Data Collection and Preprocessing Phase

Date	20 June 2024
Team ID	739900
Project Title	Predicting Permanent Magnet Resistance Of Electronic Motor Using Machine Learning.
Maximum Marks	6 Marks

Data Exploration and Preprocessing Report :

Dataset variables will be statistically analyzed to identify patterns and outliers, with Python employed for preprocessing tasks like normalization and feature engineering. Data cleaning will address missing values and outliers, ensuring quality for subsequent analysis and modeling, and forming a strong foundation for insights and predictions.
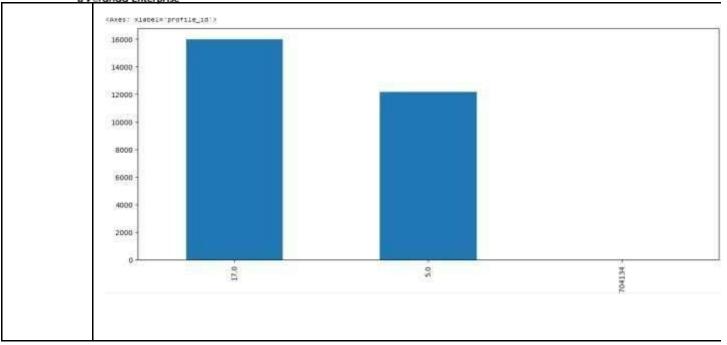
Univariate Analysis	
Section	**Description**
Data Overview	Dimension: 28115rows × 9 Columns Descriptive Descriptive statistics: _(table below)_

	u_q	coolant	u_d	motor_speed	i_d	i_q	pm	ambient	profile_id
0	-0.450682	18.805172	-0.350055	0.002866	0.004419	0.000328	24.554214	19.850691	17.0
1	-0.325737	18.818571	-0.305803	0.000257	0.000606	-0.000785	24.538078	19.850672	17.0
2	-0.440864	18.828770	-0.372503	0.002355	0.001290	0.000386	24.544693	19.850657	17.0
3	-0.327026	18.835567	-0.316199	0.006105	0.000026	0.002046	24.554018	19.850647	17.0
4	-0.471150	18.857033	-0.332272	0.003133	-0.064317	0.037184	24.565397	19.850639	17.0
...	...	...	...	...	...	...	...	...	...
28110	49.997669	19.196394	-0.340213	999.987427	-1.997597	1.097189	29.068382	23.233206	5.0
28111	50.007954	19.171013	-0.329662	999.995911	-2.002546	1.097204	29.068363	23.239384	5.0
28112	50.028343	19.096292	-0.346269	999.986389	-2.000041	1.097740	29.067829	23.245535	5.0
28113	50.011482	19.034031	-0.323677	999.989929	-1.998187	1.096765	29.065723	23.246590	5.0
28114	50.003902	18.971241	-0.344793	NaN	NaN	NaN	NaN	NaN	NaN

<Axes: xlabel='profile_id'>

Outliers and Anomalies	-

Data Preprocessing Code Screenshots

Multivariate Analysis	

Loading Data	```
data=pd.read_csv("/content/measures_v2.csv")
```
df.head()

| | u_q | coolant | u_d | motor_speed | i_d | i_q | pm | ambient | profile_id |
|---|---|---|---|---|---|---|---|---|---|
| 0 | -0.450682 | 18.805172 | -0.350055 | 0.002866 | 0.004419 | 0.000328 | 24.554214 | 19.850691 | 17.0 |
| 1 | -0.325737 | 18.818571 | -0.305803 | 0.000257 | 0.000606 | -0.000785 | 24.538078 | 19.850672 | 17.0 |
| 2 | -0.440864 | 18.828770 | -0.372503 | 0.002355 | 0.001290 | 0.000386 | 24.544693 | 19.850657 | 17.0 |
| 3 | -0.327026 | 18.835567 | -0.316199 | 0.006105 | 0.000026 | 0.002046 | 24.554018 | 19.850647 | 17.0 |
| 4 | -0.471150 | 18.857033 | -0.332272 | 0.003133 | -0.064317 | 0.037184 | 24.565397 | 19.850639 | 17.0 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 28110 | 49.997669 | 19.196394 | -0.340213 | 999.987427 | -1.997597 | 1.097189 | 29.068382 | 23.233206 | 5.0 |
| 28111 | 50.007954 | 19.171013 | -0.329662 | 999.995911 | -2.002546 | 1.097204 | 29.068363 | 23.239384 | 5.0 |
| 28112 | 50.028343 | 19.096292 | -0.346269 | 999.986389 | -2.000041 | 1.097740 | 29.067829 | 23.245535 | 5.0 |
| 28113 | 50.011482 | 19.034031 | -0.323677 | 999.989929 | -1.998187 | 1.096765 | 29.065723 | 23.246590 | 5.0 |
| 28114 | 50.003902 | 18.971241 | -0.344793 | NaN | NaN | NaN | NaN | NaN | NaN |

28115 rows × 9 columns |
| Handling Missing Data | ```
data.isnull().sum()
```
```
u_q                0
coolant            0
stator_winding     0
u_d                0
stator_tooth       0
motor_speed        0
i_d                0
i_q                0
pm                 0
stator_yoke        0
ambient            0
torque             0
profile_id         0
dtype: int64
``` |

Data Transformation	-----
Feature Engineering	Attached the codes in final submission.
Save Processed Data	-