Prediction of Concrete Strength using Neural Network

Introduction

Engineering is a field where accurate estimates of performance of building materials is crucial. Estimates can be used for governing material used in construction. Estimating strength of concrete is a challenge as concrete performance varies greatly due to the use of a wide variety of ingredients that interact in complex ways. Hence it is difficult to predict the strength of the final product.

Concrete is the most important material in civil engineering. The concrete compressive strength is a highly nonlinear function of age and ingredients. These ingredients include cement, blast furnace slag, fly ash, water, superplasticizer, coarse aggregate, and fine aggregate. Conventional concrete is a mixture of cement, water, and coarse and fine aggregates.. The aim of any proportioning process is to determine an ample and cost-effective material to make up the concrete, which can be used in its fabrication, as near as possible to the chosen properties. The engineering properties of cement-based materials and special concretes depend on various parameters including the nonhomogeneous nature of their components and the intrinsically different properties of various elements and sometimes on the twin and/or contradictory effects of some ingredients on the overall concrete performance. Therefore, a clear understanding of such complex behavior is needed in order to successfully use these materials in various engineered structures.

The research project aims at predicting the concrete compressive strength using an Artificial Neural Network (ANN).

Objective of the project

To develop a model that reliably predicts concrete strength, given a listing of the composition of the input materials could result in safer construction practices.

About the Dataset

The dataset includes various features used to measure the concrete compressive strength:

Name of the component	Data type	Measurement	Description
Cement	Quantitative	kg in a m3 mixture	Input variable
Blast Furnace Slag	Quantitative	kg in a m3 mixture	Input variable
Fly Ash	Quantitative	kg in a m3 mixture	Input variable
Water	Quantitative	kg in a m3 mixture	Input variable
Superplasticizer	Quantitative	kg in a m3 mixture	Input variable
Coarse Aggregate	Quantitative	kg in a m3 mixture	Input variable
Fine Aggregate	Quantitative	kg in a m3 mixture	Input variable
Age	Quantitative	Day (1~365)	Input variable
Concrete compressive strength	Quantitative	MPa	Output variable

Challenge

1. Perform exploratory data analysis to understand the significant features in determining the concrete compressive strength
2. Build a predictive model using Artificial Neural Network using Tensorflow framework to assess the factors determining the strength of concrete.