

Concrete Mix Design Using Neural Network

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Abstract : Basic ingredients of concrete are cement, fine aggregate, coarse aggregate and water. To produce a concrete of certain specific properties, optimum proportion of these ingredients are mixed. The important factors which govern the mix design are grade of concrete, type of cement and size, shape and grading of aggregates. Concrete mix design method is based on experimentally evolved empirical relationship between the factors in the choice of mix design. Basic draw backs of this method are that it does not produce desired strength, calculations are cumbersome and a number of tables are to be referred for arriving at trial mix proportion moreover, the variation in attainment of desired strength is uncertain below the target strength and may even fail. To solve this problem, a lot of cubes of standard grades were prepared and attained 28 days strength determined for different combination of cement, fine aggregate, coarse aggregate and water. An artificial neural network (ANN) was prepared using these data. The input of ANN were grade of concrete, type of cement, size, shape and grading of aggregates and output were proportions of various ingredients. With the help of these inputs and outputs, ANN was trained using feed forward back proportion model. Finally trained ANN was validated, it was seen that it gave the result with/ error of maximum 4 to 5%. Hence, specific type of concrete can be prepared from given material properties and proportions of these materials can be quickly evaluated using the proposed ANN.

Keywords : aggregate proportions, artificial neural network, concrete grade, concrete mix design

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