besides, the sensitivity analysis of predictor variables in this study revealed that the variables "specimen age," "binder," and "fine aggregate" were more effective and important in this research. Comparison of the results showed that the improved proposed model using the ABC algorithm was more capable and more accurate in reducing the error rate in providing computational relations compared to the default models examined in the prediction of the compressive strength of .RCC and also tried in simplifying computational relations

کلمات کلیدی:

Artificial Neural Network, Artificial Bee Colony Algorithm, Roller-Compacted Concrete, Compressive strength

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