

MTCARS Linear Regression Analysis

1. Find correlation matrix to choose associated columns

	hp	mpg	cyl	disp	drat	wt	qsec	vs	am	gear	carb
hp	1										
mpg	-0.7781683718	1									
cyl	0.8324474527	-0.8521819594	1								
disp	0.7909485864	-0.8475513793	0.9020328721	1							
drat	-0.4487591169	0.6811719078	-0.6999381138	-0.7102139272	1						
wt	0.6587478873	-0.8676593765	0.7824957945	0.8879799221	-0.7124406467	1					
qsec	-0.7082233889	0.4186840339	-0.5912420738	-0.4336978808	0.09120475965	-0.1747158787	1				
vs	-0.7230967374	0.6640389191	-0.8108117961	-0.7104158908	0.440278465	-0.5549156777	0.7445354435	1			
am	-0.2432042572	0.5998324295	-0.5226070469	-0.5912270401	0.7127111272	-0.6924952588	-0.2298608622	0.1683451246	1		
gear	-0.1257042582	0.4802847573	-0.4926865994	-0.5555691986	0.6996101319	-0.5832869965	-0.2126822297	0.2060233487	0.7940587603	1	
carb	0.7498124715	-0.5509250739	0.5269882937	0.3949768649	-0.09078979887	0.4276059377	-0.6562492283	-0.569607141	0.05753435107	0.2740728364	1

2.To predict hp, hp = f(cyl,disp,wt)

hp	cyl	disp	wt	predicted hp	error	error^2
110	6	160	2.62	134.34	24.34	592.28
110	6	160	2.875	131.63	21.63	467.74
93	4	108	2.32	79.20	-13.80	190.34
110	6	258	3.215	147.70	37.70	1421.66
175	8	360	3.44	213.68	38.68	1496.08
105	6	225	3.46	138.47	33.47	1120.27
245	8	360	3.57	212.30	-32.70	1069.43
62	4	146.7	3.19	77.73	15.73	247.58
95	4	140.8	3.15	76.97	-18.03	324.93
123	6	167.6	3.44	127.15	4.15	17.23
123	6	167.6	3.44	127.15	4.15	17.23
180	8	275.8	4.07	190.07	10.07	101.38
180	8	275.8	3.73	193.68	13.68	187.18
180	8	275.8	3.78	193.15	13.15	172.93
205	8	472	5.25	216.95	11.95	142.78
215	8	460	5.424	212.69	-2.31	5.34
230	8	440	5.345	209.51	-20.49	419.82
66	4	78.7	2.2	74.59	8.59	73.82
52	4	75.7	1.615	80.20	28.20	795.52
65	4	71.1	1.835	76.94	11.94	142.64
97	4	120.1	2.465	80.09	-16.91	285.82
150	8	318	3.52	204.39	54.39	2958.39
150	8	304	3.435	202.48	52.48	2754.31
245	8	350	3.84	207.42	-37.58	1412.26
175	8	400	3.845	217.41	42.41	1798.80
66	4	79	1.935	77.47	11.47	131.51
91	4	120.3	2.14	83.59	-7.41	54.95
113	4	95.1	1.513	85.19	-27.81	773.60
264	8	351	3.17	214.74	-49.26	2426.56
175	6	145	2.77	129.73	-45.27	2049.43
335	8	301	3.57	200.44	-134.56	18105.22
109	4	121	2.78	76.93	-32.07	1028.64

Manual Method

hp = f(cyl,disp,wt)

hp = b0 + b1*cyl + b2*disp + b3*wt

b0, b1, b2 and b3

[we do not know which one is b0, b1, b2 and b3 yet, so it's good to use xlminder]

-10.62530469 0.2009075229 23.93683836 -13.59118624

Sum Square Error

42785.56

RMSE

36.56567789

XL Miner

SUMMARY OUTPUT

Regression Statistics			Manual
Multiple R	0.8404754388	Correct	0.8404754388
R Square	0.7063989632	Correct	0.7063989632
Adjusted R Square	0.6749417093		
Standard Error	39.09035394		
Observations	32		

ANOVA						
	df	SS	MS	F	Significance F	
Regression	3	102941.3134	34313.77114	22.45583688	0.0000001305914096	Less than 0.05 => Significant
Residual	28	42785.56159	1528.055771			
Total	31	145726.875				

		Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
b0	Intercept	-13.59118624	42.82436102	-0.3173704387	0.7533171144	-101.312912	74.13053955
b1	cyl	23.93683836	9.146805573	2.616981536	0.01414360778	5.200456749	42.67321997
b2	disp	0.2009075229	0.1784540462	1.125822178	0.269798328	-0.164639015	0.5664540608
b3	wt	-10.62530469	15.67084749	-0.678029998	0.5033178281	-42.72558018	21.4749708