Concrete Strength Prediction from Composition and Age

Presented by
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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
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Citation Request

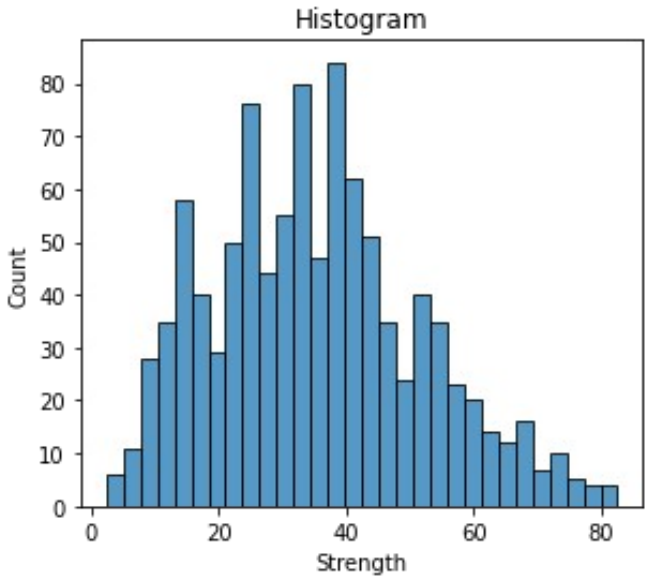
I-Cheng Yeh, "Modeling of strength of high performance concrete using artificial neural networks," Cement and Concrete Research, Vol. 28, No. 12, pp. 1797-1808 (1998).

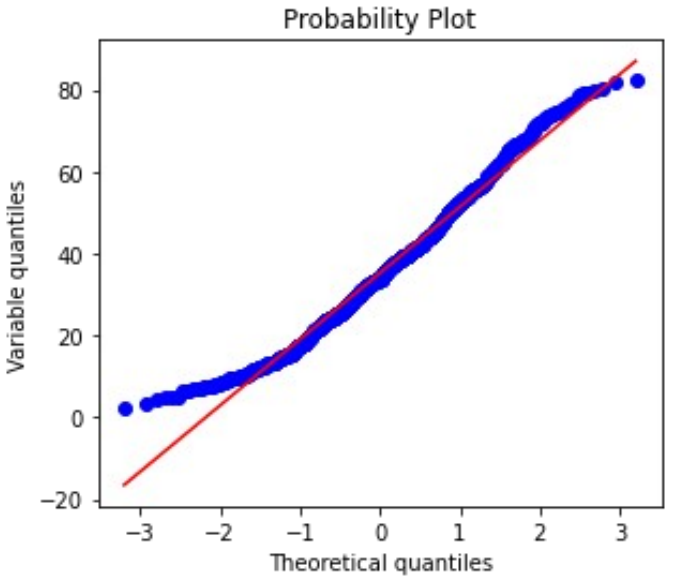
Introduction

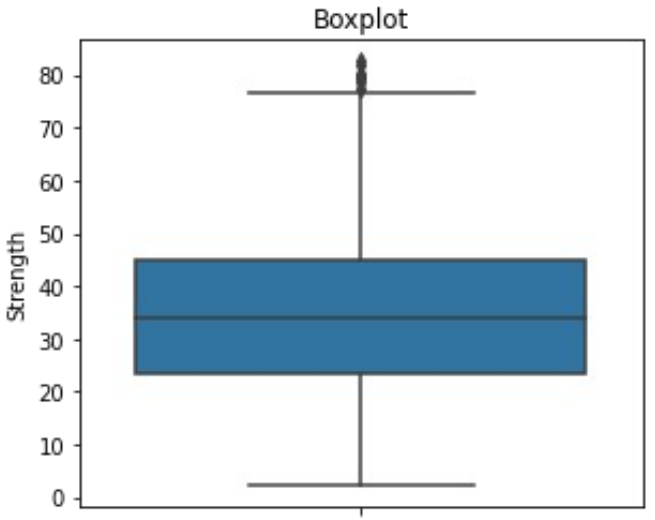
The goal of this project is to predict compressive strength of concrete from composition and age.

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

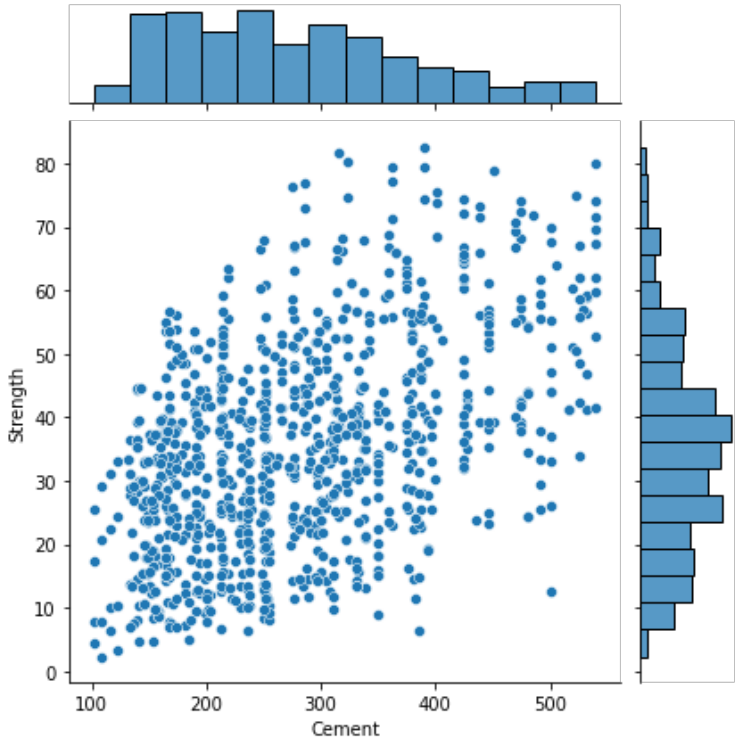


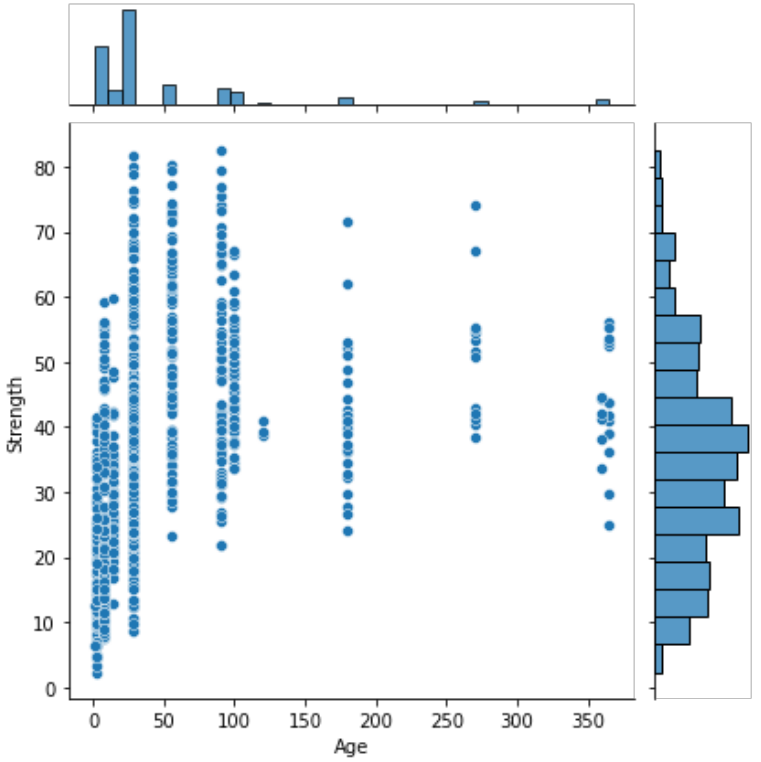




Distributions of numerical variables are reasonably close to normal.
No acute outliers.

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

With the selected features the strength was predicted with RMSE_train of 5.6 and RMSE_test of 19.8. R2_train 0.98 and R2_test 0.93.

The end

Thank you for your attention!