Knowledge Discovery of Concrete Material Using Genetic Operation Trees

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Abstract

This study proposed a novel knowledge discovery method, Genetic Operation Tree (GOT), which is composed of operation tree (OT) and genetic algorithm (GA), to automatically produce self-organized formulas to predict compressive strength of High-Performance Concrete. In GOT, operation tree plays the architecture to represent an explicit formula, and genetic algorithm plays the optimization mechanism to optimize the operation tree to fit experimental data. Experimental data from several different sources were used to evaluate the method. The results showed that GOT can produce formulas which are more accurate than non-linear regression formulas but less accurate than neural network models. However, neural networks are black box models, while GOT can produce explicit formulas, which is an important advantage in practical applications.

Keyword：knowledge discovery, genetic algorithms, operation tree, material, concrete.