The determination of ground granulated concrete compressive strength-based machine learning models

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ABSTRACT

The advancement of machine learning (ML) models has received remarkable attention by several science and engineering applications. Within the material engineering, ML models are usually utilized for building an expert system for supporting material design and attaining an optimal formulation material sustainability and maintenance. The current study is conducted on the based of the utilization of ML models for modeling compressive strength (C_s) of ground granulated blast furnace slag concrete (GGBFSC). Random Forest (RF) model is developed for this purpose. The predictive model is constructed based on multiple correlated properties for the concrete material including coarse aggregate (CA), curing temperature (T), GGBFSC to total binder ratio (GGBFSC/B), water to binder ratio (w/b), water content (W), fine aggregate (FA), superplasticizer (SP). A total of 268 experimental dataset are gather form the open-source previous published researches, are used to build the predictive model. For the verification purpose, a predominant ML model called support vector machine (SVM) is developed. The efficiency of the proposed predictive and the benchmark models is evaluated using statistical formulations and graphical presentation. Based on the attained prediction accuracy, RF model demonstrated an excellent performance for predicting the C_s using limited input parameters. Overall, the proposed methodology showed an exceptional predictive model that can be utilized for modeling compressive strength of GGBFSC.