

Project Name : Concrete Compressive Strength Prediction using DL Auto Keras(Auto ML)



▼ Abstract

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

▼ Data Characteristics

The actual concrete compressive strength (MPa) for a given mixture under a specific age (days) was determined from laboratory.

▼ Time Line of the Project:

- Data Analysis
- Data Preprocessing
- Feature Engineering
- Model Building using DL
- Model Building using Auto Keras

Importing Libraries

```
import pandas as pd
import numpy as np
from matplotlib import pyplot as plt
%matplotlib inline
import matplotlib
```

```
from google.colab import drive
drive.mount('/content/drive')
df = pd.read_csv("/content/drive/MyDrive/concrete_data.csv")
df.head()
```

Mounted at /content/drive

	cement	blast_furnace_slag	fly_ash	water	superplasticizer	coarse_aggregate	fine_aggregate
0	540.0	0.0	0.0	162.0	2.5	1040.0	1040.0
1	540.0	0.0	0.0	162.0	2.5	1055.0	1055.0
2	332.5	142.5	0.0	228.0	0.0	932.0	932.0
3	332.5	142.5	0.0	228.0	0.0	932.0	932.0
4	198.6	132.4	0.0	192.0	0.0	978.4	978.4

```
from google.colab import drive
drive.mount('/content/drive')
```

Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount(

```
df.shape
```

```
(1030, 9)
```

▼ Data Analysis

```
df.describe()
```

	cement	blast_furnace_slag	fly_ash	water	superplasticizer	coarse_aggregate
count	1030.000000	1030.000000	1030.000000	1030.000000	1030.000000	1030.000000
mean	281.167864	73.895825	54.188350	181.567282	6.204660	688.018000
std	104.506364	86.279342	63.997004	21.354219	5.973841	273.886160
min	102.000000	0.000000	0.000000	121.800000	0.000000	220.000000
25%	192.375000	0.000000	0.000000	164.900000	0.000000	420.000000
50%	272.900000	22.000000	0.000000	185.000000	6.400000	540.000000
75%	350.000000	142.950000	118.300000	192.000000	10.200000	660.000000
max	540.000000	359.400000	200.100000	247.000000	32.200000	910.000000

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1030 entries, 0 to 1029
Data columns (total 9 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   cement                                1030 non-null   float64
1   blast_furnace_slag                   1030 non-null   float64
2   fly_ash                               1030 non-null   float64
3   water                                 1030 non-null   float64
4   superplasticizer                     1030 non-null   float64
5   coarse_aggregate                     1030 non-null   float64
6   fine_aggregate                       1030 non-null   float64
7   age                                   1030 non-null   int64
8   concrete_compressive_strength        1030 non-null   float64
dtypes: float64(8), int64(1)
memory usage: 72.5 KB
```

```
df.isna().sum()
```

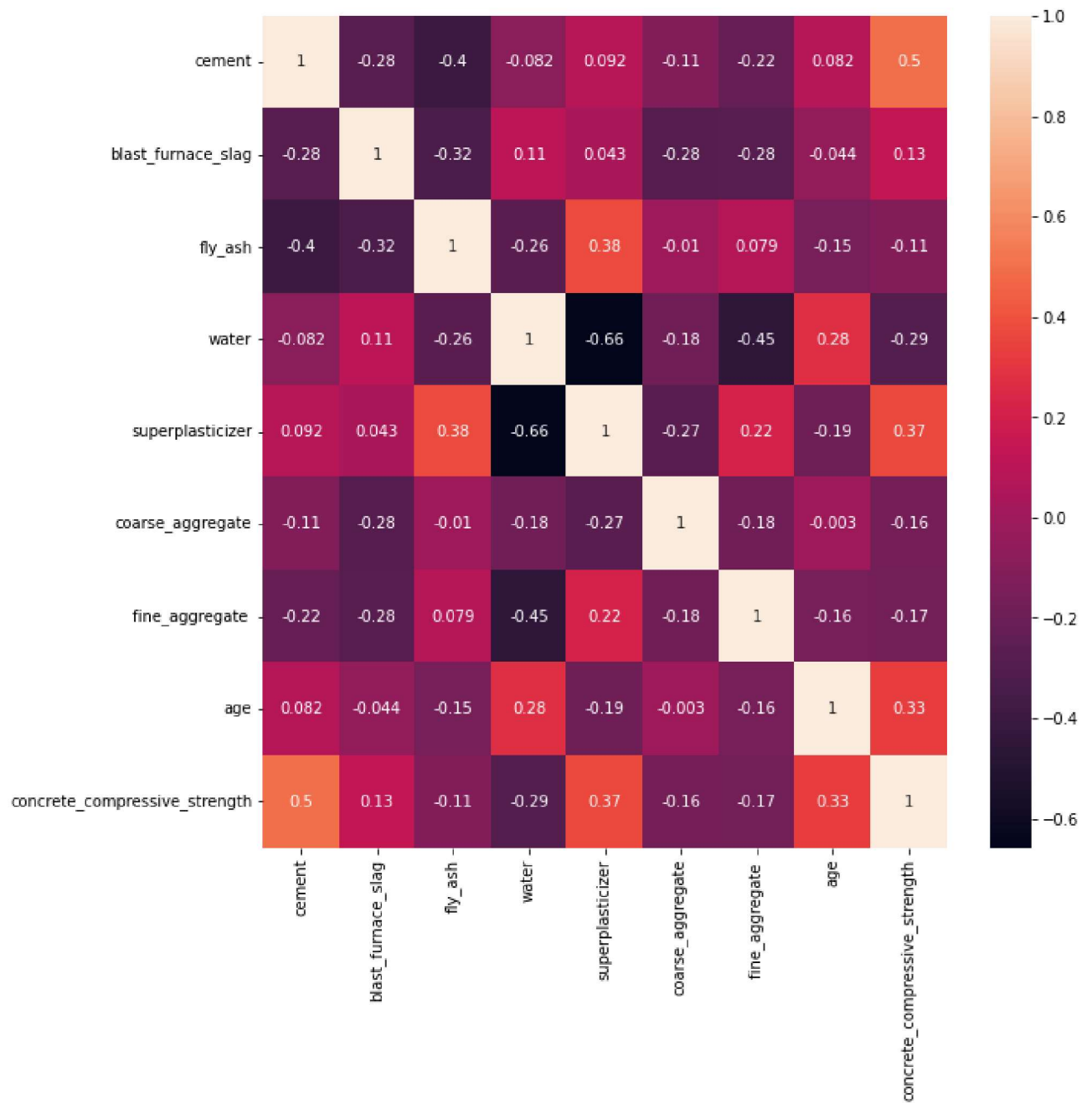
```
cement                                0
blast_furnace_slag                    0
fly_ash                               0
water                                 0
superplasticizer                      0
coarse_aggregate                      0
fine_aggregate                        0
age                                    0
concrete_compressive_strength          0
dtype: int64
```

▼ Heatmap

```
import seaborn as sns
plt.figure(figsize=(10,10))
```

```
sns.heatmap(df.corr(),annot=True)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f5831b87510>
```



```
for i in df.columns:
    for j in df.columns:
        plt.figure(figsize=(9,7))
        sns.scatterplot(x=i,y=j,hue="concrete_compressive_strength",data=df)
        plt.show()
```

