Two-sample T-tests and Binary Logistic Regression Results

Figure 14

Two-sample T-test for rpm

engine_condition	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
0		7218	885.0	271.7	3.1983	351.0	2239.0
1		12317	736.3	249.3	2.2463	61.0000	2172.0
Diff (1-2)	Pooled		148.7	257.8	3.8217		
Diff (1-2)	Satterthwaite		148.7		3.9083		

engine_condition	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
0		885.0	878.7	891.3	271.7	267.4	276.2
1		736.3	731.9	740.7	249.3	246.2	252.5
Diff (1-2)	Pooled	148.7	141.2	156.2	257.8	255.3	260.4
Diff (1-2)	Satterthwaite	148.7	141.0	156.4			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	19533	38.91	<.0001
Satterthwaite	Unequal	14085	38.05	<.0001

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	7217	12316	1.19	<.0001

Figure 15

Boxplot for RPM Grouped by Engine Condition

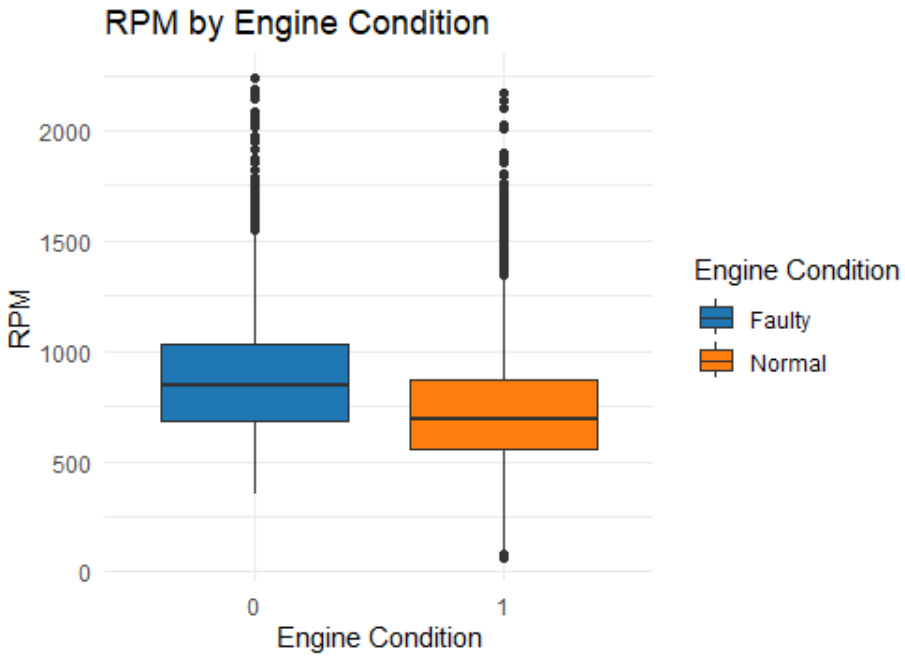

Figure 16

Two-sample T-test for Fuel Pressure

engine_condition	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
0		7218	6.2363	2.6815	0.0316	0.00319	19.8589
1		12317	6.9013	2.7774	0.0250	0.0507	21.1383
Diff (1-2)	Pooled		-0.6650	2.7424	0.0407		
Diff (1-2)	Satterthwaite		-0.6650		0.0403		

engine_condition	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
0		6.2363	6.1744	6.2982	2.6815	2.6385	2.7260
1		6.9013	6.8523	6.9504	2.7774	2.7431	2.8125
Diff (1-2)	Pooled	-0.6650	-0.7447	-0.5853	2.7424	2.7154	2.7698
Diff (1-2)	Satterthwaite	-0.6650	-0.7440	-0.5861			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	19533	-16.36	<.0001
Satterthwaite	Unequal	15544	-16.51	<.0001

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	12316	7217	1.07	0.0008

Figure 17

Boxplot for Fuel Pressure Grouped by Engine Condition

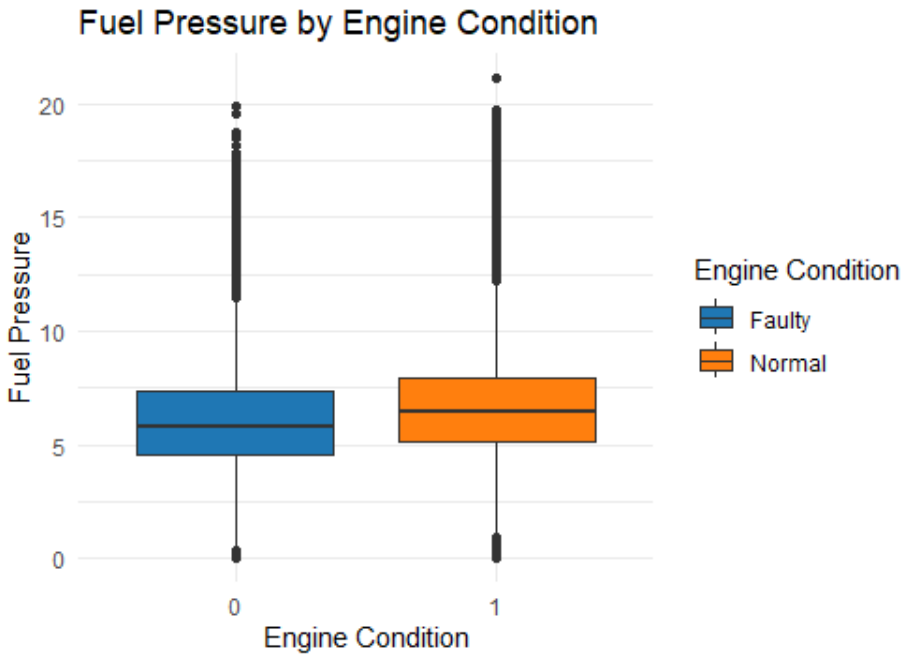

Figure 18

Two-sample T-test for Coolant Pressure

engine_condition	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
0		7218	2.3679	1.0872	0.0128	0.00248	7.1684
1		12317	2.3163	1.0050	0.00906	0.0157	7.4785
Diff (1-2)	Pooled		0.0516	1.0361	0.0154		
Diff (1-2)	Satterthwaite		0.0516		0.0157		

engine_condition	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
0		2.3679	2.3428	2.3930	1.0872	1.0697	1.1052
1		2.3163	2.2985	2.3340	1.0050	0.9926	1.0177
Diff (1-2)	Pooled	0.0516	0.0215	0.0818	1.0361	1.0259	1.0465
Diff (1-2)	Satterthwaite	0.0516	0.0209	0.0824			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	19533	3.36	0.0008
Satterthwaite	Unequal	14172	3.29	0.0010

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	7217	12316	1.17	<.0001

Figure 19

Boxplot for Coolant Pressure Grouped by Engine Condition

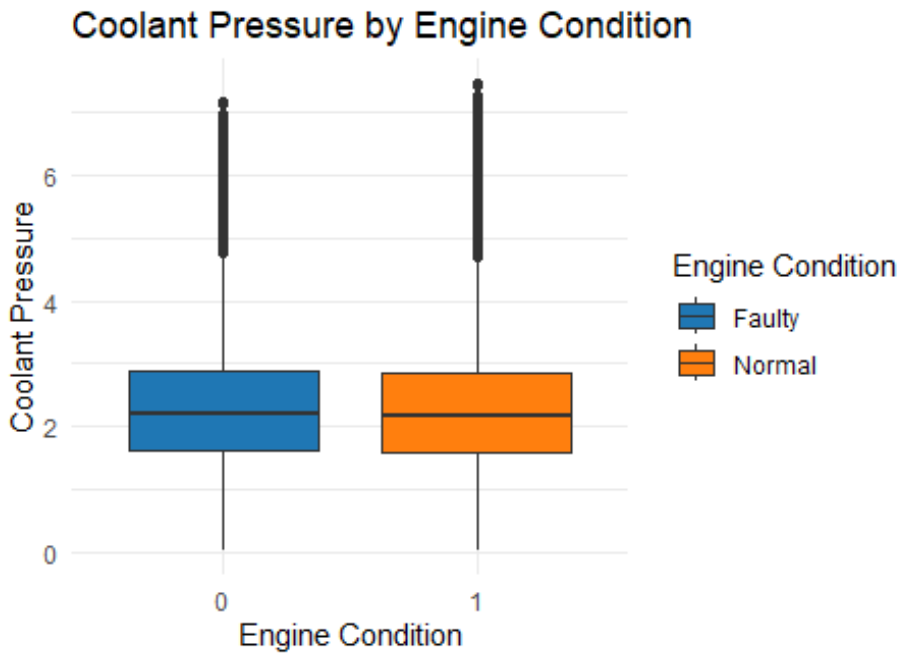

Figure 20

Two-sample T-test for Coolant Temperature

engine_condition	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
0		7218	78.8030	5.9684	0.0703	62.4460	118.4
1		12317	78.2073	6.3322	0.0571	61.6733	195.5
Diff (1-2)	Pooled		0.5957	6.2002	0.0919		
Diff (1-2)	Satterthwaite		0.5957		0.0905		

engine_condition	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
0		78.8030	78.6653	78.9407	5.9684	5.8726	6.0674
1		78.2073	78.0955	78.3192	6.3322	6.2541	6.4122
Diff (1-2)	Pooled	0.5957	0.4156	0.7759	6.2002	6.1394	6.2623
Diff (1-2)	Satterthwaite	0.5957	0.4183	0.7731			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	19533	6.48	<.0001
Satterthwaite	Unequal	15840	6.58	<.0001

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	12316	7217	1.13	<.0001

Figure 21

Boxplot for Coolant Temperature Grouped by Engine Condition

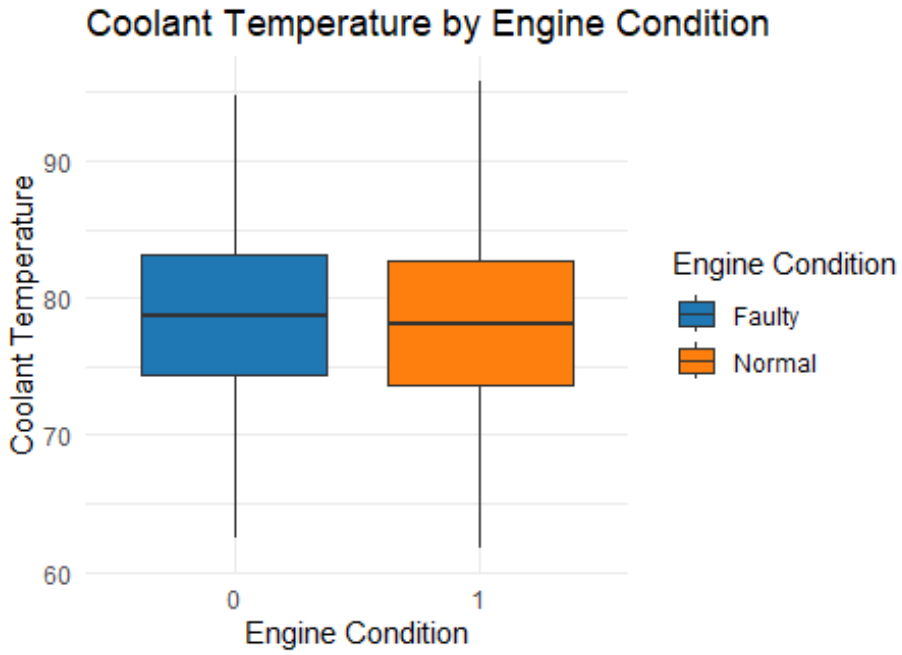

Figure 22

Two-sample T-test for Oil Pressure

engine_condition	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
0		7218	3.2225	1.0104	0.0119	0.00789	7.0513
1		12317	3.3514	1.0253	0.00924	0.00338	7.2656
Diff (1-2)	Pooled		-0.1289	1.0198	0.0151		
Diff (1-2)	Satterthwaite		-0.1289		0.0151		

engine_condition	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
0		3.2225	3.1992	3.2458	1.0104	0.9941	1.0271
1		3.3514	3.3333	3.3695	1.0253	1.0126	1.0382
Diff (1-2)	Pooled	-0.1289	-0.1585	-0.0993	1.0198	1.0098	1.0300
Diff (1-2)	Satterthwaite	-0.1289	-0.1584	-0.0994			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	19533	-8.53	<.0001
Satterthwaite	Unequal	15292	-8.56	<.0001

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	12316	7217	1.03	0.1637

Figure 23

Boxplot for Oil Pressure Grouped by Engine Condition

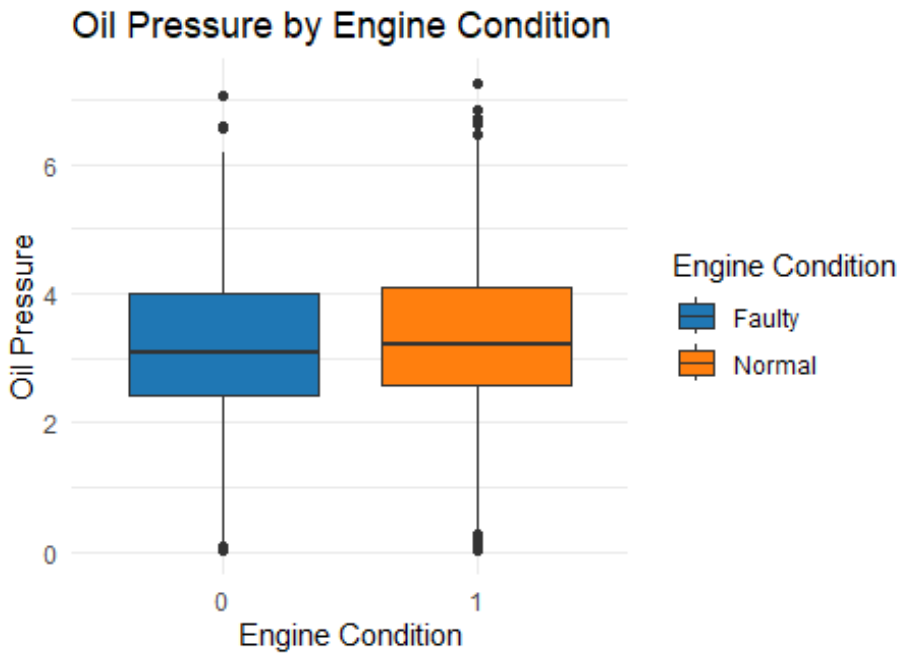

Figure 24

Two-sample T-test for Oil Temperature

engine_condition	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
0		7218	78.0239	3.2318	0.0380	72.2446	89.5808
1		12317	77.4204	3.0158	0.0272	71.3220	89.2863
Diff (1-2)	Pooled		0.6035	3.0974	0.0459		
Diff (1-2)	Satterthwaite		0.6035		0.0467		

engine_condition	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
0		78.0239	77.9494	78.0985	3.2318	3.1799	3.2854
1		77.4204	77.3672	77.4737	3.0158	2.9787	3.0540
Diff (1-2)	Pooled	0.6035	0.5135	0.6935	3.0974	3.0670	3.1284
Diff (1-2)	Satterthwaite	0.6035	0.5119	0.6951			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	19533	13.14	<.0001
Satterthwaite	Unequal	14283	12.91	<.0001

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	7217	12316	1.15	<.0001

Figure 25

Boxplot for Oil Temperature Grouped by Engine Condition

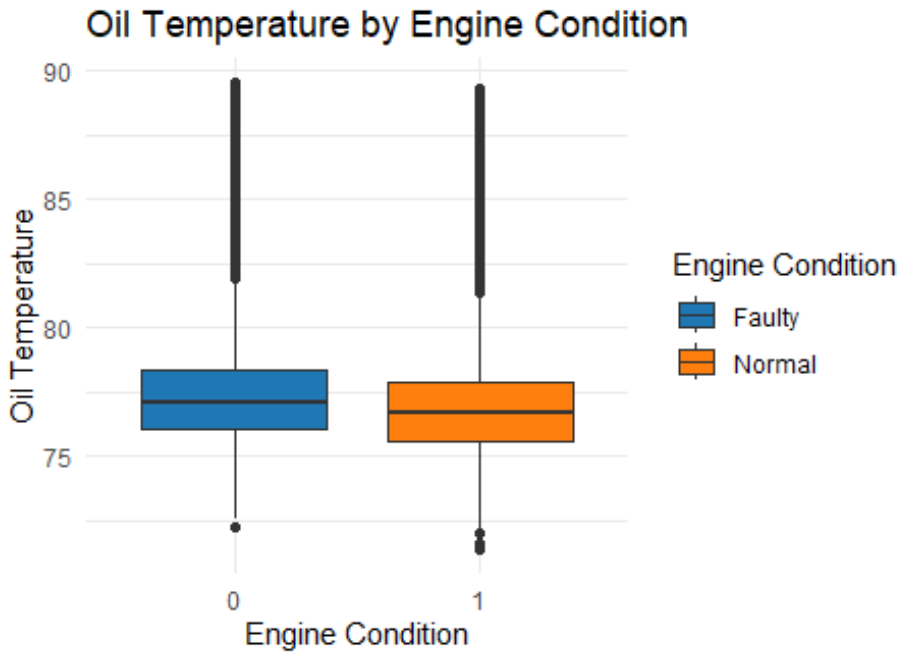

Figure 26

Logistic Regression Model

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-5.8970	0.4719	156.1773	<.0001
rpm	1	0.00223	0.000073	936.1432	<.0001
fuel_pres	1	-0.1057	0.00729	209.9626	<.0001
coolant_pres	1	0.0870	0.0179	23.6954	<.0001
oil_pres	1	-0.1368	0.0184	55.4951	<.0001
oil_temp	1	0.0580	0.00592	95.9441	<.0001

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
rpm	1.002	1.002	1.002
fuel_pres	0.900	0.887	0.913
coolant_pres	1.091	1.053	1.130
oil_pres	0.872	0.841	0.904
oil_temp	1.060	1.048	1.072

Figure 27

Confusion Matrix, Training Data

	Predicted		All
	0	1	
	Count	Count	Count
Actual			
0	1576	3501	5077
1	1112	7484	8596

Figure 28

Performance Metrics, Training Data

Sensitivity	Specificity	Accuracy
31.04%	87.06%	66.26%

Figure 29

Confusion Matrix, Validation Data

	Predicted		All
	0	1	
	Count	Count	Count
Actual			
0	638	1502	2140
1	486	3234	3720

Figure 30

Performance Metrics, Validation Data

Sensitivity	Specificity	Accuracy
29.81%	86.94%	66.08%

Figure 31

Receiver Operating Characteristic (ROC) Curve, Validation Data