Concrete Strength Prediction from Composition and Age

Presented by
Artem Ramus

Background

Abstract
Concrete is the most important material in civil engineering. The concrete compressive strength is a highly nonlinear function of age and ingredients.

Source
Original Owner and Donor Prof. I-Cheng Yeh Department of Information Management Chung-Hua University, Hsin Chu, Taiwan 30067, R.O.C. e-mail:icyeh@chu.edu.tw
Heysem Kaya, Department of Computer Engineering, Boğaziçi University, TR-34342, Beşiktaş, İstanbul, Turkey Email: heysem@boun.edu.tr

Citation Request

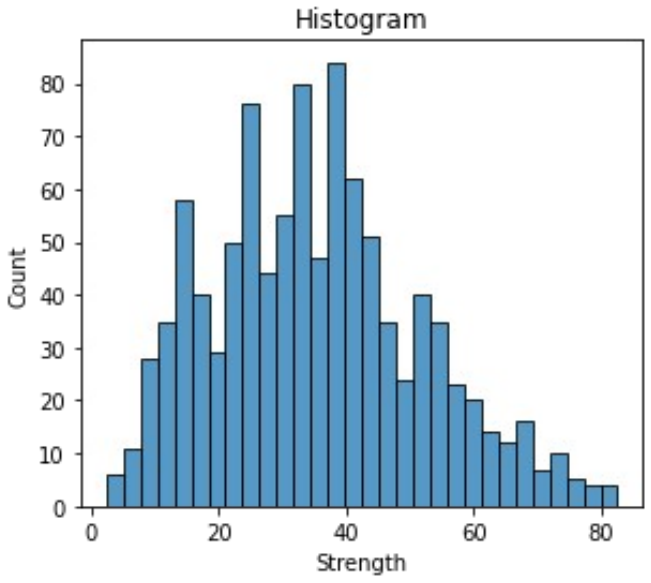
I-Cheng Yeh, "Modeling of strength of high performance concrete using artificial neural networks," Cement and Concrete Research, Vol. 28, No. 12, pp. 1797-1808 (1998).

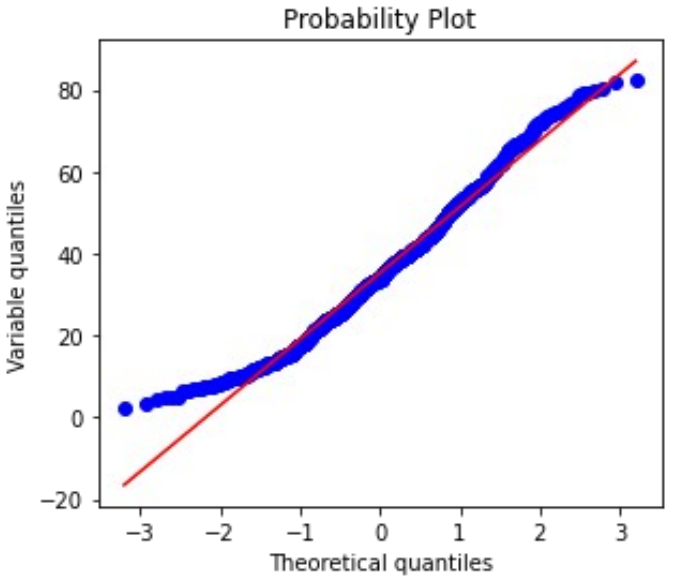
Introduction

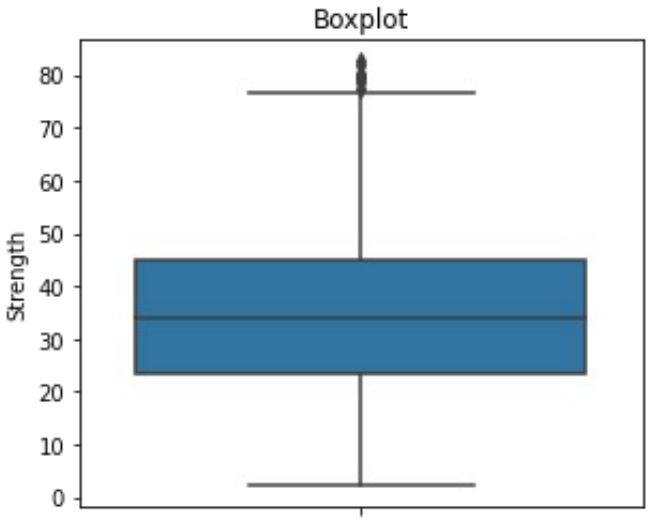
The goal of this project is to predict compressive strength of concrete from composition and age.

Available variables
Cement, kg in a m3 mixture
Blast Furnace Slag, kg in a m3 mixture
Fly Ash, kg in a m3 mixture
Water, kg in a m3 mixture
Superplasticizer, kg in a m3 mixture
Coarse Aggregate, kg in a m3 mixture
Fine Aggregate, kg in a m3 mixture
Age, days

Exploratory Data Analysis

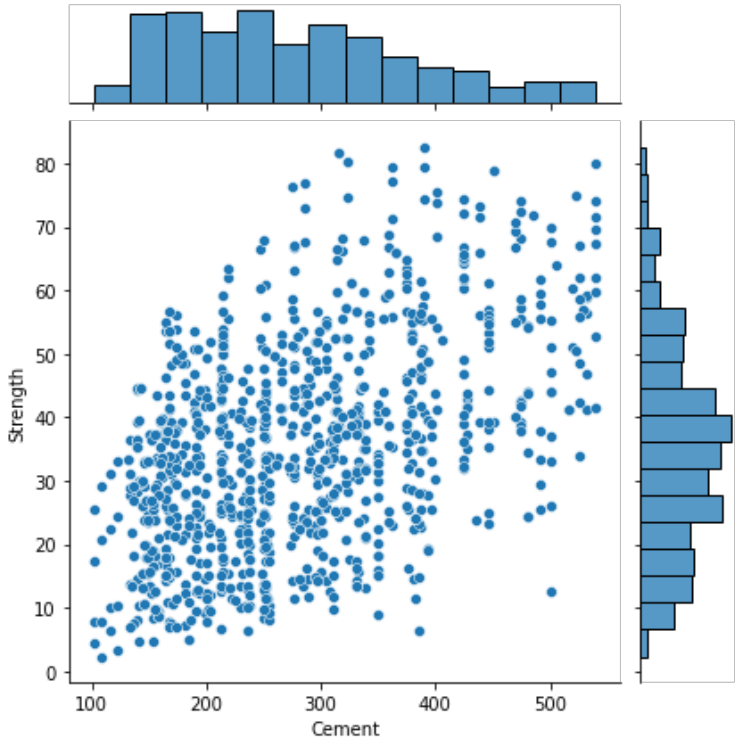


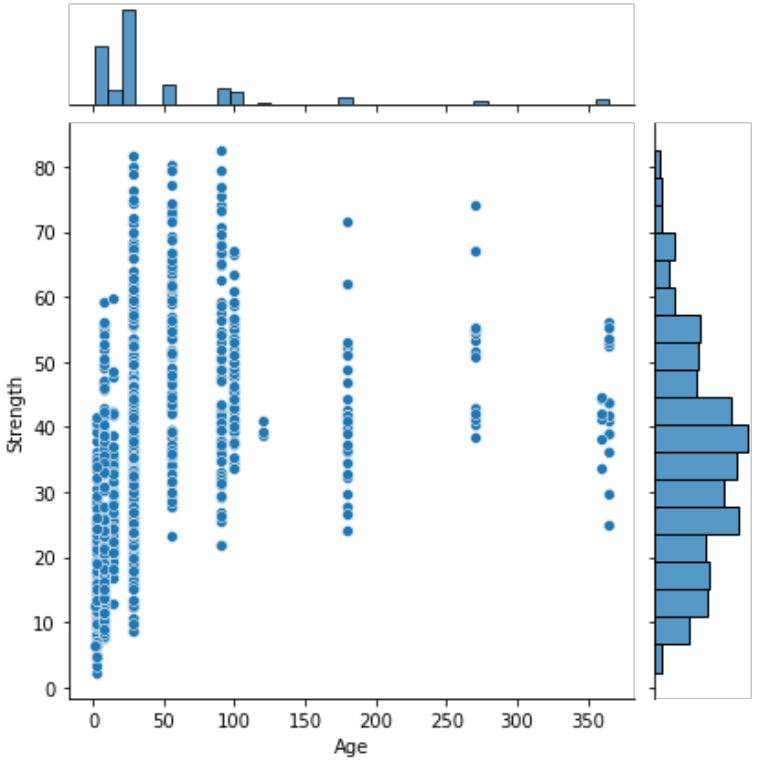




Distributions of numerical variables are reasonably close to normal.
No acute outliers.

Exploratory Data Analysis





Target variable is highly dependable on ‘Cement’ and ‘Age’.

Feature Engineering and Selection

Original distribution of all the variables selected.

Based on single feature shuffling method, variables ‘Fly_Ash’ and ‘Superplasticizer’ showed least influence of about 1%.

Selected variables: ‘Cement’, ‘Blast Furnace Slag’, ‘Water’, ‘Coarse Aggregate’, ‘Fine Aggregate’ and ‘Age’.

Summary and Conclusions

XGBoost regression gave RMSE of 24.3 MPa and R square score of 92%.

The end

Thank you for your attention!