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Concrete Breaking Strength Prediction Using Machine Learning

Dr. R. Premsudha[1], Dr. S. Kapilan[2], G. Viswanathan[3], M. Naganathan[4], S. Dhamodaran[5]
Professor and HoD[1], Department of Civil Engineering
Associate Professor[2], Department of Civil Engineering,
Final Year Students, Department of Civil Engineering[3,4,5]
Akshaya College of Engineering , Kinathukadavu, Coimbatore, India

Abstract: *When it comes to estimating, classifying, and forecasting material strength based on changing material parameters, machine learning (ML) techniques have shown to be dependable methodologies. It is found that choosing the right machine learning technique depends on the characteristics of the problem and the available data. Therefore, fifteen different machine learning techniques were used to a specific dataset of concrete compressive strength in order to assess the accuracy of ML models to predict concrete compressive strength. Due to its excellent performance while dealing with continuous target variables and nonlinear interactions among the features and the target, the Support Vector Regressor (SVR) had the greatest prediction accuracy (88.18%) of all the ML methods employed. To guarantee the structural integrity of building projects, it is essential to predict the breaking strength of concrete. The goal of this project is to create a machine learning model that can forecast concrete's breaking strength depending on the mix's composition and curing circumstances. A dataset was created that included details regarding concrete samples, such as mix ratios, curing temperatures, curing times, and breaking strengths. recise estimation of concrete's compressive strength is crucial for the advancement and construction. A bibliometric analysis of the pertinent literature published in was conducted in order to comprehend the state of research in the field of concrete compressive strength prediction. The previous ten years have seen the first research in this sector. The database consisted of 31,35 journal articles published between 2012 and 2021 in the Web of Science core database. The knowledge map was created using Cite Space 6.1R2, a visualisation tool, to analyse the field at a macro level in terms of hotspot distribution, spatial and temporal distribution, and evolutionary trends, respectively. Next, we become specific and separate the prediction techniques for concrete compressive strength into two groups.*

Keywords: Predicting the breaking strength of concrete machine learning; compressive strength of concrete; prediction; gradient boost regression tree; artificial intelligence; bibliometric