Supported Information

Application of Machine Learning to Fischer-Tropsch Synthesis for Cobalt Catalysts

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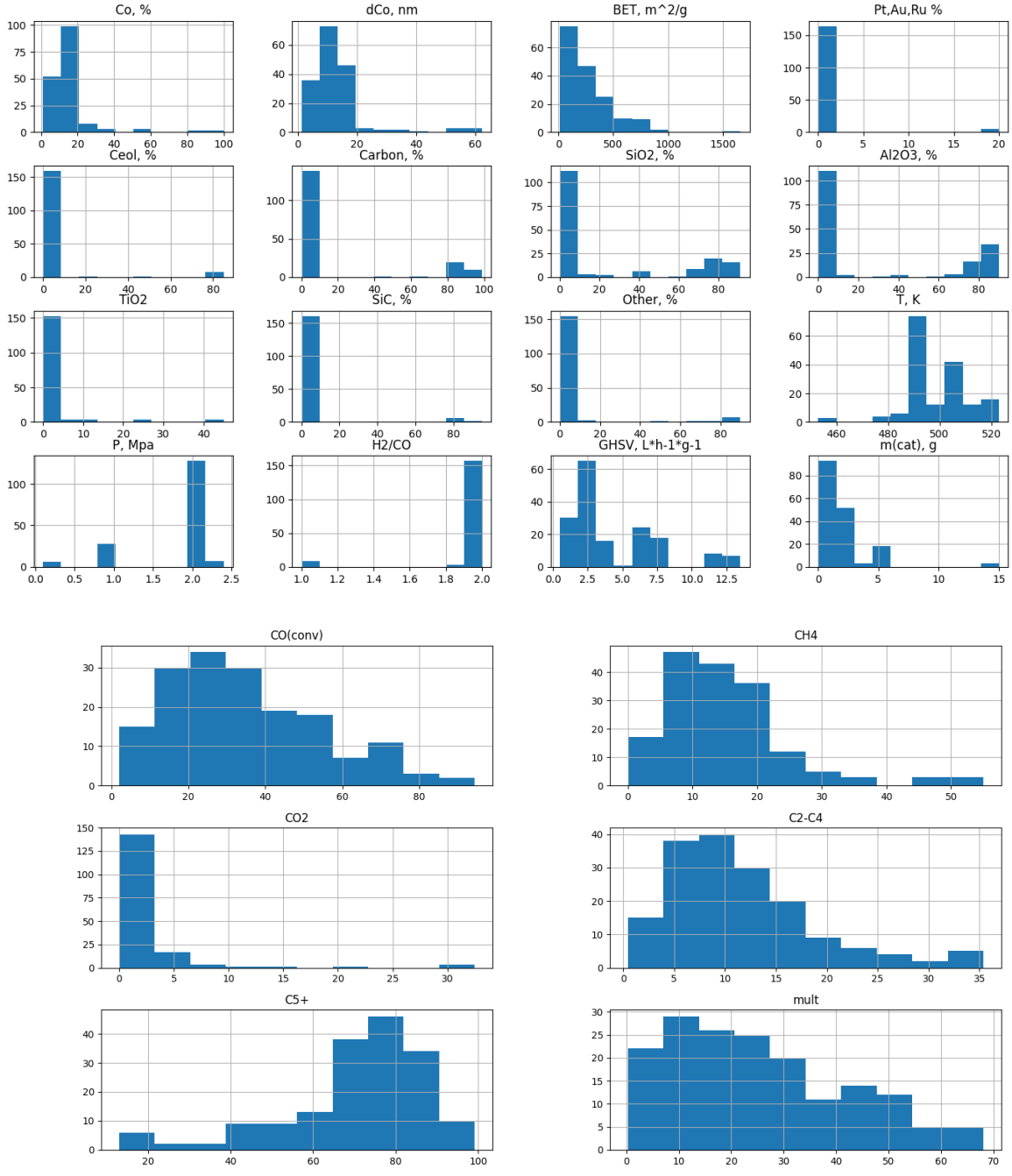

Figure S1. The statistic plots for all features and property of experiments under consideration.

Table S1. Dataset of 169 experiments with 16 feature parameters (green) and 6 property parameters (red)

N	Co, %	dCo, nm	BET, m^2/g	Pt,Au,Ru %	Ceol, %	Carbon, %	SiO2, %	Al2O3, %	Reference
1	13	15.7	173	0.2	0	0	0	84	1
2	13	14.2	169	0.2	0	0	5	79	1
3	13	15	164	0.2	0	0	10	74	1
4	13	18.7	161	0.2	0	0	15	69	1
5	10	12.7	763	0	0	0	90	0	2
6	10	12.7	763	0	0	0	90	0	2
7	10	10.9	720	0	0	0	85.5	0	2
8	10	10.9	720	0	0	0	85.5	0	2
9	10	8.3	650	0	0	0	91	0	2
10	10	8.3	650	0	0	0	91	0	2
11	10	7.3	615	0	0	0	67.5	0	2
12	10	7.3	615	0	0	0	67.5	0	2
13	10	7.8	550	0	0	0	45	0	2
14	10	7.8	550	0	0	0	45	0	2
15	10	19.5	320	0	0	0	90	0	2
16	10	19.5	320	0	0	0	90	0	2
17	10	15.6	316	0	0	0	85.5	0	2
18	10	15.6	316	0	0	0	85.5	0	2
19	10	10	308	0	0	0	91	0	2
20	10	10	308	0	0	0	91	0	2
21	10	12.7	296	0	0	0	67.5	0	2
22	10	12.7	296	0	0	0	67.5	0	2
23	10	11.5	296	0	0	0	45	0	2
24	10	11.5	296	0	0	0	45	0	2
25	15	19.3	158	0	0	85	0	0	3
26	15	19.3	156	0	0	85	0	0	3
27	15	18.1	167	0	0	85	0	0	3
28	15	16.5	173	0	0	85	0	0	3
29	15	9.4	141	0	0	85	0	0	4
30	15	10.1	132	0	0	85	0	0	4
31	15	11.3	102	0	0	85	0	0	4
32	1	4.9	235	0	0	99	0	0	5
33	5	3.6	235	0	0	95	0	0	5
34	10	3.9	235	0	0	90	0	0	5
35	15	4.2	235	0	0	85	0	0	5
36	20	5.3	235	0	0	80	0	0	5
37	40	10.5	235	0	0	60	0	0	5
38	20	5.2	178	0	0	80	0	0	6
39	20	4.8	587	0	0	80	0	0	6
40	20	5.1	854	0	0	80	0	0	6
41	10	6.2	607	0	0	0	90	0	7
42	20	11.4	508	0	0	0	80	0	7
43	30	13.8	421	0	0	0	70	0	7
44	40	17.6	350	0	0	0	60	0	7

45	20	9.5	498	1	0	0	79	0	7
46	20	5.9	476	0	0	0	78	0	7
47	20	6.8	443	1	0	0	77	0	7
48	20	14.1	262	0	0	0	80	0	7
49	20	18.3	198	0	0	0	80	0	8
50	19.95	17.2	193	0	0	0	79.95	0	8
51	19.9	17.3	1661	0	0	0	79.9	0	8
52	19.75	17.5	132	0	0	0	79.75	0	8
53	19.5	17.6	89	0	0	0	79.5	0	9
54	15	7.2	144	0	0	0	0	85	9
55	15	12.88	140	0	0	0	0	84.6	9
56	15	13.03	137	0	0	0	0	83.94	9
57	15	12.03	132	0	0	0	0	82.31	9
58	15	12.1	119	0	0	0	0	78.32	9
59	15	14.1	107	0	0	0	0	72.96	9
60	15	12.3	100	0	0	0	0	69.13	9
61	15	7.1	131.5	0	0	0	0	85	10
62	15	9.5	135	0	0	0	0	84.5	10
63	15	9.8	135.5	0	0	0	0	84	10
64	30	12.4	285	0	0	0	70	0	11
65	30	18.7	357	0	0	0	70	0	11
66	30	18.2	319	0	0	0	70	0	11
67	21.8	9.7	130	0	0	0	78.2	0	12
68	21.6	8.6	132	0	0	0.1	78.3	0	12
69	21.4	8.2	135	0	0	0.5	78.1	0	12
70	21.3	7.9	153	0	0	1	77.7	0	12
71	100	10.8	100	0	0	0	0	0	13
72	95	11.3	97	0	0	0	0	5	13
73	90	10.8	94	0	0	0	0	10	13
74	85	11.1	86	0	0	0	0	15	13
75	20	16.7	216	0	0	0	0	80	14
76	20	14.8	247	0	0	0	0	79.1	14
77	20	14.5	236	0	0	0	0	78.2	14
78	20	12.3	231	0	0	0	0	75.4	14
79	20	12	194	0	0	0	0	71	14
80	20	17.1	64	0	0	0	0	34	14
81	5	27.5	34.1	0	0	0	0	0	15
82	5	23.6	29.8	0	0	0	0	0	15
83	20	50.4	22.9	0	0	0	0	0	15
84	20	50.4	22.9	0	0	0	0	0	15
85	20	50.4	22.9	0	0	0	0	0	15
86	20	62.3	27.4	0	0	0	0	0	15
87	20	62.3	27.4	0	0	0	0	0	15
88	20	62.3	27.4	0	0	0	0	0	15
89	15	13.8	68	0	0	0	0	85	16
90	15	13.8	68	0	0	0	0	85	16
91	15	11.4	125	0	0	0	0	85	16
92	15	11.4	125	0	0	0	0	85	16

93	15	8.7	137	0	0	0	0	85	16
94	15	8.7	137	0	0	0	0	85	16
95	15	16.7	13	0	0	0	0	85	16
96	15	16.7	13	0	0	0	0	85	16
97	15	8.6	145	0	0	0	0	85	16
98	15	8.6	145	0	0	0	0	85	16
99	15	8	178	0	0	0	0	85	16
100	15	8	178	0	0	0	0	85	16
101	7.2	6.8	400	0	0	92.8	0	0	17
102	8	14.6	438	0	0	92	0	0	17
103	12.1	32.4	460	0	0	87.9	0	0	17
104	3.9	15.9	418	0	0	84	0	0	17
105	7.2	6.8	400	0	0	92.8	0	0	17
106	7.2	6.8	400	0	0	92.8	0	0	17
107	7.2	6.8	400	0	0	92.8	0	0	17
108	7.2	6.8	400	0	0	92.8	0	0	17
109	7.2	6.8	400	0	0	92.8	0	0	17
110	20	39	153	0	0	0	80	0	18
111	10	33	82	0	0	0	40	0	18
112	6.67	25	45	0	0	0	26.63	0	18
113	5	26	36	0	0	0	20	0	18
114	15	9.6	120.5	0	0	85	0	0	19
115	15	10.1	115	0	0	84.8	0	0	19
116	7.5	9.6	118	0	0	87.5	0	0	19
117	51.5	9.1	337.6	0	0	48.5	0	0	20
118	60	9.3	104.8	0	0	0	0	40	20
119	38.8	7.1	181.1	0	0	0	0	61.2	20
120	55.4	7.2	120.3	0	0	0	0	44.6	20
121	15	9	35.5	0.5	0	0	0	0	21
122	15	3.4	57.7	0.5	0	0	0	0	21
123	15	6.4	50.7	0.5	0	0	0	0	21
124	15	1.2	69.7	0.5	0	0	0	0	21
125	10	12.2	48	0	0	0	0	0	22
126	10	12.2	48	0	0	0	0	0	22
127	10	12.2	48	0	0	0	0	0	22
128	10	9.4	112	0	0	0	0	90	22
129	10	9.4	112	0	0	0	0	90	22
130	11.7	14.8	342.5	0	20	0	68.3	0	23
131	7.9	14.6	367	0	50	0	42.1	0	23
132	3.6	13.9	361	0	80	0	16.4	0	23
133	15.7	23.3	300	0	84.3	0	0	0	23
134	10	11	154	0	0	0	0	90	24
135	7.5	17	158	0	0	0	0	90	24
136	5	7	166	0	0	0	0	90	24
137	2.5	4	165	0	0	0	0	90	24
138	19.5	9	294	0	0	0	0	80.5	25
139	19.8	7.8	341	0	0	0	0	80.15	25
140	20	8.3	322	1	0	0	0	79	25

141	20	7.5	324	1	0	0	0	79	25
142	20	8	407	1	0	0	0	78.95	25
143	20.3	9.1	314	0	0	0	0	79.65	25
144	20	9.1	314	1	0	0	0	78.95	25
145	20	9.1	314	1	0	0	0	78.95	25
146	15	15.3	694	0	0	85	0	0	26
147	15	15.3	986	0	0	85	0	0	26
148	10	2.8	312	0	0	0	90	0	27
149	10	5.2	427	0	0	0	90	0	27
150	10	5.4	407	0	0	0	90	0	27
151	15	14.3	408	0	85	0	0	0	28
152	15	12.9	332	0	85	0	0	0	28
153	15	5.6	376	0	85	0	0	0	28
154	15	5.6	376	0	85	0	0	0	28
155	15	5.6	376	0	85	0	0	0	28
156	15	5.6	376	0	85	0	0	0	28
157	15	11.7	217	0	0	0	0	85	29
158	15	9.15	215	0	0	0	0	85	29
159	15	10.575	225	0	0	0	0	85	29
160	15	16.05	201	0	0	0	0	85	29
161	15	10.65	186.5	0	0	0	0	85	29
162	15	10.9	165	0	0	0	0	85	30
163	15	6.2	168.8	0.5	0	0	0	84.5	30
164	15	7.5	167.5	0.5	0	0	0	83.5	30
165	20	15.3	723	20	0	0	80	0	31
166	20	14.7	702	20	0	0	80	0	31
167	20	15.6	786	20	0	0	80	0	31
168	20	15.1	722	20	0	0	80	0	31
169	20	15.3	572	20	0	0	80	0	31

N	TiO2, %	SiC, %	Other, %	T, K	P Mpa	H2/CO	GHSV, L*h-1*g-1	m(cat), g
1	0	0	3	493	2.4	2	2.0	3.00
2	0	0	3	493	2.4	2	2.0	3.00
3	0	0	3	493	2.4	2	2.0	3.00
4	0	0	3	493	2.4	2	2.0	3.00
5	0	0	0	493	2	2	2.0	2.50
6	0	0	0	503	2	2	2.0	2.50
7	4.5	0	0	493	2	2	2.0	2.50
8	4.5	0	0	503	2	2	2.0	2.50
9	9	0	0	493	2	2	2.0	2.50
10	9	0	0	503	2	2	2.0	2.50
11	22.5	0	0	493	2	2	2.0	2.50
12	22.5	0	0	503	2	2	2.0	2.50
13	45	0	0	493	2	2	2.0	2.50
14	45	0	0	503	2	2	2.0	2.50
15	0	0	0	493	2	2	2.0	2.50

16	0	0	0	503	2	2	2.0	2.50
17	4.5	0	0	493	2	2	2.0	2.50
18	4.5	0	0	503	2	2	2.0	2.50
19	9	0	0	493	2	2	2.0	2.50
20	9	0	0	503	2	2	2.0	2.50
21	22.5	0	0	493	2	2	2.0	2.50
22	22.5	0	0	503	2	2	2.0	2.50
23	45	0	0	493	2	2	2.0	2.50
24	45	0	0	503	2	2	2.0	2.50
25	0	0	0	493	2	2	3.0	1.00
26	0	0	0	493	2	2	3.0	1.00
27	0	0	0	493	2	2	3.0	1.00
28	0	0	0	493	2	2	3.0	1.00
29	0	0	0	498	2	2	2.4	3.00
30	0	0	0	498	2	2	2.4	3.00
31	0	0	0	498	2	2	2.4	3.00
32	0	0	0	493	0.1	2	1.2	2.00
33	0	0	0	493	0.1	2	1.2	2.00
34	0	0	0	493	0.1	2	1.2	2.00
35	0	0	0	493	0.1	2	1.2	2.00
36	0	0	0	493	0.1	2	1.2	2.00
37	0	0	0	493	0.1	2	1.2	2.00
38	0	0	0	498	2	2	6.8	0.80
39	0	0	0	498	2	2	6.8	0.80
40	0	0	0	498	2	2	6.8	0.80
41	0	0	0	493	2	2	13.5	1.00
42	0	0	0	493	2	2	13.5	1.00
43	0	0	0	493	2	2	13.5	1.00
44	0	0	0	493	2	2	13.5	1.00
45	0	0	0	493	2	2	13.5	1.00
46	0	0	2	493	2	2	13.5	1.00
47	0	0	2	493	2	2	13.5	1.00
48	0	0	0	493	2	2	2.0	1.00
49	0	0	0	523	2	2	2.0	1.50
50	0	0	0.1	523	2	2	2.0	1.50
51	0	0	0.2	523	2	2	2.0	1.50
52	0	0	0.5	523	2	2	2.0	1.50
53	0	0	1	523	2	2	2.0	1.50
54	0	0	0	503	1	2	1.9	6.00
55	0	0	0.4	503	1	2	1.9	6.00
56	0	0	1.06	503	1	2	1.9	6.00
57	0	0	2.69	503	1	2	1.9	6.00
58	0	0	6.68	503	1	2	1.9	6.00
59	0	0	12.04	503	1	2	1.9	6.00
60	0	0	15.87	503	1	2	1.9	6.00
61	0	0	0	453	1	2	2.8	6.00
62	0	0	0.5	453	1	2	2.8	6.00
63	0	0	1	453	1	2	2.8	6.00

64	0	0	0	503	2.06	2	7.0	0.30
65	0	0	0	503	2.06	2	7.0	0.30
66	0	0	0	503	2.06	2	7.0	0.30
67	0	0	0	478	2	2	2.8	1.00
68	0	0	0	478	2	2	2.8	1.00
69	0	0	0	478	2	2	2.8	1.00
70	0	0	0	478	2	2	2.8	1.00
71	0	0	0	503	2	2	8.0	0,1
72	0	0	0	503	2	2	8.0	0,1
73	0	0	0	503	2	2	8.0	0,1
74	0	0	0	503	2	2	8.0	0,1
75	0	0	0	493	2	2	2.0	0,1
76	0	0	0.9	493	2	2	2.0	0,1
77	0	0	1.8	493	2	2	2.0	0,1
78	0	0	4.6	493	2	2	2.0	0,1
79	0	0	9	493	2	2	2.0	0,1
80	0	0	46	493	2	2	2.0	0,1
81	0	95	0	523	2	2	6	5
82	0	95	0	523	2	2	6	5
83	0	80	0	493	2	2	6	5
84	0	80	0	508	2	2	6	5
85	0	80	0	523	2	2	6	5
86	0	80	0	493	2	2	6	5
87	0	80	0	508	2	2	6	5
88	0	80	0	523	2	2	6	5
89	0	0	0	488	2	2	1.25	1.6
90	0	0	0	498	2	2	1.25	1.6
91	0	0	0	488	2	2	1.25	1.6
92	0	0	0	498	2	2	1.25	1.6
93	0	0	0	488	2	2	1.25	1.6
94	0	0	0	498	2	2	1.25	1.6
95	0	0	0	488	2	2	1.25	1.6
96	0	0	0	498	2	2	1.25	1.6
97	0	0	0	488	2	2	1.25	1.6
98	0	0	0	498	2	2	1.25	1.6
99	0	0	0	488	2	2	1.25	1.6
100	0	0	0	498	2	2	1.25	1.6
101	0	0	0	513	2	1	4	0.4
102	0	0	0	513	2	1	4	0.4
103	0	0	0	513	2	1	4	0.4
104	0	0	0	513	2	1	3.3	0.4
105	0	0	0	513	2	1	3.3	0.4
106	0	0	0	513	2	1	5.3	0.4
107	0	0	0	513	2	1	8	0.4
108	0	0	0	493	2	1	3.3	0.4
109	0	0	0	493	2	1	3.3	0.4
110	0	0	0	493	2	2	1	0.3
111	0	0	50	493	2	2	1	0.3

112	0	0	66.7	493	2	2	1	0.3
113	0	0	75	493	2	2	1.0	0.30
114	0	0	0	523	2	2	6.3	4.00
115	0	0	0.2	523	2	2	6.3	4.00
116	0	0	5	523	2	2	6.3	4.00
117	0	0	0	503	2	2	11.3	0.25
118	0	0	0	503	2	2	11.3	0.25
119	0	0	0	503	2	2	11.3	0.25
120	0	0	0	503	2	2	11.3	0.25
121	0	0	84.5	493	1	2	3.76	0.5
122	0	0	84.5	493	1	2	3.76	0.5
123	0	0	84.5	493	1	2	3.76	0.5
124	0	0	84.5	493	1	2	3.76	0.5
125	0	0	90	493	2	2	1.54	3
126	0	0	90	493	2	2	0.77	3
127	0	0	90	503	2	2	0.77	3
128	0	0	0	493	2	2	0.77	3
129	0	0	0	503	2	2	0.77	3
130	0	0	0	523	2	2	12	0.5
131	0	0	0	523	2	2	12	0.5
132	0	0	0	523	2	2	12	0.5
133	0	0	0	523	2	2	12	0.5
134	0	0	0	513	2	2	6.7	0.0123
135	0	0	2.5	513	2	2	6.7	0.0123
136	0	0	5	513	2	2	6.7	0.0123
137	0	0	7.5	513	2	2	6.7	0.0123
138	0	0	0	493	2	2	2.6	0.5
139	0	0	0.05	493	2	2	2.6	0.5
140	0	0	0	493	2	2	7	0.5
141	0	0	0	493	2	2	7	0.5
142	0	0	0.05	493	2	2	7	0.5
143	0	0	0.05	493	2	2	2.6	0.5
144	0	0	0.05	493	2	2	7	0.5
145	0	0	0.05	493	2	2	2.6	0.5
146	0	0	0	503	2	2	0.5	3
147	0	0	0	503	2	2	0.5	3
148	0	0	0	493	1	1.8	1.8	1
149	0	0	0	493	1	1.8	1.8	1
150	0	0	0	493	1	1.8	1.8	1
151	0	0	0	503	1	2	8	1
152	0	0	0	503	1	2	8	1
153	0	0	0	483	1	2	8	1
154	0	0	0	493	1	2	8	1
155	0	0	0	503	1	2	8	1
156	0	0	0	513	1	2	8	1
157	0	0	0	483	1	2	4	0.5
158	0	0	0	483	1	2	4	0.5
159	0	0	0	483	1	2	4	0.5

160	0	0	0	483	1	2	4	0.5
161	0	0	0	483	1	2	4	0.5
162	0	0	0	493	2.2	2	1.82	15
163	0	0	0	493	2.2	2	5.9	15
164	0	0	1	493	2.2	2	0.78	15
165	0	0	0	503	2	2	6.75	0.4
166	0	0	0	503	2	2	6.75	0.4
167	0	0	0	503	2	2	6.75	0.4
168	0	0	0	503	2	2	6.75	0.4
169	0	0	0	503	2	2	6.75	0.4

N	CO(conv)	CH4	CO2	C2-C4	C5+	Mult
1	54.0	20.9	2.6	3.4	73.1	39.4686
2	71.0	24.0	2.3	3.4	70.3	49.9272
3	78.0	19.3	1.2	5.0	74.5	58.1334
4	57.0	22.3	0.9	4.5	72.4	41.2395
5	27.3	8.6	0.6	8.4	82.4	22.50629
6	30.4	9.8	0.7	9.6	79.8	24.26569
7	31.4	7.7	0.4	7.5	84.4	26.50499
8	44.4	9.3	0.5	8.0	82.2	36.48437
9	66.5	7.2	0.3	5.5	87.0	57.84684
10	75.3	8.7	0.7	6.0	84.6	63.72344
11	42.5	9.0	0.7	9.3	81.1	34.45079
12	55.9	10.9	0.8	10.3	78.0	43.58192
13	34.3	11.0	0.8	11.1	77.1	26.44519
14	53.0	12.4	0.9	11.5	75.2	39.87079
15	13.4	18.1	0.2	35.2	46.5	6.236041
16	17.7	11.0	0.4	16.8	71.8	12.71587
17	16.4	17.6	0.8	19.5	62.1	10.18941
18	24.0	16.9	1.1	18.2	63.8	15.31849
19	25.5	15.4	0.9	16.0	67.8	17.27721
20	37.0	14.8	1.1	13.5	70.6	26.11485
21	21.8	19.7	1.0	20.4	59.0	12.85846
22	34.7	15.6	1.1	13.1	70.2	24.3504
23	17.1	29.3	1.0	34.9	34.8	5.94952
24	28.8	21.7	1.2	21.7	55.4	15.94088
25	22.0	6.4	1.0	2.4	90.2	19.844
26	25.2	7.8	1.2	3.1	87.9	22.1508
27	27.5	8.1	1.7	4.5	85.7	23.5675
28	30.1	9.5	2.5	6.8	81.2	24.4412
29	53.8	15.4	0.0	32.5	52.1	28.0298
30	52.3	13.8	0.0	30.5	55.7	29.10791
31	48.3	11.5	0.0	26.8	61.7	29.8011
32	2.0	55.0	3.0	29.0	13.0	0.26
33	13.0	34.0	6.0	14.0	46.0	5.98
34	25.0	36.0	6.0	14.0	44.0	11
35	30.0	46.0	9.0	18.0	27.0	8.1

36	39.0	53.0	12.0	16.0	19.0	7.41
37	20.0	55.0	9.0	18.0	18.0	3.6
38	64.0	10.6	0.3	2.0	87.1	55.73823
39	40.0	15.2	0.0	2.5	82.3	32.91291
40	60.0	18.9	0.0	3.3	77.8	46.66667
41	13.2	26.7	5.9	23.8	43.6	5.749389
42	23.1	19.3	1.2	15.6	63.9	14.76848
43	33.1	21.1	1.1	15.3	62.5	20.69159
44	30.1	18.4	0.7	14.7	66.2	19.93714
45	43.0	13.9	1.3	11.5	73.2	31.49654
46	13.2	18.6	3.3	35.4	42.7	5.642553
47	11.5	19.5	4.4	33.8	42.3	4.859465
48	17.7	16.9	5.7	18.0	59.4	10.51981
49	94.4	18.4	5.7	6.8	69.1	65.21697
50	39.6	11.9	8.1	25.1	54.8	21.71382
51	27.6	24.1	30.7	23.6	21.6	5.952566
52	29.2	24.9	32.0	26.5	16.6	4.860054
53	32.6	24.9	32.5	27.2	15.3	5.000135
54	32.1	16.2	1.1	5.0	77.7	24.92024
55	32.1	18.5	1.5	4.3	75.7	24.26494
56	35.6	19.1	1.7	4.0	75.1	26.7082
57	24.7	20.5	1.8	4.7	73.1	18.02419
58	15.8	21.5	1.2	5.0	72.4	11.41797
59	7.2	19.9	1.4	4.9	73.8	5.277602
60	6.3	20.8	1.5	4.7	73.1	4.568366
61	35.3	12.1	0.0	10.5	77.3	27.30879
62	37.9	9.9	0.0	8.8	81.3	30.83401
63	39.7	8.6	0.0	7.9	83.5	33.137
64	28.0	25.0	3.0	14.0	58.0	16.24
65	29.0	32.0	2.0	12.0	54.0	15.66
66	28.0	32.0	6.0	13.0	49.0	13.72
67	41.0	8.1	0.7	6.7	84.5	34.645
68	49.6	4.2	0.0	3.4	92.4	45.8304
69	50.8	4.8	0.2	4.1	90.9	46.1772
70	56.7	7.9	0.5	6.3	85.3	48.3651
71	8.3	2.9	0.0	9.5	87.6	7.2708
72	89.6	3.5	20.4	5.1	71.0	63.5825
73	78.9	2.8	14.0	5.1	78.2	61.66819
74	11.4	5.0	0.0	7.1	87.9	10.0206
75	25.9	9.6	0.0	8.8	81.6	21.1344
76	20.5	10.6	0.0	7.7	81.7	16.7485
77	21.8	7.1	0.0	5.8	87.1	18.9878
78	29.9	4.3	0.0	5.8	89.9	26.8801
79	30.2	5.1	0.0	7.0	87.9	26.5458
80	17.6	7.4	0.0	9.4	83.2	14.6432
81	35.4	0	1.06	3.24	95.7	33.8778
82	22.2	0	1.22	4.74	94.04	20.87688
83	34.1	0	0.64	3.39	95.97	32.72577

84	44.6	0	0.53	3.2	96.27	42.93642
85	53.9	0	0.64	8.53	90.83	48.95737
86	31.1	0	0.22	0.96	98.82	30.73302
87	39.4	0	0.41	0.44	99.16	39.06904
88	50.9	0	0.27	1.57	98.16	49.96344
89	41.5	8.9	0.3	5.7	85.1	35.3165
90	56.4	11.5	0.5	8.2	79.8	45.0072
91	53.3	8.5	0.4	6.3	84.8	45.1984
92	73.2	10.2	0.8	7.5	81.5	59.658
93	43.6	9.1	0.4	7.4	83.1	36.2316
94	67.9	11.6	0.7	10.4	77.3	52.4867
95	30.4	8.4	0.2	6.8	84.6	25.7184
96	42.6	9.2	0.4	7.3	83.1	35.4006
97	41.3	9.4	0.7	7.7	82.2	33.9486
98	61.2	12	0.7	10.3	77	47.124
99	34.4	12.3	0.8	9.3	77.6	26.6944
100	43.9	14.5	0.9	10.9	73.7	32.3543
101	19.7	17.08292	2.497502	14.08591	66.33367	13.06773
102	12.1	46.19141	4.589844	16.11328	33.10547	4.005762
103	10.5	49.3	4.9	17.4	28.4	2.982
104	9.9	22.8	3.6	17.9	55.7	5.5143
105	23.6	16.71672	2.602603	13.21321	67.46747	15.92232
106	14.8	19.1	2.7	14.7	63.5	9.398
107	9.9	21.22122	4.704705	16.71672	57.35736	5.678378
108	9.4	12.08791	2.097902	10.48951	75.32468	7.080519
109	14.2	22.28856	2.288557	16.1194	59.30348	8.421095
110	24.2	12.8	1.4	13.1	72.7	17.5934
111	37.3	7.9	1	10.2	80.9	30.1757
112	36.2	9.2	1.3	12.8	76.7	27.7654
113	32.6	9.6	0.9	13.3	76.2	24.8412
114	57.6	8.358209	0.497512	8.855721	82.28856	47.39821
115	71.3	8.477842	3.660886	9.055877	78.80539	56.18825
116	65.1	8.276534	2.629017	9.152872	79.94158	52.04197
117	16.8	19.56947	2.152642	8.610568	69.66732	11.70411
118	35.5	7.876371	0.299103	4.386839	87.43769	31.04038
119	33.5	7.577268	0.299103	4.087737	88.03589	29.49202
120	62.6	12.15415	1.185771	5.83004	80.83004	50.5996
121	15.3	14.39842	1.282051	7.39645	76.92308	11.76923
122	29.2	17.50246	1.671583	8.751229	72.07473	21.04582
123	22.2	15.87771	1.380671	8.77712	73.9645	16.42012
124	43.2	18.50394	1.673228	11.12205	68.70079	29.67874
125	22.00	11	1	5	83	18.26
126	50.00	9	1	4	86	43
127	83.00	11	2	5	82	68.06
128	9.00	5.050505	4.040404	2.020202	88.88889	8
129	11.00	8	6	4	82	9.02
130	40.20	15.50234	0.626056	8.645533	75.22608	30.24088
131	22.20	18.52219	0.950872	12.87639	67.65055	15.01842

132	6.90	26.21686	1.068461	22.85319	49.8615	3.440443
133	22.00	29.60689	0.980295	22.87355	46.53926	10.23864
134	52.50	11.03647	0.767754	9.021113	79.17466	41.5667
135	34.40	15.20693	0.673725	13.57074	70.5486	24.26872
136	13.20	36.58071	2.387775	21.01242	40.0191	5.282521
137	7.10	30.85714	4.095238	19.2381	45.80952	3.252476
138	21.70	13.9	0	16.2	69.9	15.1683
139	31.40	15.4	0	16	68.6	21.5404
140	18.90	12.7	0	14.2	73.1	13.8159
141	17.70	11.5	0	11.8	76.7	13.5759
142	22.80	10.7	0	12.3	77	17.556
143	24.50	11.4	0	13.2	75.4	18.473
144	9.60	14.2	0	14.6	71.2	6.8352
145	24.80	12.61261	0	12.81281	74.57457	18.49449
146	29.70	24.20136	3.194579	14.13359	58.47047	17.36573
147	73.10	18.41851	3.567985	9.739634	68.27387	49.9082
148	12.00	20	0	15	65	7.8
149	37.00	9.760956	0	9.561753	80.67729	29.8506
150	55.00	15.04514	0	11.2337	73.72116	40.54664
151	12.50	17.28272	0.0999	16.18382	66.43357	8.304196
152	14.30	20.77922	0.0999	20.67932	58.44156	8.357143
153	6.50	10.38961	0.0999	10.08991	79.42058	5.162338
154	11.20	14.48551	0.0999	13.88611	71.52847	8.011189
155	13.70	14.48551	0.0999	14.78521	70.62937	9.676224
156	18.90	27.37263	0.0999	23.67632	48.85115	9.232867
157	21.70	11.25	0	13.74	75.01	16.27717
158	21.30	12.97	0	14.14	72.89	15.52557
159	19.60	12.38	0	15.01	72.61	14.23156
160	19.30	12.10268	0	15.62218	72.27514	13.9491
161	16.50	14.23	0	14.14	71.63	11.81895
162	51.50	8.848942	0.67534	10.29894	80.17678	41.29104
163	47.00	7.870738	0.872324	8.713323	82.54362	38.7955
164	42.50	13.28644	2.305588	9.876905	74.53107	31.6757
165	69.00	20.33564	1.1846	10.56269	67.91708	46.86278
166	72.90	18.69436	1.088032	11.27596	68.94164	50.25846
167	72.30	16.28825	1.283317	8.094768	74.33366	53.74324
168	70.10	14.25743	0.990099	7.029703	77.72277	54.48366
169	73.80	17.3399	1.477833	9.359606	71.82266	53.00512

Python3 code for Decision Tree:

```
import pandas as pd
from sklearn import tree
dataframe = pd.read_excel("Data.xlsx", header=0)  # load dataset from Excel
data = dataframe.values
X, Y = data[:, :-1], data[:, -1]
feature_data=dataframe.columns
feature_list=feature_data[:-1]
model = tree.DecisionTreeRegressor(max_depth=3)   # Decision Tree Model
model.fit(X,Y)
dot_data = tree.export_graphviz(model, out_file='DecisionTree.txt', feature_names=feature_list,
filled=True, rounded=True, special_characters=True)
input('Press Enter to exit...')
```

Python3 code for Random Forest:

```
from numpy import mean, std                                          # Used modules
import pandas as pd
from sklearn.model_selection import cross_val_score, RepeatedKFold, train_test_split
from sklearn.ensemble import RandomForestRegressor
from sklearn.inspection import permutation_importance
from sklearn.metrics import mean_absolute_error

dataframe = pd.read_excel('Data.xlsx', header=0)                      # Read dataset for model
building from Data.xlsx
feature_list=dataframe.columns[:-1]
Xr, Yr = dataframe.values[:, :-1], dataframe.values[:, -1]
(X,Xtest,Y,Ytest) = train_test_split(Xr,Yr,test_size=0.3,random_state=100)          # Splitting dataset
to training (70%) and test (30%)
model = RandomForestRegressor()                                      # Regression Random Forest Model
cv = RepeatedKFold(n_splits=5, n_repeats=10, random_state=1)                  # Cross-validation
test
n_scores = cross_val_score(model, Xr, Yr, scoring='neg_mean_absolute_error', cv=cv, n_jobs=-1,
error_score='raise')
print('MAE cross validation: %.3f (%.3f)' % (-mean(n_scores), std(n_scores))+'\n')
model.fit(X, Y)                                  # Fit the model on the training dataset
print('MAE(training dataset): %.3f' % (mean_absolute_error(Y,model.predict(X))))
print('MAE(test dataset)    : %.3f' % (mean_absolute_error(Ytest,model.predict(Xtest)))+'\n')

importances = permutation_importance(model, X, Y,
scoring='neg_mean_squared_error').importances_mean  # Importance parameters estimation
print('Importances of parameters:')
j = 0
for ind in importances:
 j+=1
 print('Parameter_'+str(j)+' ('+feature_list[j-1]+'): '+str(round(100*ind/sum(importances)))+' %')
input('P.S.: Obtained parameters can vary from run to run.  Press Enter to exit...')
```

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