

SERVO PREDICTION PREDICTION MODEL

YBI DATA SCIENCE AND ML INTERNSHIP

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IMPORTING LIBRARIES

```
In [41]: import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score, mean_absolute_error
```

```
In [11]: data = pd.read_csv('https://raw.githubusercontent.com/YBIFoundation/Dataset/main/ServoPredictionModel.csv')
```

```
In [12]: data.head()
```

```
Out[12]:
```

	Motor	Screw	Pgain	Vgain	Class
0	E	E	5	4	4
1	B	D	6	5	11
2	D	D	4	3	6
3	B	A	3	2	48
4	D	B	6	5	6

```
In [13]: data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 167 entries, 0 to 166
Data columns (total 5 columns):
#   Column  Non-Null Count  Dtype
---  -
0   Motor   167 non-null      object
1   Screw   167 non-null      object
2   Pgain   167 non-null      int64
3   Vgain   167 non-null      int64
4   Class   167 non-null      int64
dtypes: int64(3), object(2)
memory usage: 6.6+ KB
```

```
In [14]: data.describe()
```

```
Out[14]:
```

	Pgain	Vgain	Class
count	167.000000	167.000000	167.000000
mean	4.155689	2.538922	21.173653
std	1.017770	1.369850	13.908038
min	3.000000	1.000000	1.000000
25%	3.000000	1.000000	10.500000
50%	4.000000	2.000000	18.000000
75%	5.000000	4.000000	33.500000
max	6.000000	5.000000	51.000000

```
In [15]: data.columns
```

```
Out[15]: Index(['Motor', 'Screw', 'Pgain', 'Vgain', 'Class'], dtype='object')
```

```
In [19]: data.shape
```

```
Out[19]: (167, 5)
```

```
In [22]: data[['Motor']].value_counts()
```

```
Out[22]: Motor
C         40
A         36
B         36
E         33
D         22
dtype: int64
```

```
In [23]: data[['Screw']].value_counts()
```

```
Out[23]: Screw
A         42
B         35
C         31
D         30
E         29
dtype: int64
```

Encoding of Categorical Features

```
In [26]: data.replace({'Motor':{'A':0, 'B':1, 'C':2, 'D':3, 'E':4}}, inplace=True)
data.replace({'Screw':{'A':0, 'B':1, 'C':2, 'D':3, 'E':4}}, inplace=True)
```

```
In [28]: data.head()
```

Out[28]:

	Motor	Screw	Pgain	Vgain	Class
0	4	4	5	4	4
1	1	3	6	5	11
2	3	3	4	3	6
3	1	0	3	2	48
4	3	1	6	5	6

```
In [29]: y = data['Class']
x = data.drop('Class',axis=1)
```

Train Test Split

```
In [36]: xtrain, xtest, ytrain, ytest = train_test_split(x,y,test_size = 0.4, random_state=1)
```

Model Training

```
In [39]: lmodel = LinearRegression()

lmodel.fit(xtrain,ytrain)
```

Out[39]: LinearRegression()

Model Prediction

```
In [40]: ypred = lmodel.predict(xtest)
ypred
```

Out[40]: array([33.19906731, 24.26517548, 31.56222022, 31.39299345, 34.7914281 ,
13.67010693, -2.06196532, 15.76133204, 5.75827338, 41.06510343,
25.04919106, 33.65344533, 34.22243671, 20.75212747, -8.12061646,
18.20652434, 27.87863432, 18.5907753 , 41.63409481, 14.23778718,
12.1478732 , 16.61416355, 5.30389536, 40.49611204, 17.3523817 ,
8.41848987, 29.96985943, 20.58158958, 28.4476257 , 35.57544367,
22.67281469, 22.38897456, 30.25501068, 9.48765671, 39.5428697 ,
16.33032342, 18.70538866, -2.10776274, 16.284526 , 32.63007592,
26.81077861, 21.08176503, 23.91120829, 32.1312116 , 1.50569609,
13.73892286, 6.2571377 , 37.66666878, 28.90200372, 2.07468748,
39.75789389, 15.19234065, 15.26115659, 23.17299014, 0.55245375,
11.07870637, 22.55820133, 35.29029242, 27.02580281, 25.50356908,
20.01259819, 21.0359676 , 32.34623579, 27.14041617, 37.45164459,
18.42154853, 11.57757069])

Model Evaluation

```
In [43]: mean_squared_error(ytest, ypred)
```

Out[43]: 61.74872629404508

```
In [44]: mean_absolute_error(ytest, ypred)
```

Out[44]: 6.4310958271631495

In [45]: `r2_score(ytest, ypred)`

Out[45]: 0.6761942433233474

In []: