

Data Overall Descriptions:

26,145,539 rows

Date: 20200401 to 20200419

29 Vehicles:

+-----+-----+	
truckid	truckno
+-----+-----+	
107624CE6B76B627818179C74FF206CF	粤ADS670
107EF28DD023DD7F50AEDA9CA033325B	粤ADP980
1118B0990B58DDFB6D11A2ED16ED4840	黑AU3950
182A2AE0916333EBB6E4E990BD5BE9E6	黑AT2683
257C0D741E2CDDAFDA1A297FC5AC9964	闽K59936
3EF3F915B5831AE8667B6FC54FBA89B7	闽K55572
4D5F26E56B06BCCE82B34A7CA9E7F069	黑AR3759
5F5B01E8FC80BBEB4343079ED4A8D335	黑AR8222
608DCE21EB07CE9667B7D1310EE180FA	黑AU8308
649CD8B2F189A42FB44E8AAD254CDA40	粤ABW222
77A23E4D11A0AC3D3BCE588C9914FA7A	黑AU2730
83E94E04A08895767DFE0D80A21A07D3	闽K59938
89B08661EC03B72A0079B5287CAAE32E	黑AU6059
91CE568D83BBF1E406AF867F672F315A	黑AT0739
A0A4A31F4C3509655240D8D7DB9CD389	闽K59769
A2432F10BB8ED8C18EDD1390E1B46521	粤ADL825
A62093852B45126F7A3ECB2DA074E1EB	黑AS0585
BA7B72B6E9864A85373620A3C27CD7FA	黑AU1646
C3E00060A9980231C0A2EDA0ECC2AED7	黑AU0951
C80B2DE52A26473DBEC0299CE9795CA8	黑AR8389
CB38B8775C50FFD05818D002A852D2EF	黑AS8080
CBE2895A78C93ABA20230E2869DCDD08	黑AU2865
CFEA72E73CBCDED68B49899579F65D1A	黑AU2006
D2435C582532998AC70CE612FDDF015F	黑AU7451
D5867540C6F9463DEE90FC353D84A3AD	粤ADW293
E4FFB0732413F6FC9E3EF8D2D7A6CC6F	黑AS6483
E7A0A2A06A7B9353F5C0D79630E6B857	黑AS7560
E87560F6E4BBB0D47606FBB2A9D75A6A	黑AU3549
E910EF71FE2D2DE2AB8286EA74F852F1	黑AU6249
+-----+-----+	

Added features:

		单位 : 0.4% 范围 : 0%-100%
		FE : 无效
0x716D	刹车踏板位置	FF : 错误
	当前转速的负载百分比 (可以理解为最大扭矩输出百分比)	
0x704F		1%
0x705F	上报档位信息	发动机请求百分比 (当前借用该字段上报档位信息)

Vehicle ID and collected date:

107624CE6B76B627818179C74FF206CF
['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407', '20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414', '20200415', '20200416', '20200417', '20200418', '20200419']

107EF28DD023DD7F50AEDA9CA033325B
['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407', '20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414', '20200415', '20200416', '20200417', '20200418', '20200419']

1118B0990B58DDFB6D11A2ED16ED4840
['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407', '20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414', '20200415', '20200416', '20200417', '20200418', '20200419']

182A2AE0916333EBB6E4E990BD5BE9E6
['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407', '20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414', '20200415', '20200416', '20200417', '20200418', '20200419']

257C0D741E2CDDAFDA1A297FC5AC9964
['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407', '20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414', '20200415', '20200416', '20200417', '20200418', '20200419']

3EF3F915B5831AE8667B6FC54FBA89B7
['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407', '20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414', '20200415', '20200416', '20200417', '20200418', '20200419']

4D5F26E56B06BCCE82B34A7CA9E7F069

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407',
'20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414',
'20200415', '20200416', '20200417', '20200418', '20200419']

5F5B01E8FC80BBEB4343079ED4A8D335

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407',
'20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414',
'20200415', '20200416', '20200417', '20200418', '20200419']

608DCE21EB07CE9667B7D1310EE180FA

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407',
'20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414',
'20200415', '20200416', '20200417', '20200418', '20200419']

649CD8B2F189A42FB44E8AAD254CDA40

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407',
'20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414',
'20200415', '20200416', '20200417', '20200418', '20200419']

77A23E4D11A0AC3D3BCE588C9914FA7A

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407',
'20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414',
'20200415', '20200416', '20200417', '20200418', '20200419']

83E94E04A08895767DFE0D80A21A07D3

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407',
'20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414',
'20200415', '20200416', '20200418']

89B08661EC03B72A0079B5287CAAE32E

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407',
'20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414',
'20200415', '20200416', '20200417', '20200418', '20200419']

91CE568D83BBF1E406AF867F672F315A

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407',
'20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414',
'20200415', '20200416', '20200417', '20200418', '20200419']

A0A4A31F4C3509655240D8D7DB9CD389

['20200403', '20200404', '20200405', '20200406', '20200407', '20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414', '20200415', '20200416', '20200417', '20200418', '20200419']

A2432F10BB8ED8C18EDD1390E1B46521

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407', '20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414', '20200415', '20200416', '20200417', '20200418', '20200419']

A62093852B45126F7A3ECB2DA074E1EB

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407', '20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414', '20200415', '20200416', '20200417', '20200418', '20200419']

BA7B72B6E9864A85373620A3C27CD7FA

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407', '20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414', '20200415', '20200416', '20200417', '20200418', '20200419']

C3E00060A9980231C0A2EDA0ECC2AED7

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407', '20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414', '20200415', '20200416', '20200417', '20200418', '20200419']

C80B2DE52A26473DBEC0299CE9795CA8

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407', '20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414', '20200415', '20200416', '20200417', '20200418', '20200419']

CB38B8775C50FFD05818D002A852D2EF

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407', '20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414', '20200415', '20200416', '20200417', '20200418', '20200419']

CBE2895A78C93ABA20230E2869DCDD08

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407', '20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414', '20200415', '20200416', '20200417', '20200418', '20200419']

CFEA72E73CBCDED68B49899579F65D1A

['20200401']

D2435C582532998AC70CE612FDDF015F

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407',
'20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414',
'20200415', '20200416', '20200417', '20200418', '20200419']

D5867540C6F9463DEE90FC353D84A3AD

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407',
'20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414',
'20200415', '20200416', '20200417', '20200418', '20200419']

E4FFB0732413F6FC9E3EF8D2D7A6CC6F

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407',
'20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414',
'20200415', '20200416', '20200417', '20200418', '20200419']

E7A0A2A06A7B9353F5C0D79630E6B857

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407',
'20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414',
'20200415', '20200416', '20200417', '20200418', '20200419']

E87560F6E4BBB0D47606FBB2A9D75A6A

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407',
'20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414',
'20200415', '20200416', '20200417', '20200418', '20200419']

E910EF71FE2D2DE2AB8286EA74F852F1

['20200401', '20200402', '20200403', '20200404', '20200405', '20200406', '20200407',
'20200408', '20200409', '20200410', '20200411', '20200412', '20200413', '20200414',
'20200415', '20200416', '20200417', '20200418', '20200419']

Same routes:

Routes Example 1:

truckid = 257C0D741E2CDDAFDA1A297FC5AC9964 and **city** = '重庆市'

Route 1: 0405, 0411, 0412, 0417

Routes Example 2:

truckid = '107624CE6B76B627818179C74FF206CF' and **city** = '湘潭市'

South to North: 0403, 0410, 0413, 0416

North to south: 0404, 0408, 0412, 0414, 0417

Routes Example 3:

truckid = '107624CE6B76B627818179C74FF206CF' and **city** = '衡阳市'

South to North: 0403, 0406, 0410, 0413, 0416, 0419

North to south: 0404, 0412, 0414, 0417

Routes Example 4:

truckid = 107EF28DD023DD7F50AEDA9CA033325B and **city** = '荆州市'

South to North: 0403, 0407, 0415, 0419

North to south: 0405, 0413

Routes Example 5:

truckid = 107EF28DD023DD7F50AEDA9CA033325B and **city** = '长沙市'

Route 1: 0402, 0409

Route 2: 0403, 0407, 0415, 0419

Route 3: 0405, 0413

Route 4: 0411, 0412

Fuel rate prediction:

Route example 1: 9964 ‘重庆市’

G1: engine speed, throttle

G2: engine speed, throttle, torque

G3: engine speed, torque

R2	MLP	PR	CNN	LSTM (10)
G1	0.9135	0.9215	0.9222	0.8788
G2	0.9131	0.9222	0.9223	0.9523
G3	0.5445	0.5622	0.5631	0.9474

LSTM:

<i>R2 - LSTM</i>	look_back = 5	10	15	17	20	25	30
G2	0.8832	0.9523	0.9538	0.9557	0.9567	0.9552	0.9559

LSTM:

G4: engine, torque, throttle, speed, fuel look_back = 10 **R2: 0.9499**

Layer (type)	Output Shape	Param #
=====		
lstm_17 (LSTM)	(None, 10, 100)	42400
lstm_18 (LSTM)	(None, 10, 100)	80400
lstm_19 (LSTM)	(None, 10, 100)	80400
lstm_20 (LSTM)	(None, 50)	30200
dense_5 (Dense)	(None, 1)	51
=====		

LSTM with MLP:

G2 look_back = 15 **R2: 0.9539**

Layer (type)	Output Shape	Param #
=====		
lstm_17 (LSTM)	(None, 15, 100)	42000
lstm_18 (LSTM)	(None, 15, 100)	80400
lstm_19 (LSTM)	(None, 15, 100)	80400
lstm_20 (LSTM)	(None, 50)	30200
dense_21 (Dense)	(None, 40)	2040
dense_22 (Dense)	(None, 20)	820
dense_23 (Dense)	(None, 20)	420
dense_24 (Dense)	(None, 10)	210
dense_25 (Dense)	(None, 1)	11

=====

LSTM with more layers:

G2 look_back = 20 **R2: 0.9561**

Layer (type)	Output Shape	Param #
lstm_29 (LSTM)	(None, 20, 100)	42000
lstm_30 (LSTM)	(None, 20, 100)	80400
lstm_31 (LSTM)	(None, 20, 100)	80400
lstm_32 (LSTM)	(None, 20, 100)	80400
lstm_33 (LSTM)	(None, 20, 100)	80400
lstm_34 (LSTM)	(None, 20, 100)	80400
lstm_35 (LSTM)	(None, 50)	30200
dense_5 (Dense)	(None, 1)	51

=====

Negative fuel rate analysis:

(https://github.com/scikit-learn/scikit-learn/blob/95d4f0841/sklearn/linear_model/_base.py#L211)

Linear model: $y = \text{np.dot}(X, T) + \text{intercept}$

For the model in python script: **intercept** = 3.787616766175372

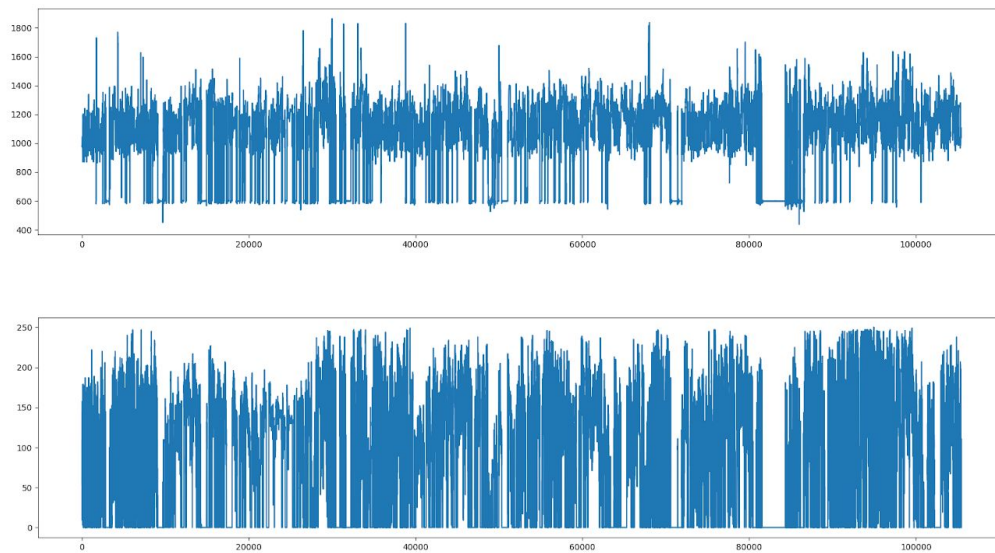
Negatives without intercept: 111024 out of 250000 (**44.41%**)

G1: engine speed, throttle

R1: rpm (500, 3000) throttle (0, 100)

R2: rpm (500, 1900) throttle (0, 100)

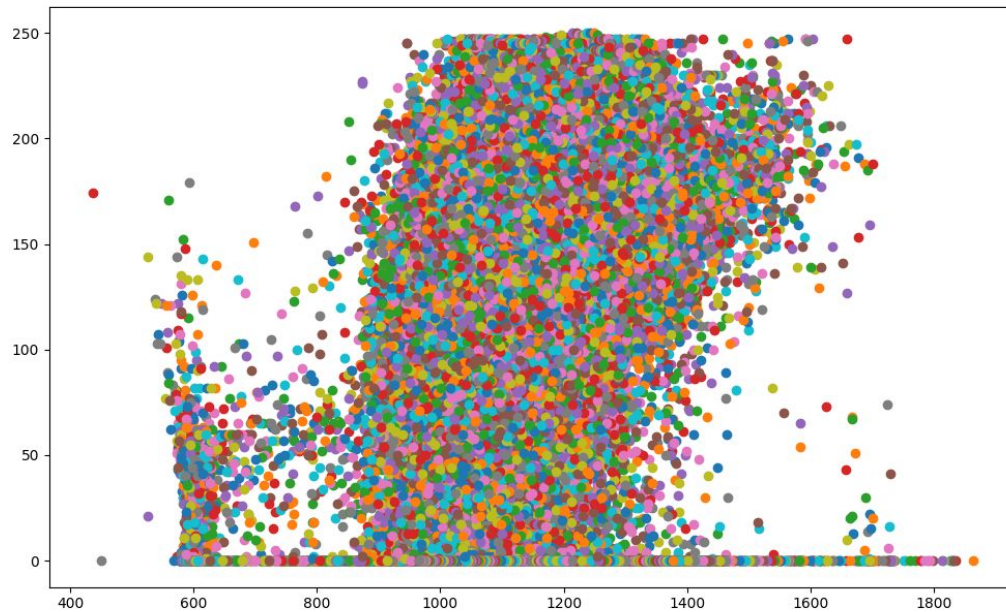
R3 (training dataset range): rpm (500, 1900) throttle (0, 250)



number of negatives	Fold 1	Fold 2	Fold 3	Fold 4	Fold 5	Total instances
R1	9015	10192	12845	13975	57237	250000
R2	8217	4126	8301	7276	14127	140000
R3	26712	20160	27963	26872	52118	350000

Q1:

- throttle can be larger than 100, range from 0 to 250. How to explain?
- The distribution of rpm and throttle in training data is sparse, no data for some range. Are they all meaningful for some points within R1, R2, and R3?
- Optimization: decrease the polynomial features, remove some cross features



throttle (0,250) rpm (800,1400) Fold5 negatives: 3907 out of 150000 (2.6%)

G1: engine speed, throttle

KFold = 5 :

Coefficients:

```
[ 0.00000000e+00 -2.55775167e-05  1.68271577e-05 -3.42349529e-05
-2.61140801e-03  1.69305399e-02  4.45784463e-08  5.80642609e-06
-1.36790639e-05 -1.46655111e-04 -2.05826706e-11 -4.63738844e-09
 8.28155655e-09  1.13871078e-07  2.60427488e-07  3.19243879e-15
 1.40088380e-12 -9.77658291e-12  7.60973498e-11 -6.64161113e-10
 8.74119010e-10]
```

Intercept: 7.229204044553981

R Mean squared error: 5.99

Coefficient of determination: 0.93

Coefficients:

```
[ 0.00000000e+00 -1.89098024e-05  1.71798785e-05 -1.45950065e-05
-2.43011698e-03  1.48061287e-02  5.91644448e-09  5.61831883e-06
-1.32830440e-05 -1.24519848e-04  6.92139511e-12 -4.68440803e-09
 1.12982338e-08  8.68876079e-08  2.26717964e-07 -3.54273571e-15
 1.47120773e-12 -1.16051014e-11  8.74288209e-11 -6.61081079e-10
 9.23639892e-10]
```

Intercept: 5.4557817702735285

R Mean squared error: 6.82

Coefficient of determination: 0.92

Coefficients:

[0.00000000e+00 -2.60748128e-05 1.69813914e-05 -1.83755718e-05
-2.70515085e-03 1.68858241e-02 1.42225267e-08 5.95921359e-06
-1.28202329e-05 -1.44939587e-04 3.47038273e-13 -4.64263542e-09
5.44546719e-09 1.26139485e-07 2.14706351e-07 -1.74569464e-15
1.36665614e-12 -8.47211229e-12 7.10390882e-11 -6.60329838e-10
9.38850379e-10]

Intercept: 5.726441921994319

R Mean squared error: 6.57

Coefficient of determination: 0.93

Coefficients:

[0.00000000e+00 -2.91485004e-05 8.55204452e-06 -1.06945026e-05
-2.82599583e-03 1.75952786e-02 -2.69544883e-09 6.44218063e-06
-1.59471149e-05 -1.44548433e-04 1.31941695e-11 -5.17994158e-09
8.92459792e-09 1.26416225e-07 2.17583435e-07 -4.98726389e-15
1.55454346e-12 -9.83061772e-12 7.30055546e-11 -6.72032844e-10
9.48353346e-10]

Intercept: 5.260531334732459

R Mean squared error: 6.26

Coefficient of determination: 0.92

Coefficients:

[0.00000000e+00 -7.72323800e-06 -2.81025161e-06 -1.67576320e-06
-1.33428418e-03 6.83663692e-03 -1.29149831e-08 1.83265834e-06
2.46488916e-05 -1.96615351e-04 1.57584155e-11 -7.39373946e-10
-3.38621420e-08 1.96286988e-07 2.62992455e-07 -4.65826514e-15
1.90583820e-13 3.90561327e-12 5.02856810e-11 -7.06208215e-10
9.42744131e-10]

Intercept: 3.787616766175372

R Mean squared error: 8.10

Coefficient of determination: 0.91

0.9215116175072119

G2: engine speed, throttle, torque

KFold = 5 :

Coefficients:

[1.48521080e-10 9.83251129e-06 -3.16571681e-04 -3.00136050e-04
-2.55060274e-05 2.17626985e-03 -2.28153396e-03 -2.82711769e-02
-4.28701235e-03 1.49696262e-02 4.96837137e-08 -5.58639042e-06
4.46750283e-06 5.39098771e-05 3.32599458e-05 -7.97817345e-06
3.15481088e-04 -1.19829728e-04 -1.04060743e-04 -1.29224321e-04
-3.73124450e-11 4.47623606e-09 -3.14536752e-09 -2.17840619e-08

-5.37727252e-08 5.93410534e-09 -5.16898271e-07 1.74952909e-07
2.57840379e-07 5.26068370e-08 -1.29163793e-06 1.48942328e-06
-7.83272802e-07 -3.72505929e-08 3.30390540e-07 9.93934210e-15
-1.19548512e-12 8.85636941e-13 5.89000376e-12 2.16049166e-11
-1.00037587e-11 -7.86735954e-12 -2.83908136e-11 -1.23585289e-10
1.08045809e-10 2.86452586e-09 -4.32058708e-10 -1.73755148e-10
1.44199108e-10 -7.06580751e-10 -3.07092352e-09 -9.44604699e-09
4.32912212e-09 9.37311848e-10 -5.14949441e-10 8.94976119e-10]

Intercept: 3.5638381161816426

R Mean squared error: 5.98

Coefficient of determination: 0.93

Coefficients:

[2.43663863e-07 4.49905489e-06 -2.71306951e-04 -2.80573458e-04
-1.18590552e-05 1.80099093e-03 -1.98032544e-03 -2.55587457e-02
-3.65749038e-03 1.21087733e-02 6.48379263e-09 -4.52157477e-06
4.00968159e-06 4.68739892e-05 2.86018854e-05 -5.47534643e-06
3.11537440e-04 -1.32925777e-04 -8.12322479e-05 -1.10319954e-04
3.95601133e-12 3.58400152e-09 -2.91632135e-09 -1.74063181e-08
-4.93870444e-08 6.75989964e-09 -5.11219178e-07 1.88607643e-07
2.45172369e-07 2.43626137e-08 -1.20245320e-06 1.66460017e-06
-8.71942311e-07 -8.01304308e-08 3.24361456e-07 -2.43122342e-15
-8.82505874e-13 8.32230877e-13 -8.54906423e-13 2.10870557e-11
-1.07690393e-11 1.32163231e-10 -1.25632759e-11 -1.40694564e-10
1.20924534e-10 1.57311196e-09 -9.38944243e-10 -9.32245466e-11
2.68452860e-10 -7.26766870e-10 3.12753114e-10 -7.70986322e-09
4.74771337e-09 7.37867544e-10 -7.05275571e-10 9.62904161e-10]

Intercept: 3.763724723436649

R Mean squared error: 6.80

Coefficient of determination: 0.92

Coefficients:

[2.71742542e-07 -2.85960077e-06 -2.71392968e-04 -2.47031956e-04
-2.63293571e-06 2.03264463e-03 -2.41440062e-03 -2.53490978e-02
-3.88046990e-03 1.49156043e-02 -9.48864660e-09 -5.30495671e-06
4.74312425e-06 4.98116094e-05 3.33143425e-05 -7.34866737e-06
2.64249598e-04 -1.12050999e-04 -1.14302930e-04 -1.26501051e-04
1.37001831e-11 4.26019967e-09 -3.19752151e-09 -1.70343099e-08
-5.43116755e-08 2.81952356e-09 -5.23774817e-07 1.40534472e-07
2.76594974e-07 6.28049567e-08 -6.07626688e-07 1.42549414e-06
-6.15740833e-07 -6.59099053e-08 2.92973572e-07 -4.42154587e-15
-1.04673648e-12 8.21065058e-13 -1.72349635e-12 2.15498947e-11
-8.09752309e-12 1.18995537e-10 3.40715572e-11 -1.42949153e-10
1.02344305e-10 1.80711026e-09 -1.02608303e-09 -3.22011690e-10
2.49832953e-10 -7.06835079e-10 -2.87056389e-09 -6.81028505e-09

5.46275583e-09 4.24443298e-10 -6.26486996e-10 9.65007048e-10]

Intercept: 2.8139450667427646

R Mean squared error: 6.57

Coefficient of determination: 0.93

Coefficients:

[2.70453320e-07 -2.77035281e-05 -3.04528859e-04 -2.56148063e-04
4.81697448e-06 2.78404756e-03 -2.47317501e-03 -3.23825336e-02
-6.08349596e-03 1.52884723e-02 -1.97564122e-08 -7.12395438e-06
5.06014274e-06 5.88790101e-05 4.00589407e-05 -9.72100868e-06
3.41124819e-04 -1.15447565e-04 -1.07209992e-04 -1.27054891e-04
1.87585224e-11 5.63726632e-09 -3.58382898e-09 -1.83262307e-08
-6.26967324e-08 5.81788551e-09 -5.94730337e-07 1.63280413e-07
2.79900553e-07 6.40967400e-08 -8.83269411e-07 1.28843759e-06
-6.89529495e-07 -1.07216638e-07 3.03754933e-07 -5.23954761e-15
-1.43100028e-12 9.70909768e-13 1.53148327e-13 2.64640922e-11
-9.74835533e-12 8.05938218e-11 -4.83460945e-11 -1.46009295e-10
1.07393783e-10 2.36117536e-09 -3.74615394e-10 7.14365637e-11
1.60795491e-10 -7.29387744e-10 -4.47698010e-09 -5.84938242e-09
1.37987133e-09 1.16540926e-09 -4.34467318e-10 9.57540090e-10]

Intercept: 1.4726213729409174

R Mean squared error: 6.23

Coefficient of determination: 0.92

Coefficients:

[1.07866005e-07 9.39557892e-06 -3.22099909e-04 -2.70730162e-04
-7.01712694e-06 1.79345634e-03 -1.68137077e-03 -2.89502217e-02
2.05940710e-03 8.88257237e-03 5.23474152e-10 -4.39665452e-06
2.50669527e-06 5.07137574e-05 1.84007615e-05 1.48163271e-05
3.86145858e-04 -1.63255953e-04 -1.11717396e-04 -1.54174044e-04
5.58689648e-12 3.35955781e-09 -1.09753102e-09 -1.86187009e-08
-4.24627624e-08 -1.99596837e-08 -5.47287043e-07 2.54128138e-07
2.50314885e-07 1.03376342e-07 -1.93153399e-06 1.49140854e-06
-6.76080871e-07 -5.42180710e-09 3.10308614e-07 -2.20475561e-15
-8.29893446e-13 2.12838427e-13 1.53134103e-12 2.00509253e-11
-1.46095115e-12 9.21080768e-11 -1.00250002e-10 -1.13101375e-10
9.01150283e-11 2.10121938e-09 -4.17166790e-10 8.98765762e-11
1.75812082e-11 -7.08332615e-10 1.38688722e-09 -7.23088547e-09
1.77364229e-09 1.06030102e-09 -2.93892750e-10 8.95877296e-10]

Intercept: 3.155479677145518

R Mean squared error: 8.02

Coefficient of determination: 0.91

0.9222026606874525

G3: engine, torque

KFold = 5 :

Coefficients:

[0.00000000e+00 -1.00814515e-04 2.28038556e-04 6.54675426e-06
-2.81274810e-03 2.02661136e-02 -3.15340840e-08 6.00045728e-06
-7.68265924e-05 5.01766757e-04 4.65908567e-11 -1.97382904e-09
-3.42114714e-08 1.67902738e-06 -1.57946890e-05 -1.95329989e-14
4.30824420e-13 -4.04598049e-12 1.62475365e-10 -8.48524730e-09
8.96584843e-08]

Intercept: 4.46506390060344

R Mean squared error: 15.35

Coefficient of determination: 0.56

Coefficients:

[0.00000000e+00 -1.09420486e-04 2.85943758e-04 -1.19057977e-04
-3.23497357e-03 2.62053273e-02 2.20377602e-07 6.91772134e-06
-8.97193756e-05 4.67979273e-04 -1.38148675e-10 -2.17782430e-09
-3.71959438e-08 1.82325281e-06 -1.58346253e-05 2.75178159e-14
2.43147735e-13 3.55880707e-12 4.92509302e-11 -8.06979993e-09
8.74669204e-08]

Intercept: 15.618257286473206

R Mean squared error: 16.00

Coefficient of determination: 0.55

Coefficients:

[0.00000000e+00 -1.00089826e-04 2.45522088e-04 -2.24358962e-05
-3.04524225e-03 2.27902191e-02 4.09495093e-08 6.25083858e-06
-7.79267637e-05 4.58035010e-04 -1.73155962e-11 -1.53672134e-09
-4.94267854e-08 1.82948936e-06 -1.55866205e-05 -4.98452375e-16
-4.35305607e-15 1.02228160e-11 -6.68385642e-12 -7.59445938e-09
8.42092596e-08]

Intercept: 6.22257047576154

R Mean squared error: 15.31

Coefficient of determination: 0.61

Coefficients:

[0.00000000e+00 -1.64862033e-05 3.53959545e-05 -8.37903430e-05
-1.49728569e-03 3.89146814e-03 1.58041870e-07 2.83373956e-06
-4.08224882e-05 5.43967099e-04 -9.31214048e-11 4.58242305e-10
-4.92368256e-08 1.33287939e-06 -1.37381918e-05 1.57018389e-14
-2.07906527e-13 -1.81477163e-12 2.30328020e-10 -7.41066450e-09
7.55903827e-08]

Intercept: 10.426534801858079

R Mean squared error: 15.19

Coefficient of determination: 0.55

Coefficients:

[0.00000000e+00 -7.24962907e-05 1.70978403e-04 -1.07606804e-04

-1.39981547e-03 1.56317498e-02 2.13368607e-07 3.14818244e-06
-6.83478797e-05 2.86771739e-04 -1.36249656e-10 1.09653014e-10
-3.45719856e-08 1.59091533e-06 -1.08862125e-05 2.67967291e-14
-2.89066804e-13 5.00075661e-12 -1.39759000e-11 -6.76182664e-09
5.93806985e-08]

Intercept: 10.599603839784034

R Mean squared error: 17.77

Coefficient of determination: 0.54

0.5621768497541764

Non-negative coefficients:

G1: engine speed, throttle

(https://scikit-learn.org/stable/modules/generated/sklearn.linear_model.Lasso.html#sklearn.linear_model.Lasso)

KFold = 5 :

Coefficients:

[0.00000000e+00 0.00000000e+00 8.12039727e-02 0.00000000e+00
1.54728864e-04 0.00000000e+00 0.00000000e+00 0.00000000e+00
1.27665031e-07 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00]

Intercept: 0.08575994166506007

R Mean squared error: 7.46

Coefficient of determination: 0.90

negative numbers:

0

Coefficients:

[0.00000000e+00 0.00000000e+00 8.25397598e-02 0.00000000e+00
1.54334293e-04 0.00000000e+00 0.00000000e+00 0.00000000e+00
1.36819670e-07 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00]

Intercept: 0.08375164671823754

R Mean squared error: 8.15

Coefficient of determination: 0.88

negative numbers:

0

Coefficients:

[0.00000000e+00 0.00000000e+00 8.22265157e-02 0.00000000e+00
1.55080953e-04 1.13723828e-04 0.00000000e+00 0.00000000e+00

3.04073625e-08 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00]

Intercept: 0.08336515177655457

R Mean squared error: 7.83

Coefficient of determination: 0.90

negative numbers:

0

Coefficients:

[0.00000000e+00 0.00000000e+00 9.73762898e-02 0.00000000e+00
1.45763001e-04 2.14382007e-05 0.00000000e+00 0.00000000e+00
1.02354378e-07 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00]

Intercept: 0.08160902978888629

R Mean squared error: 7.50

Coefficient of determination: 0.89

negative numbers:

0

Coefficients:

[0.00000000e+00 0.00000000e+00 1.30433755e-01 0.00000000e+00
7.79295694e-05 0.00000000e+00 0.00000000e+00 0.00000000e+00
3.81268329e-07 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00]

Intercept: 0.39616940147791624

R Mean squared error: 10.12

Coefficient of determination: 0.85

negative numbers:

0

0.8837210953734391