**CONCRETE STRENGTH PREDICTION**

Predicting the compressive strength of concrete using Linear Regression

**DATASET DESCRIPTION:**

* Cement (cement) -- quantitative -- kg in a m3 mixture -- Input Variable
* Blast Furnace Slag (slag) -- quantitative -- kg in a m3 mixture -- Input Variable
* Fly Ash (ash) -- quantitative -- kg in a m3 mixture -- Input Variable
* Water (water) -- quantitative -- kg in a m3 mixture -- Input Variable
* Superplasticizer (superplastic) -- quantitative -- kg in a m3 mixture -- Input Variable
* Coarse Aggregate (coarseagg) -- quantitative -- kg in a m3 mixture -- Input Variable
* Fine Aggregate (fineagg) -- quantitative -- kg in a m3 mixture -- Input Variable
* Age(age) -- quantitative -- Day (1~365) -- Input Variable
* Concrete compressive strength(strength) -- quantitative -- MPa -- Output Variable

**PROPOSED SOLUTION:**

The focus of this project is the application of machine learning Model (Linear Regression), and its suitability to model concrete compressive strength compared with early models obtained from the literature and also a recommendation system is developed by applying Linear Regression, to predict the concrete strength from its components accurately and then looking for the optimal combination of components which increases the strength.

**STEPS:**

Step 1: Import Libraries

*# Import the numerical algebra libs*

import pandas as pd

import numpy as np

*# Import visualization libs*

import seaborn as sns

import matplotlib.pyplot as plt

Step 2: Import and Read data

Data Source: ‘https://github.com/ybifoundation/Dataset/raw/main/Concrete%20Compressive%20Strength.csv’

Step 3: Study Data: After importing the file we have to run 4 functions to understand data

1. X.head() : The head() method returns a specified number of rows, string from the top.
2. X.info (): The info () method prints information about the DataFrame
3. X.describe(): The describe() method returns description of the data in the DataFrame.
4. X.isnull(). sum (): Checks missing values. If there are certain numbers of null values present in each feature, then we have to impute any other value to fill null values

Step 4: Divide data into Y{Target} & X{Features}

Step 5: Split the data into Test and Train

Eg: from sklearn.model\_selection import train\_test\_split

Step6: Select, train(fit) & predict the Model

Step 7: Error Calculation (Model Accuracy)

Step 8: Future Prediction

**CONCLUSION:**

Analyzed the Compressive Strength and used Machine Learning to Predict the Compressive Strength of Concrete. We have used Linear Regression and its variations, to make predictions and compared their performance. And also, we can further improve the performance of the algorithm by tuning the hyperparameters by performing a grid search or random search.