

Report of Price**The GLM Procedure**

Number of Observations Read	9660
Number of Observations Used	9660

Report of Price**The GLM Procedure****Dependent Variable: Price**

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	8637.356	1727.471	6.10	<.0001
Error	9654	2734187.794	283.218		
Corrected Total	9659	2742825.149			

R-Square	Coeff Var	Root MSE	Price Mean
0.003149	1531.051	16.82909	1.099185

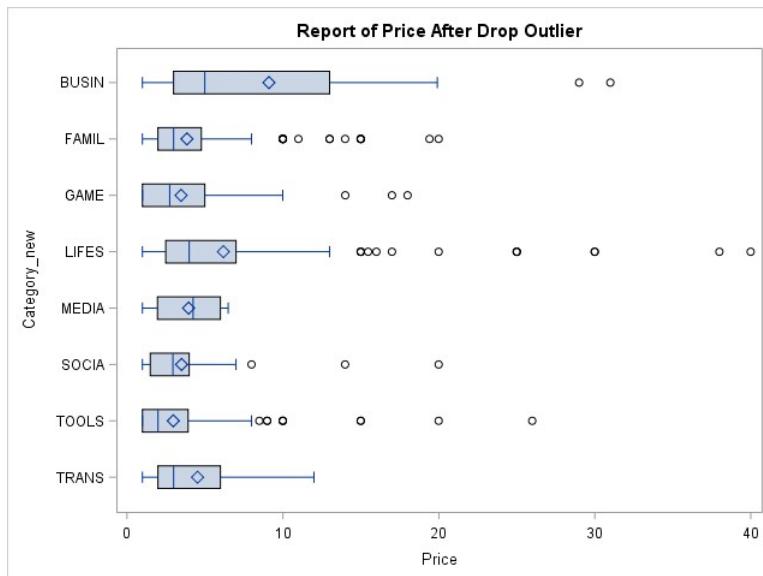
Source	DF	Type I SS	Mean Square	F Value	Pr > F
Rating	1	1049.406020	1049.406020	3.71	0.0543
Size	1	1177.701281	1177.701281	4.16	0.0415
Installs_new	1	6235.749287	6235.749287	22.02	<.0001
Reviews	1	14.862129	14.862129	0.05	0.8188
Recency	1	159.636832	159.636832	0.56	0.4528

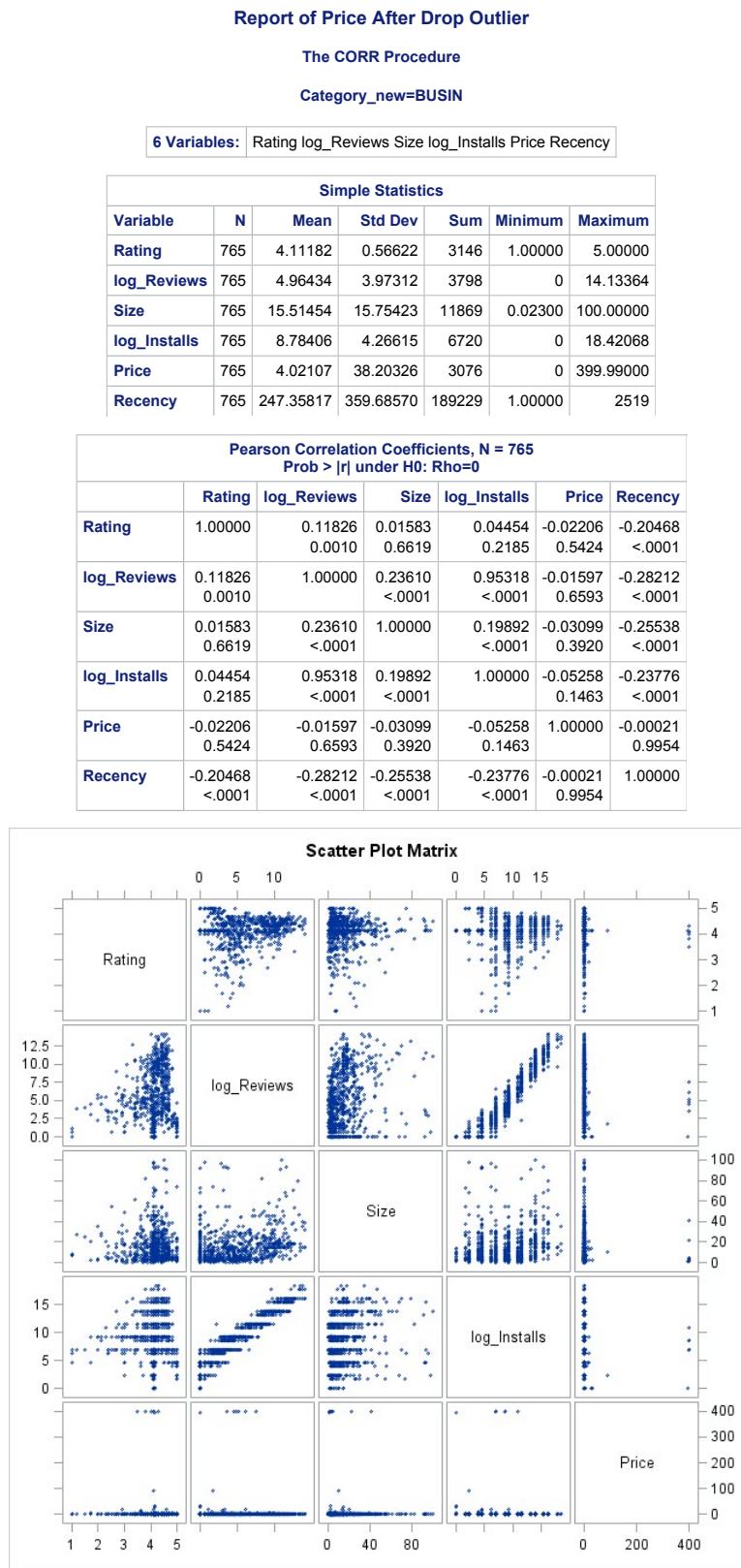
Source	DF	Type III SS	Mean Square	F Value	Pr > F
Rating	1	698.727712	698.727712	2.47	0.1163
Size	1	197.198118	197.198118	0.70	0.4041
Installs_new	1	6334.417162	6334.417162	22.37	<.0001
Reviews	1	12.748458	12.748458	0.05	0.8320
Recency	1	159.636832	159.636832	0.56	0.4528

Parameter	Estimate	Standard Error	t Value	Pr > t
Intercept	4.926010131	1.49618196	3.29	0.0010
Rating	-0.546826235	0.34814157	-1.57	0.1163
Size	-0.007279063	0.00872338	-0.83	0.4041
Installs_new	-0.515571728	0.10901752	-4.73	<.0001
Reviews	0.000000020	0.00000010	0.21	0.8320
Recency	-0.000334029	0.00044492	-0.75	0.4528

Report of Price

Obs	ID	App	Category_new	Rating	Reviews	Size	Installs	Installs_new	Type	Price	Content_Rating	Last_Updated	C
1756	2253	Vargo Anesthesia Mega App	LIFES	4.6	92	32	1000	1	Paid	79.99	Everyone	2018-06-18	1
1769	2266	EMT PASS	LIFES	3.4	51	2.4	1000	1	Paid	29.99	Everyone	2014-10-22	2.
1804	2301	A Manual of Acupuncture	LIFES	3.5	214	68	1000	1	Paid	33.99	Everyone	2017-10-02	2.
1882	2390	Language Therapy: Aphasia	LIFES	4.189142857	10	28	1000	1	Paid	74.99	Everyone	2018-06-25	3.
3276	4134	Norwegian For Kids & Babies F	FAMIL	4.192272467	1	14	5	0	Paid	39.99	Everyone	2015-09-24	1
3328	4197	most expensive app (H)	FAMIL	4.3	6	1.5	100	0	Paid	399.99	Everyone	2018-07-16	1
3466	4362	???? I'm rich	LIFES	3.8	718	26	10000	2	Paid	399.99	Everyone	2018-03-11	1.
3470	4367	I'm Rich - Trump Edition	LIFES	3.6	275	7.3	10000	2	Paid	400	Everyone	2018-05-03	1.
4397	5351	I am rich	LIFES	3.8	3547	1.8	100000	3	Paid	399.99	Everyone	2018-01-12	2
4399	5354	I am Rich Plus	FAMIL	4	856	8.7	10000	2	Paid	399.99	Everyone	2018-05-19	3
4400	5355	I am rich VIP	LIFES	3.8	411	2.6	10000	2	Paid	299.99	Everyone	2018-07-21	1.
4401	5356	I Am Rich Premium	BUSIN	4.1	1867	4.7	50000	2	Paid	399.99	Everyone	2017-11-12	1.
4402	5357	I am extremely Rich	LIFES	2.9	41	2.9	1000	1	Paid	379.99	Everyone	2018-07-01	1
4403	5358	I am Rich!	BUSIN	3.8	93	22	1000	1	Paid	399.99	Everyone	2017-12-11	1
4404	5359	I am rich(premium)	BUSIN	3.5	472	0.965	5000	1	Paid	399.99	Everyone	2017-05-01	3.
4407	5362	I Am Rich Pro	FAMIL	4.4	201	2.7	5000	1	Paid	399.99	Everyone	2017-05-30	1.
4409	5364	I am rich (Most expensive app)	BUSIN	4.1	129	2.7	1000	1	Paid	399.99	Teen	2017-12-06	2
4411	5366	I Am Rich	FAMIL	3.6	217	4.9	10000	2	Paid	389.99	Everyone	2018-06-22	1.
4414	5369	I am Rich	BUSIN	4.3	180	3.8	5000	1	Paid	399.99	Everyone	2018-03-22	1
4418	5373	I AM RICH PRO PLUS	BUSIN	4	36	41	1000	1	Paid	399.99	Everyone	2018-06-25	1.
4526	5489	AP Art History Flashcards	FAMIL	5	1	96	10	0	Paid	29.99	Mature 1	2016-01-19	3.
5546	6559	Dr.Dice - Sic bo analyzer	FAMIL	4.192272467	2	8.5	10	0	Paid	46.99	Everyone	2016-11-05	1
5600	6624	BP Fitness Lead Scanner	SOCIA	4.435555556	1	6.7	1	0	Paid	109.99	Everyone	2017-08-23	0.
5662	6692	cronometra-br	TOOLS	4.211396011	1	5.4	1	0	Paid	154.99	Everyone	2017-11-24	1.
6429	7477	USMLE Step 2 CK Flashcards	FAMIL	5	1	40	10	0	Paid	19.99	Everyone	2014-05-26	2.
7245	8328	Guide to Nikon Df	TOOLS	4.192113565	1	0.663	10	0	Paid	29.99	Everyone	2014-02-18	2.
8578	9719	EP Cook Book	LIFES	4.189142857	1	3.2	1	0	Paid	200	Everyone	2015-07-26	1
8589	9730	Lean EQ	BUSIN	4.121452145	6	10	10	0	Paid	89.99	Everyone	2017-02-14	1
8764	9917	Eu Sou Rico	BUSIN	4.131888545	1	1.4	1	0	Paid	394.99	Everyone	2018-07-11	1
8781	9934	I'm Rich/Eu sou Rico/?????? ??????/?????????????	LIFES	4.094904459	1	40	1	0	Paid	399.99	Everyone	2017-12-01	M





Report of Price After Drop Outlier

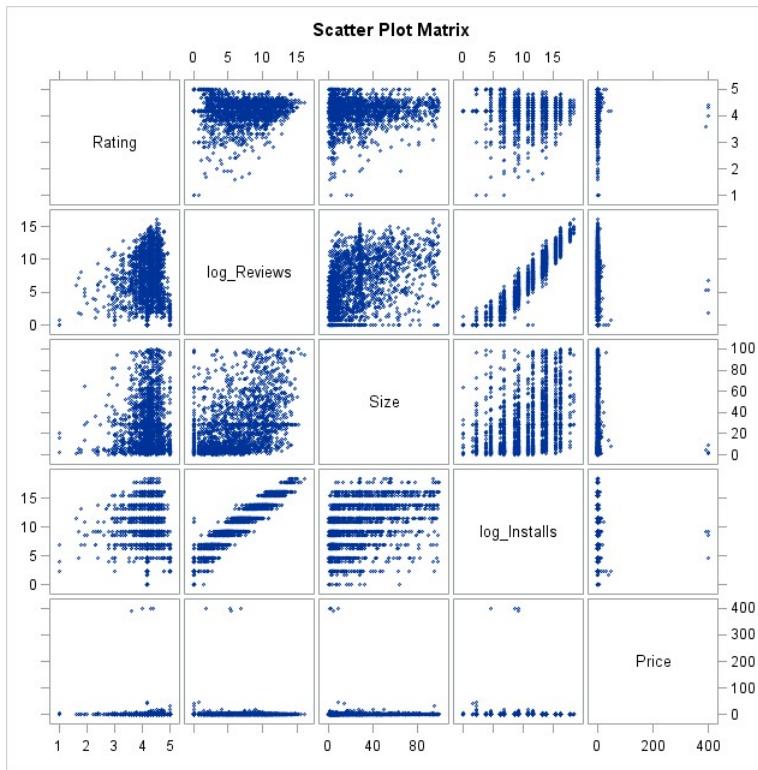
The CORR Procedure

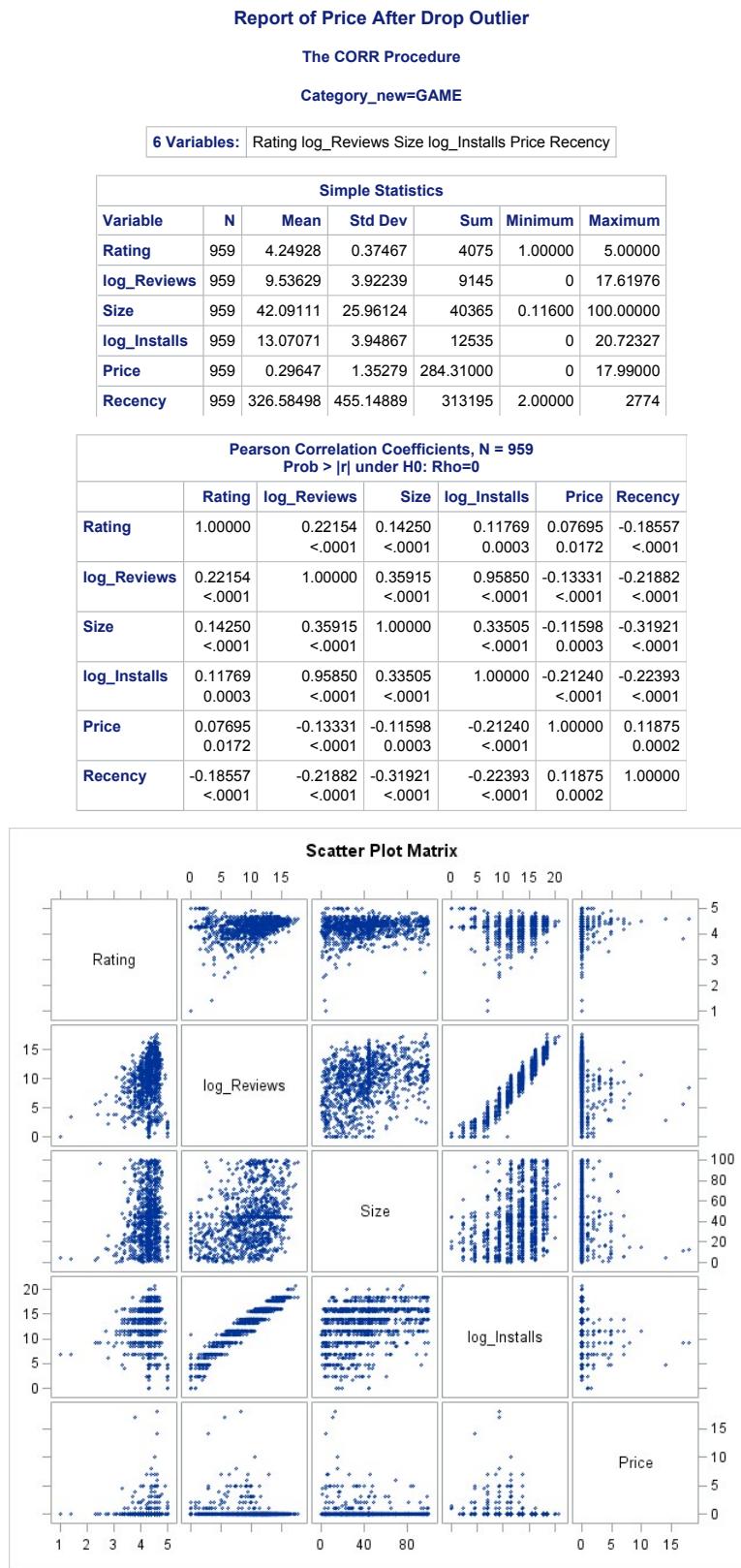
Category_new=FAMIL

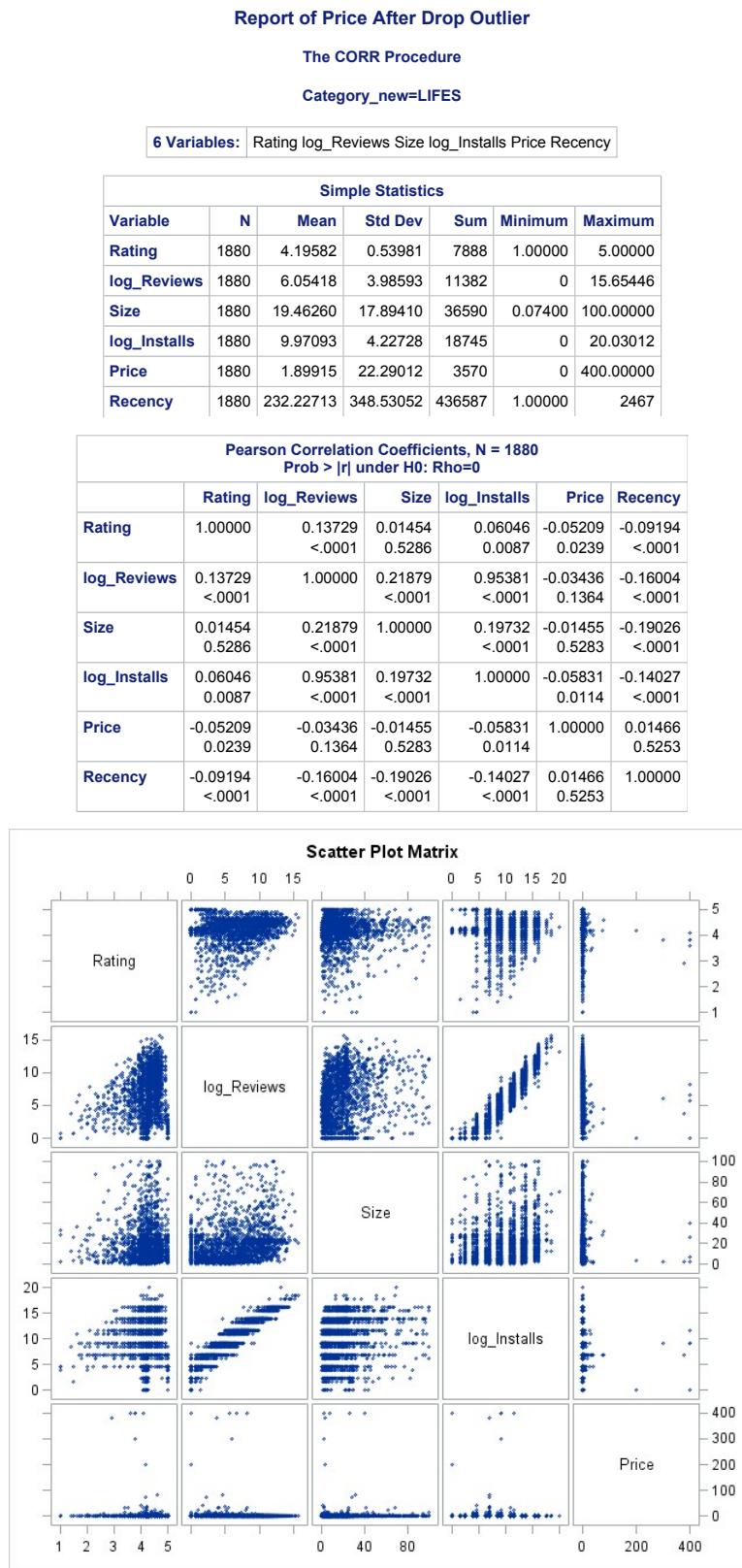
6 Variables: Rating log_Reviews Size log_Installs Price Recency

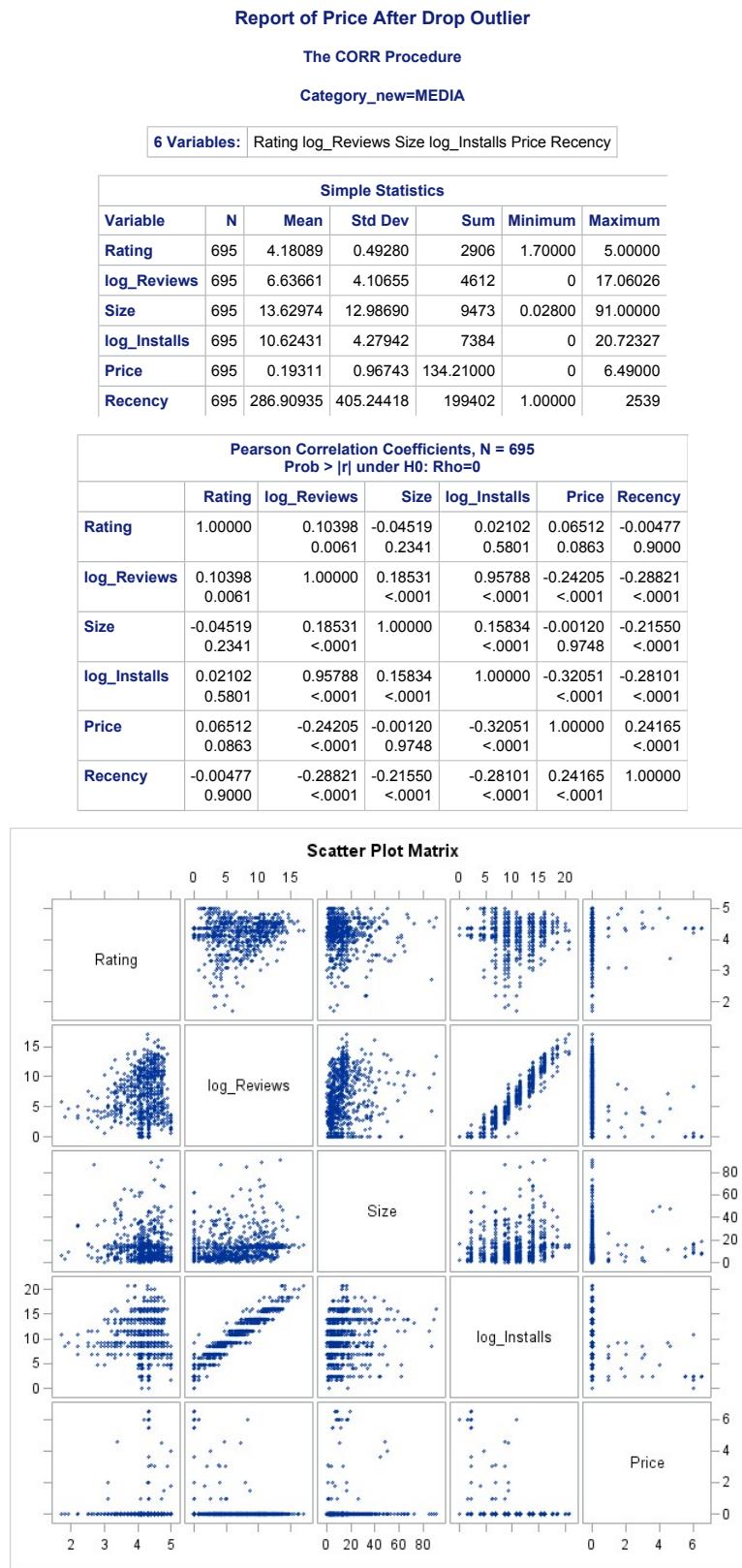
Simple Statistics						
Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
Rating	1832	4.18121	0.49029	7660	1.00000	5.00000
log_Reviews	1832	6.45925	3.90376	11833	0	16.12340
Size	1832	27.25344	24.82367	49928	0.01400	100.00000
log_Installs	1832	10.36016	3.97132	18980	0	18.42068
Price	1832	1.30997	18.67676	2400	0	399.99000
Recency	1832	330.61408	402.58244	605685	1.00000	3028

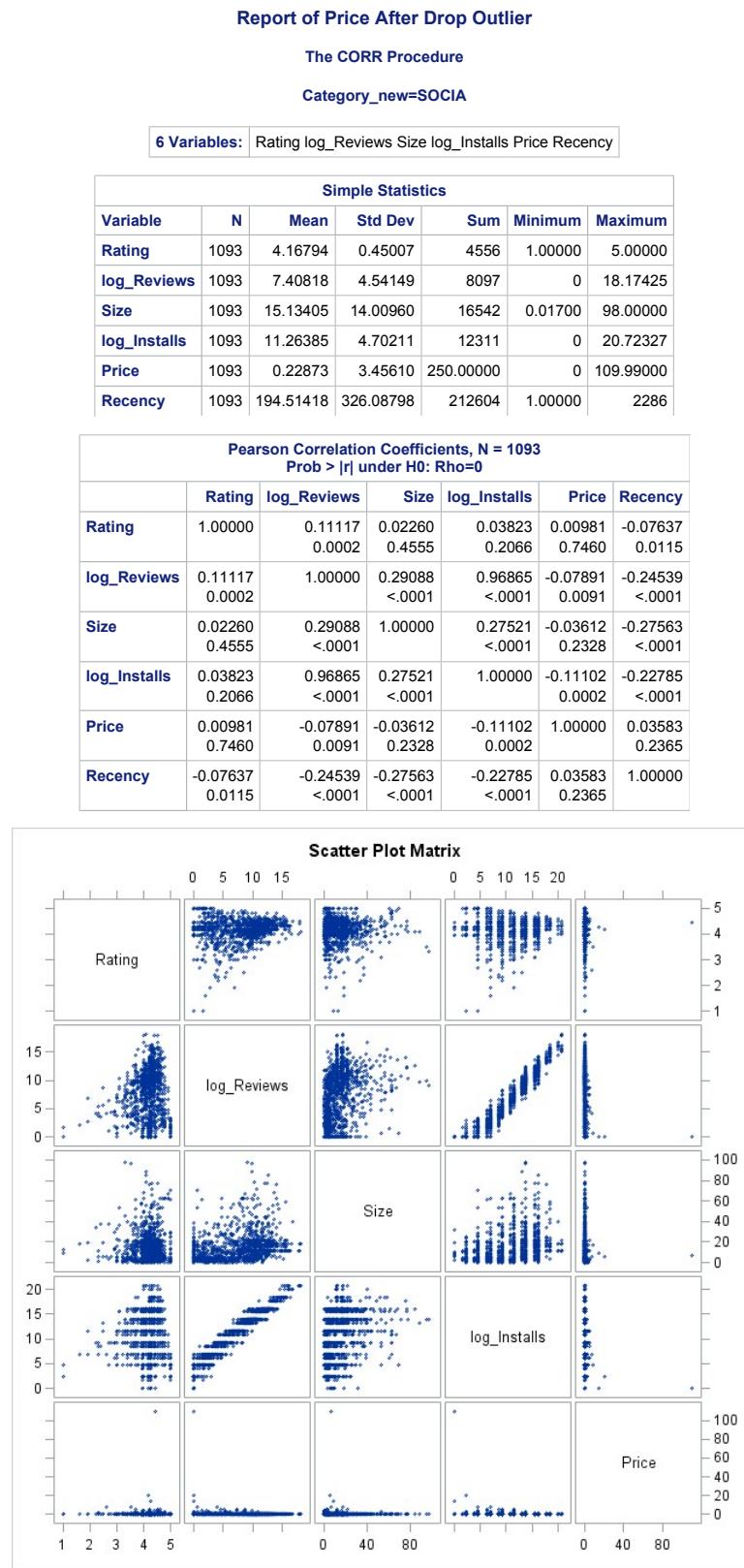
Pearson Correlation Coefficients, N = 1832						
	Prob > r under H0: Rho=0					
	Rating	log_Reviews	Size	log_Installs	Price	Recency
Rating	1.00000	0.03772 0.1065	0.05734 0.0141	-0.03827 0.1015	-0.00123 0.9581	-0.13230 <.0001
log_Reviews	0.03772 0.1065	1.00000	0.41932 <.0001	0.94925 <.0001	-0.02915 0.2124	-0.13925 <.0001
Size	0.05734 0.0141	0.41932 <.0001	1.00000	0.39148 <.0001	-0.04211 0.0715	-0.23225 <.0001
log_Installs	-0.03827 0.1015	0.94925 <.0001	0.39148 <.0001	1.00000	-0.04746 0.0423	-0.14819 <.0001
Price	-0.00123 0.9581	-0.02915 0.2124	-0.04211 0.0715	-0.04746 0.0423	1.00000	-0.00669 0.7748
Recency	-0.13230 <.0001	-0.13925 <.0001	-0.23225 <.0001	-0.14819 <.0001	-0.00669 0.7748	1.00000

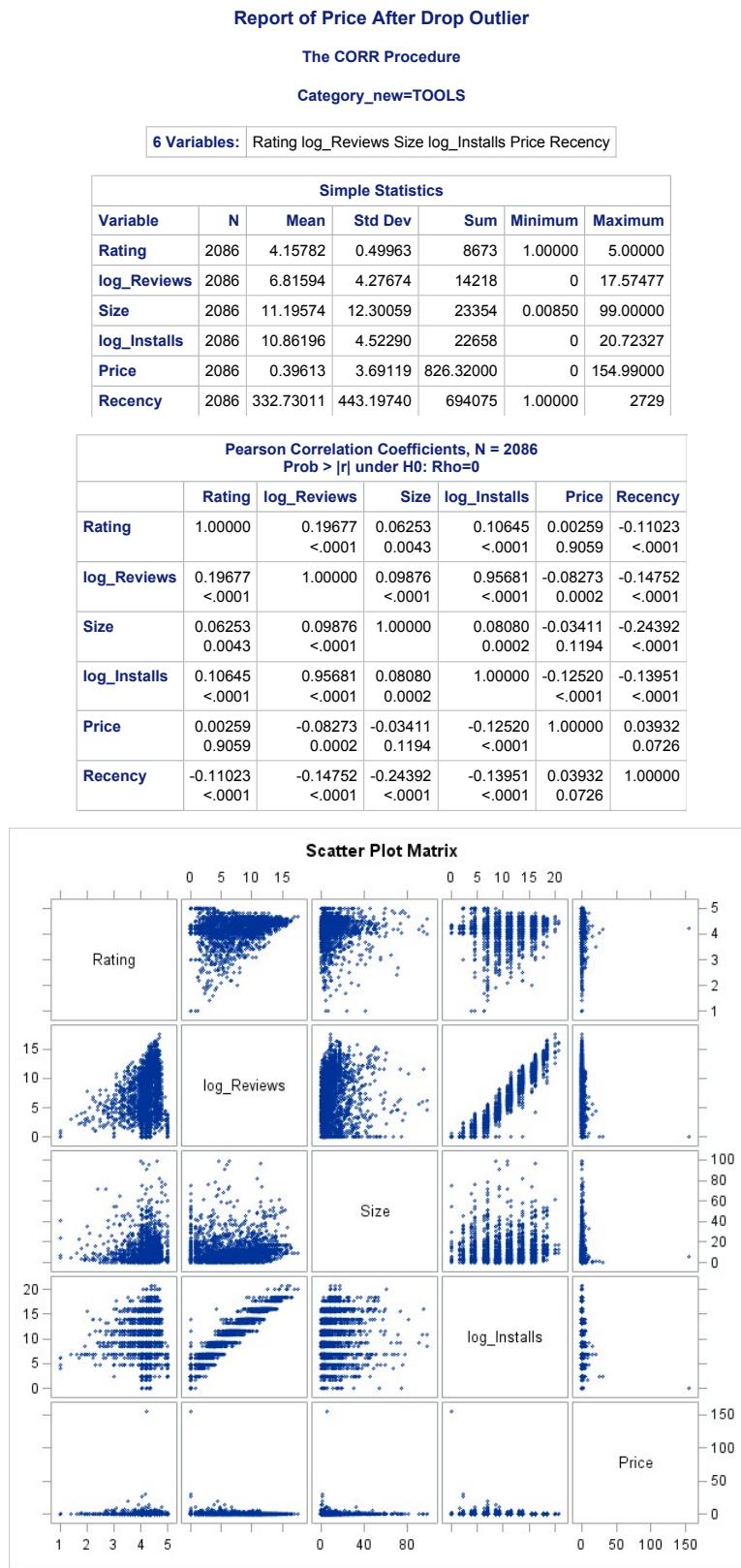


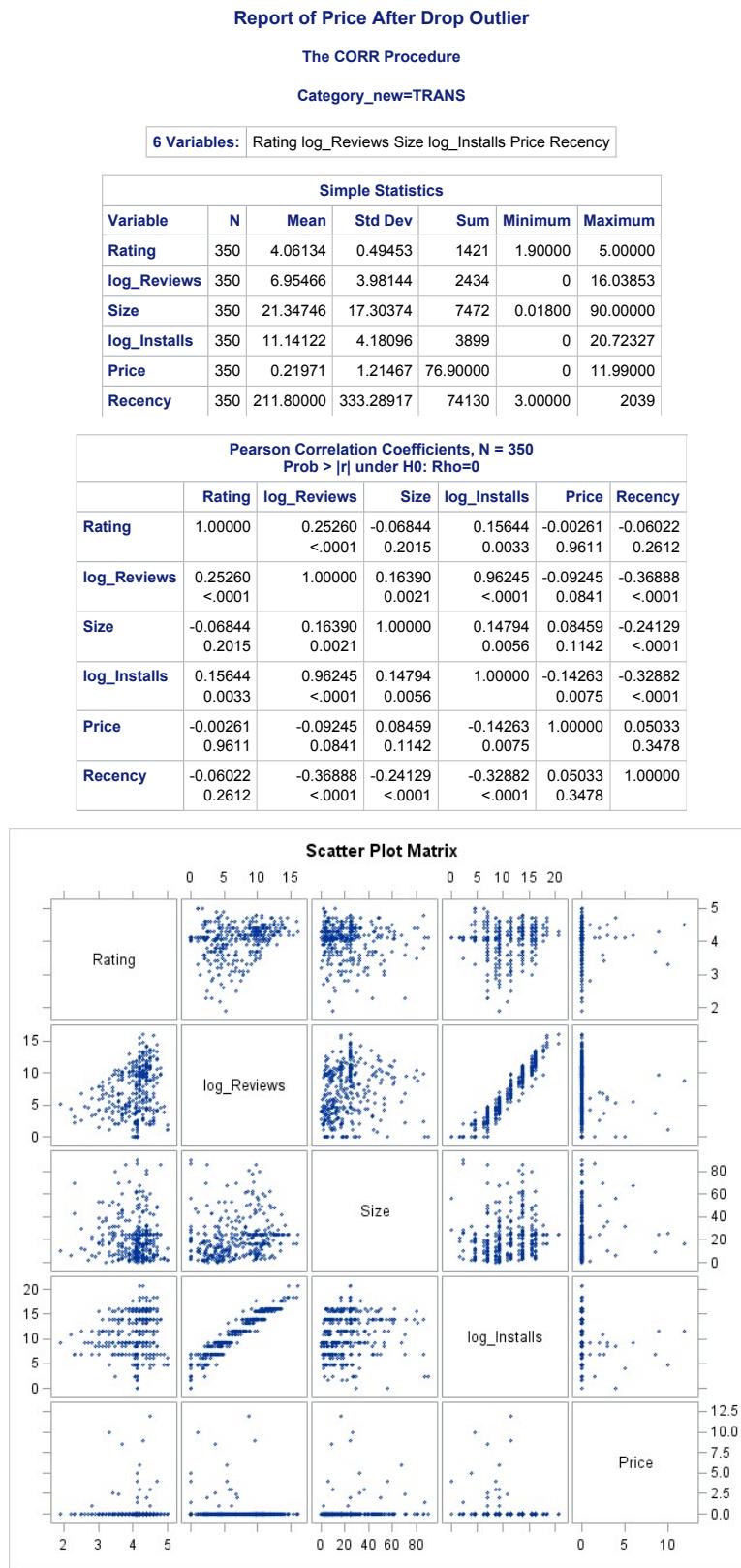












Non-linear Regression - Rating over Price and its power 2

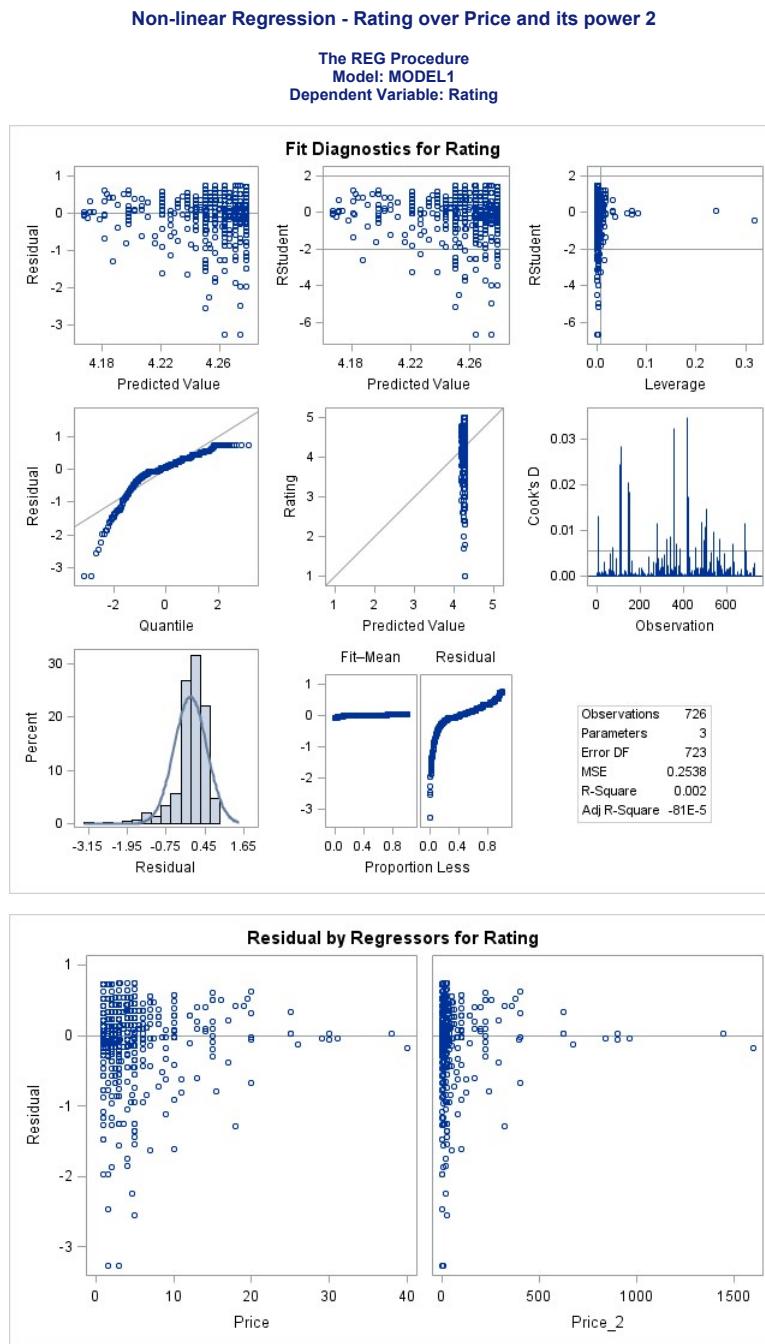
The REG Procedure
Model: MODEL1
Dependent Variable: Rating

Number of Observations Read	726
Number of Observations Used	726

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.35899	0.17950	0.71	0.4934
Error	723	183.50448	0.25381		
Corrected Total	725	183.86347			

Root MSE	0.50380	R-Square	0.0020
Dependent Mean	4.25826	Adj R-Sq	-0.0008
Coeff Var	11.83102		

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	4.28548	0.03396	126.18	<.0001
Price	1	-0.00772	0.00968	-0.80	0.4253
Price_2	1	0.00012586	0.00035717	0.35	0.7246



Non-linear Regression - Rating over Price and its power 2**The SURVEYSELECT Procedure**

Selection Method	Simple Random Sampling
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Input Data Set	APP_NEW
Random Number Seed	2
Sampling Rate	0.8
Sample Size	7704
Selection Probability	0.8
Sampling Weight	0
Output Data Set	APP_NEW_SAMPLED

linear regression**The GLM Procedure**

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL LIFES MEDIA SOCIA TOOLS TRANS GAME
Android_Ver	2	1 0
Content_Rating	5	Adults o Mature 1 Teen Unrated Everyone
Type	2	Paid Free
update	11	1 2 3 4 5 6 7 8 9 10 0

Number of Observations Read	9630
Number of Observations Used	9630

linear regression**The GLM Procedure****Dependent Variable: Rating**

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	50	259.764752	5.195295	23.57	<.0001
Error	9579	2111.195073	0.220398		
Corrected Total	9629	2370.959825			

R-Square	Coeff Var	Root MSE	Rating Mean
0.109561	11.24526	0.469466	4.174790

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Category_new	7	14.4834811	2.0690687	9.39	<.0001
Size	1	3.5691688	3.5691688	16.19	<.0001
Size*Category_new	7	3.5107528	0.5015361	2.28	0.0259
log_Installs	1	5.2569432	5.2569432	23.85	<.0001
log_Insta*Category_n	7	7.6066559	1.0866651	4.93	<.0001
log_Reviews	1	194.7867970	194.7867970	883.79	<.0001
Content_Rating	4	2.8105293	0.7026323	3.19	0.0126
Recency	1	18.4394239	18.4394239	83.66	<.0001
Android_Ver	1	0.4002343	0.4002343	1.82	0.1778
update	10	6.2274416	0.6227442	2.83	0.0017
Type	1	0.0005866	0.0005866	0.00	0.9589
Type*update	9	2.6727371	0.2969708	1.35	0.2064

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Category_new	7	9.4842513	1.3548930	6.15	<.0001
Size	1	2.3815983	2.3815983	10.81	0.0010
Size*Category_new	7	3.4294878	0.4899268	2.22	0.0295
log_Installs	1	134.4505869	134.4505869	610.03	<.0001
log_Insta*Category_n	7	8.9001936	1.2714562	5.77	<.0001
log_Reviews	1	175.9704069	175.9704069	798.42	<.0001
Content_Rating	4	3.2366350	0.8091588	3.67	0.0054
Recency	1	20.1862593	20.1862593	91.59	<.0001
Android_Ver	1	0.3954475	0.3954475	1.79	0.1804
update	10	2.2568213	0.2256821	1.02	0.4198
Type	1	0.1943178	0.1943178	0.88	0.3478
Type*update	9	2.6727371	0.2969708	1.35	0.2064

Parameter	Estimate	Standard Error	t Value	Pr > t
Intercept	4.581826321	B	0.06662253	68.77 <.0001
Category_new BUSIN	-0.055994042	B	0.06729209	-0.83 0.4054
Category_new FAMIL	0.150511795	B	0.06168173	2.44 0.0147
Category_new LIFES	0.005644024	B	0.06096610	0.09 0.9262
Category_new MEDIA	0.086059632	B	0.07309243	1.18 0.2391
Category_new SOCIA	0.033034913	B	0.06561763	0.50 0.6147
Category_new TOOLS	-0.084346834	B	0.06025323	-1.40 0.1616
Category_new TRANS	-0.168808843	B	0.09205262	-1.83 0.0667
Category_new GAME	0.000000000	B	.	.
Size	0.000452369	B	0.00062558	0.72 0.4696
Size*Category_new BUSIN	-0.001986377	B	0.00127055	-1.56 0.1180
Size*Category_new FAMIL	-0.000426538	B	0.00078840	-0.54 0.5885
Size*Category_new LIFES	-0.001452263	B	0.00088087	-1.65 0.0992
Size*Category_new MEDIA	-0.004038920	B	0.00152446	-2.65 0.0081
Size*Category_new SOCIA	-0.001265238	B	0.00122861	-1.03 0.3031
Size*Category_new TOOLS	-0.000034570	B	0.00104906	-0.03 0.9737
Size*Category_new TRANS	-0.004035575	B	0.00159879	-2.52 0.0116
Size*Category_new GAME	0.000000000	B	.	.
log_Installs	-0.105839163	B	0.00579041	-18.28 <.0001
log_Insta*Category_n BUSIN	0.006131500	B	0.00581559	1.05 0.2918
log_Insta*Category_n FAMIL	-0.011748846	B	0.00508414	-2.31 0.0209
log_Insta*Category_n LIFES	0.006566774	B	0.00488478	1.34 0.1789

log_Insta*Category_n MEDIA	0.000350828	B	0.00593465	0.06	0.9529
log_Insta*Category_n SOCIA	-0.001131116	B	0.00519875	-0.22	0.8278
log_Insta*Category_n TOOLS	0.009344338	B	0.00470492	1.99	0.0471
log_Insta*Category_n TRANS	0.015846667	B	0.00736240	2.15	0.0314
log_Insta*Category_n GAME	0.000000000	B	.	.	.
log_Reviews	0.119870427		0.00424225	28.26	<.0001
Content_Rating Adults o	-0.027681744	B	0.27161639	-0.10	0.9188
Content_Rating Mature 1	-0.095226388	B	0.02571358	-3.70	0.0002
Content_Rating Teen	-0.001462074	B	0.01654442	-0.09	0.9296
Content_Rating Unrated	0.285959053	B	0.33288383	0.86	0.3903
Content_Rating Everyone	0.000000000	B	.	.	.
Recency	-0.000124676		0.00001303	-9.57	<.0001
Android_Ver 1	-0.026281148	B	0.01962023	-1.34	0.1804
Android_Ver 0	0.000000000	B	.	.	.
update 1	-0.046153804	B	0.03873483	-1.19	0.2335
update 2	-0.068178619	B	0.04023004	-1.69	0.0902
update 3	-0.110984183	B	0.04155962	-2.67	0.0076
update 4	-0.116635193	B	0.04354945	-2.68	0.0074
update 5	-0.097240149	B	0.04595933	-2.12	0.0344
update 6	-0.1211131032	B	0.04969572	-2.44	0.0148
update 7	-0.088632847	B	0.05512601	-1.61	0.1079
update 8	-0.012311797	B	0.05861893	-0.21	0.8336
update 9	-0.183496093	B	0.07169795	-2.56	0.0105
update 10	-0.091932678	B	0.04137750	-2.22	0.0263
update 0	0.000000000	B	.	.	.
Type Paid	0.046202661	B	0.14682658	0.31	0.7530
Type Free	0.000000000	B	.	.	.
Type*update Paid 1	-0.077059448	B	0.14865672	-0.52	0.6042
Type*update Paid 2	-0.096245195	B	0.15462295	-0.62	0.5337
Type*update Paid 3	-0.011222050	B	0.16186781	-0.07	0.9447
Type*update Paid 4	0.144692288	B	0.17270285	0.84	0.4022
Type*update Paid 5	-0.134026138	B	0.20150202	-0.67	0.5060
Type*update Paid 6	0.072283575	B	0.20226555	0.36	0.7208
Type*update Paid 7	-0.053331149	B	0.21833268	-0.24	0.8070
Type*update Paid 8	-0.002843861	B	0.23462076	-0.01	0.9903
Type*update Paid 10	0.052672704	B	0.15559192	0.34	0.7350
Type*update Paid 0	0.000000000	B	.	.	.
Type*update Free 1	0.000000000	B	.	.	.
Type*update Free 2	0.000000000	B	.	.	.
Type*update Free 3	0.000000000	B	.	.	.
Type*update Free 4	0.000000000	B	.	.	.
Type*update Free 5	0.000000000	B	.	.	.
Type*update Free 6	0.000000000	B	.	.	.
Type*update Free 7	0.000000000	B	.	.	.
Type*update Free 8	0.000000000	B	.	.	.
Type*update Free 9	0.000000000	B	.	.	.
Type*update Free 10	0.000000000	B	.	.	.
Type*update Free 0	0.000000000	B	.	.	.

Note: The X'X matrix has been found to be singular, and a generalized inverse was used to solve the normal equations. Terms whose estimates are followed by the letter 'B' are not uniquely estimable.

Forward Selection based on Mallows Cp selection Criteria**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	Rating
Selection Method	Forward
Select Criterion	C(p)
Stop Criterion	C(p)
Effect Hierarchy Enforced	Single

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	* BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	* 0 1 2 3 4 5
Android_Ver	2	* 0 1
Content_Rating	5	* Adults o Everyone Mature 1 Teen Unrated
Type	2	* Free Paid
update	11	* 0 1 2 3 4 5 6 7 8 9 10

*** Associated Parameters Split**

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

Forward Selection based on Mallows Cp selection Criteria

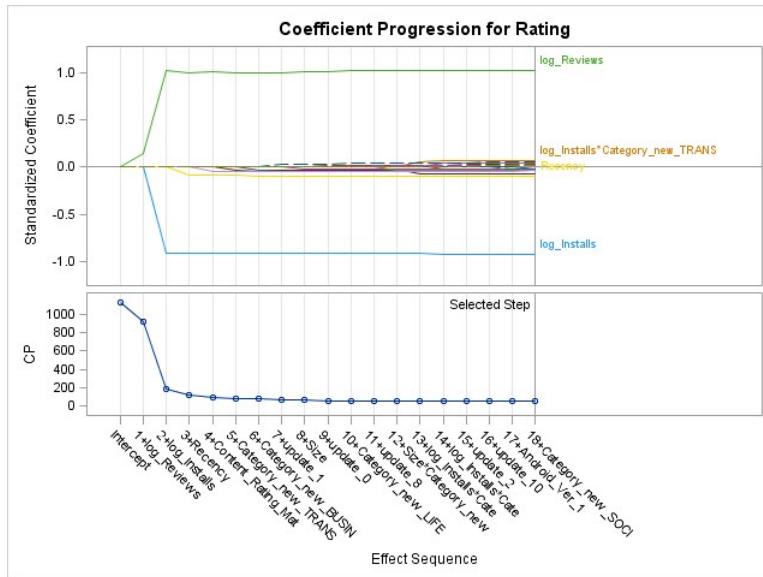
The GLMSELECT Procedure

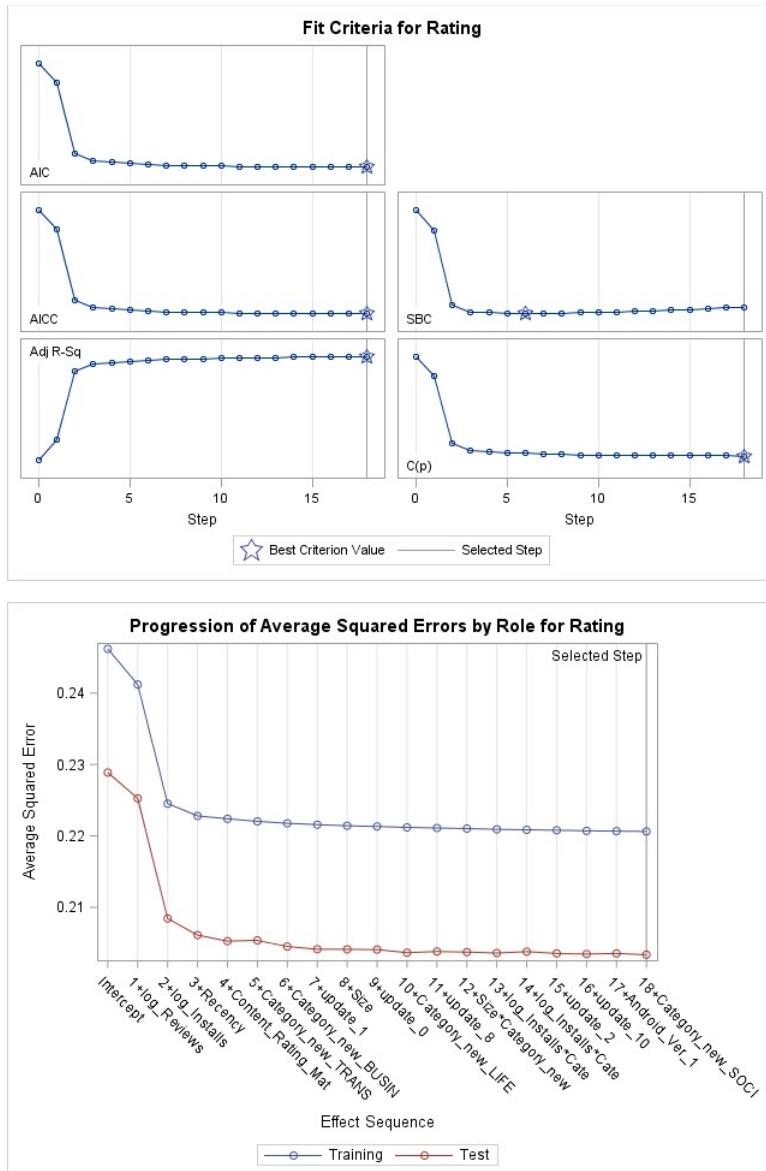
Forward Selection Summary						
Step	Effect Entered	Number Effects In	CP	ASE	Test ASE	
0	Intercept	1	1129.6152	0.2462	0.2289	
1	log_Reviews	2	913.0293	0.2412	0.2253	
2	log_Installs	3	186.3675	0.2245	0.2084	
3	Recency	4	112.7282	0.2228	0.2061	
4	Content_Rating_Mature 1	5	97.4066	0.2224	0.2053	
5	Category_new_TRANS	6	83.4354	0.2220	0.2054	
6	Category_new_BUSIN	7	73.9668	0.2218	0.2045	
7	update_1	8	66.9445	0.2216	0.2041	
8	Size	9	63.2992	0.2214	0.2041	
9	update_0	10	60.1146	0.2213	0.2041	
10	Category_new_LIFES	11	56.7829	0.2212	0.2037	
11	update_8	12	54.9387	0.2211	0.2038	
12	Size*Category_new_TRANS	13	53.5577	0.2210	0.2037	
13	log_Installs*Category_new_TRANS	14	51.0018	0.2209	0.2036	
14	log_Installs*Category_new_LIFES	15	49.9244	0.2209	0.2038	
15	update_2	16	49.2202	0.2208	0.2035	
16	update_10	17	48.0135	0.2207	0.2035	
17	Android_Ver_1	18	47.7416	0.2207	0.2035	
18	Category_new_SOCIA	19	47.5860*	0.2206	0.2034	

* Optimal Value of Criterion

Selection stopped at a local minimum of the C(p) criterion.

Stop Details			
Candidate For	Effect	Candidate C(p)	Compare C(p)
Entry	Category_new_TOOLS	47.8131	> 47.5860





Forward Selection based on Mallows Cp selection Criteria

The GLMSELECT Procedure
Selected Model

The selected model is the model at the last step (Step 18).

Effects:	Intercept Category_new_BUSIN Category_new_LIFES Category_new_SOCIA Category_new_TRANS Size Size*Category_new_TRANS log_Installs log_Installs*Category_new_LIFES log_Installs*Category_new_TRANS log_Reviews Content_Rating_Mature 1 Recency Android_Ver_1 update_0 update_1 update_2 update_8 update_10
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	18	246.41170	13.68954	61.93	<.0001
Error	9611	2124.54813	0.22105		
Corrected Total	9629	2370.95983			

Root MSE	0.47016
Dependent Mean	4.17479
R-Square	0.1039
Adj R-Sq	0.1023
AIC	-4884.05100
AICC	-4883.96358
BIC	-14514
C(p)	47.58602
SBC	-14380
ASE (Train)	0.22062
ASE (Test)	0.20337

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	4.502712	0.023635	190.51	<.0001
Category_new_BUSIN	1	-0.053893	0.018648	-2.89	0.0039
Category_new_LIFES	1	-0.025219	0.031939	-0.79	0.4298
Category_new_SOCIA	1	-0.024036	0.016396	-1.47	0.1427
Category_new_TRANS	1	-0.191900	0.076388	-2.51	0.0120
Size	1	-0.000505	0.000256	-1.97	0.0485
Size*Category_new_TRANS	1	-0.003026	0.001493	-2.03	0.0427
log_installs	1	-0.104536	0.003915	-26.70	<.0001
log_installs*Category_new_LIFES	1	0.004990	0.002872	1.74	0.0824
log_installs*Category_new_TRANS	1	0.014330	0.006235	2.30	0.0216
log_Reviews	1	0.119235	0.004052	29.43	<.0001
Content_Rating_Mature 1	1	-0.093657	0.025294	-3.70	0.0002
Recency	1	-0.000126	0.000012784	-9.86	<.0001
Android_Ver_1	1	-0.029279	0.019469	-1.50	0.1326
update_0	1	0.108148	0.038307	2.82	0.0048
update_1	1	0.056875	0.012792	4.45	<.0001
update_2	1	0.033471	0.015901	2.10	0.0353
update_8	1	0.099010	0.044188	2.24	0.0251
update_10	1	0.029385	0.017125	1.72	0.0862

Backward Selection based on Mallows Cp selection Criteria**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	Rating
Selection Method	Backward
Select Criterion	C(p)
Stop Criterion	C(p)
Effect Hierarchy Enforced	Single

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	* BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	* 0 1 2 3 4 5
Android_Ver	2	* 0 1
Content_Rating	5	* Adults o Everyone Mature 1 Teen Unrated
Type	2	* Free Paid
update	11	* 0 1 2 3 4 5 6 7 8 9 10

* Associated Parameters Split

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

Backward Selection based on Mallows Cp selection Criteria

The GLMSELECT Procedure

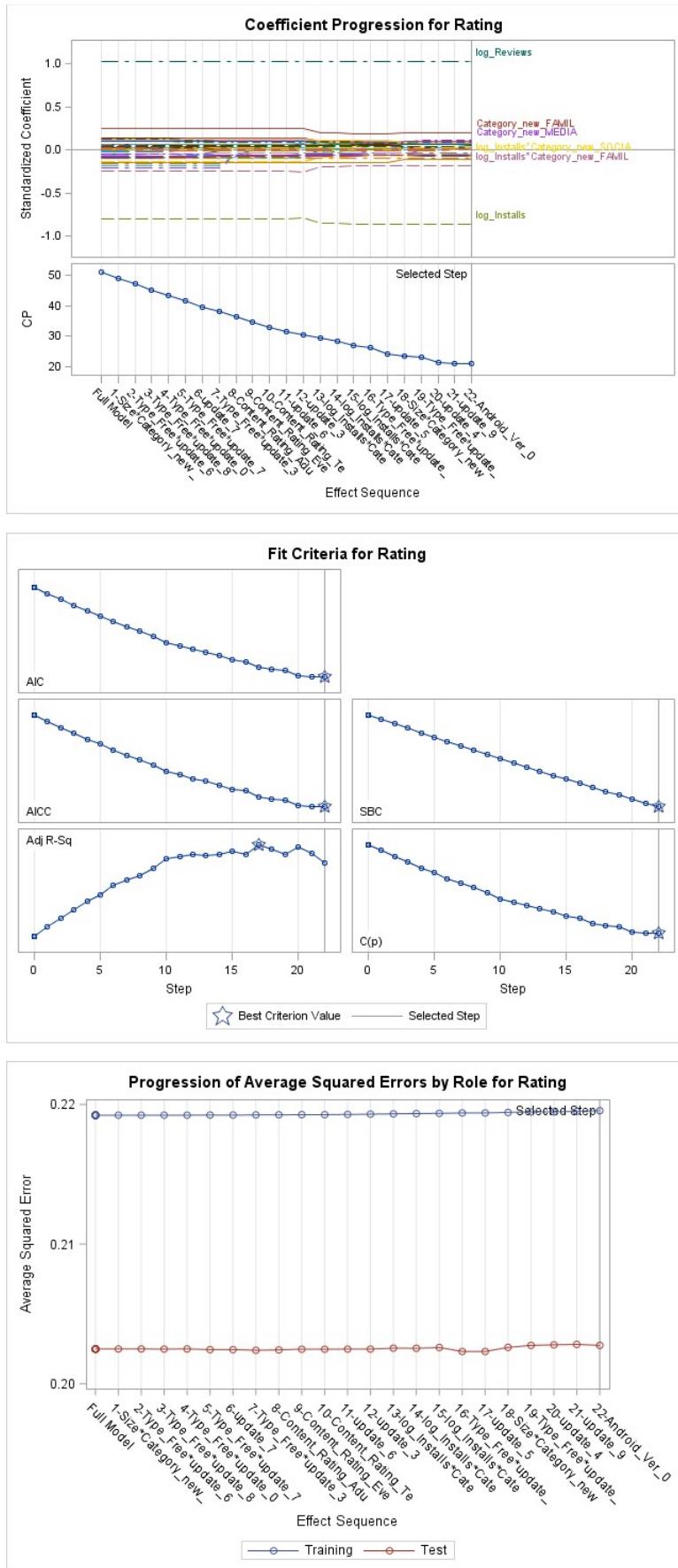
Backward Selection Summary					
Step	Effect Removed	Number Effects In	CP	ASE	Test ASE
0		70	51.0000	0.2192	0.2025
	Type_Paid*update_10	69	51.0000	0.2192	0.2025
	Type_Paid*update_8	68	51.0000	0.2192	0.2025
	Type_Paid*update_7	67	51.0000	0.2192	0.2025
	Type_Paid*update_6	66	51.0000	0.2192	0.2025
	Type_Paid*update_5	65	51.0000	0.2192	0.2025
	Type_Paid*update_4	64	51.0000	0.2192	0.2025
	Type_Paid*update_3	63	51.0000	0.2192	0.2025
	Type_Paid*update_2	62	51.0000	0.2192	0.2025
	Type_Paid*update_1	61	51.0000	0.2192	0.2025
	Type_Paid*update_0	60	51.0000	0.2192	0.2025
	Type_Free*update_10	59	51.0000	0.2192	0.2025
	Type_Free*update_9	58	51.0000	0.2192	0.2025
	Type_Paid	57	51.0000	0.2192	0.2025
	update_10	56	51.0000	0.2192	0.2025
	Android_Ver_1	55	51.0000	0.2192	0.2025
	Content_Rating_Unrated	54	51.0000	0.2192	0.2025
	log_Installs*Category_new_TRANS	53	51.0000	0.2192	0.2025
	Size*Category_new_TRANS	52	51.0000	0.2192	0.2025
	Category_new_TRANS	51	51.0000	0.2192	0.2025
1	Size*Category_new_MEDIA	50	49.0000	0.2192	0.2025
2	Type_Free*update_6	49	47.0174	0.2192	0.2025
3	Type_Free*update_8	48	45.1109	0.2192	0.2025
4	Type_Free*update_0	47	43.2216	0.2192	0.2025
5	Type_Free*update_7	46	41.5756	0.2192	0.2024
6	update_7	45	39.5823	0.2192	0.2024
7	Type_Free*update_3	44	37.9724	0.2193	0.2024
8	Content_Rating_Adults_o	43	36.5036	0.2193	0.2024
9	Content_Rating_Everyone	42	34.7198	0.2193	0.2025
10	Content_Rating_Teen	41	32.7287	0.2193	0.2025
11	update_6	40	31.4631	0.2193	0.2025
12	update_3	39	30.3034	0.2193	0.2025
13	log_Installs*Category_new_TOOLS	38	29.4088	0.2193	0.2025
14	log_Installs*Category_new_BUSIN	37	28.2283	0.2194	0.2025
15	log_Installs*Category_new_LIFES	36	26.9013	0.2194	0.2026
16	Type_Free*update_5	35	26.2266	0.2194	0.2023
17	update_5	34	24.2280	0.2194	0.2023
18	Size*Category_new_BUSIN	33	23.6628	0.2194	0.2026
19	Type_Free*update_4	32	23.2591	0.2195	0.2027
20	update_4	31	21.4305	0.2195	0.2028
21	update_9	30	21.1309	0.2195	0.2028
22	Android_Ver_0	29	21.1217*	0.2196	0.2027

* Optimal Value of Criterion

Note: Effects dropped at step 0 are redundant.

Selection stopped at a local minimum of the C(p) criterion.

Stop Details			
Candidate For	Effect	Candidate C(p)	Compare C(p)
Removal	Size*Category_new_SOCIA	21.2349	> 21.1217



Backward Selection based on Mallows Cp selection Criteria**The GLMSELECT Procedure
Selected Model****The selected model is the model at the last step (Step 22).**

Effects:	Intercept Category_new_BUSIN Category_new_FAMIL Category_new_GAME Category_new_LIFES Category_new_MEDIA Category_new_SOCIA Category_new_TOOLS Size Size*Category_new_FAMIL Size*Category_new_GAME Size*Category_new_LIFES Size*Category_new_SOCIA Size*Category_new_TOOLS log_Installs log_Installs*Category_new_FAMIL log_Installs*Category_new_GAME log_Installs*Category_new_MEDIA log_Installs*Category_new_SOCIA log_Reviews Content_Rating_Mature 1 Recency update_0 update_1 update_2 update_8 Type_Free Type_Free*update_1 Type_Free*update_2
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	28	256.65235	9.16616	41.62	<.0001
Error	9601	2114.30748	0.22022		
Corrected Total	9629	2370.95983			

Root MSE	0.46927
Dependent Mean	4.17479
R-Square	0.1082
Adj R-Sq	0.1056
AIC	-4910.58132
AICC	-4910.38755
BIC	-14540
C(p)	21.12173
SBC	-14335
ASE (Train)	0.21955
ASE (Test)	0.20274

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	4.449031	0.046873	94.92	<.0001
Category_new_BUSIN	1	0.045342	0.030851	1.47	0.1417
Category_new_FAMIL	1	0.258880	0.045710	5.66	<.0001
Category_new_GAME	1	0.109714	0.063114	1.74	0.0822
Category_new_LIFES	1	0.094554	0.033775	2.80	0.0051
Category_new_MEDIA	1	0.188981	0.057248	3.30	0.0010
Category_new_SOCIA	1	0.138496	0.050588	2.74	0.0062
Category_new_TOOLS	1	0.028703	0.032825	0.87	0.3819
Size	1	-0.002726	0.000742	-3.67	0.0002
Size*Category_new_FAMIL	1	0.002732	0.000883	3.09	0.0020
Size*Category_new_GAME	1	0.003164	0.000965	3.28	0.0010
Size*Category_new_LIFES	1	0.001541	0.000955	1.61	0.1068
Size*Category_new_SOCIA	1	0.001876	0.001290	1.45	0.1459
Size*Category_new_TOOLS	1	0.003192	0.001115	2.86	0.0042
log_Installs	1	-0.097878	0.004149	-23.59	<.0001
log_Installs*Category_new_FAMIL	1	-0.020472	0.003405	-6.01	<.0001
log_Installs*Category_new_GAME	1	-0.008854	0.004378	-2.02	0.0432
log_Installs*Category_new_MEDIA	1	-0.008956	0.004455	-2.01	0.0444
log_Installs*Category_new_SOCIA	1	-0.009580	0.003510	-2.73	0.0064
log_Reviews	1	0.120681	0.004215	28.63	<.0001
Content_Rating_Mature 1	1	-0.095494	0.025378	-3.76	0.0002
Recency	1	-0.000123	0.000012914	-9.50	<.0001
update_0	1	0.101031	0.037994	2.66	0.0078
update_1	1	-0.053433	0.039759	-1.34	0.1790
update_2	1	-0.094243	0.057049	-1.65	0.0986
update_8	1	0.090643	0.043775	2.07	0.0384
Type_Free	1	-0.078798	0.033898	-2.32	0.0201
Type_Free*update_1	1	0.112209	0.041091	2.73	0.0063
Type_Free*update_2	1	0.130114	0.058920	2.21	0.0272

Stepwise Selection based on Mallows Cp selection Criteria**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	Rating
Selection Method	Stepwise
Select Criterion	C(p)
Stop Criterion	C(p)
Effect Hierarchy Enforced	Single

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	* BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	* 0 1 2 3 4 5
Android_Ver	2	* 0 1
Content_Rating	5	* Adults o Everyone Mature 1 Teen Unrated
Type	2	* Free Paid
update	11	* 0 1 2 3 4 5 6 7 8 9 10

*** Associated Parameters Split**

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

Stepwise Selection based on Mallows Cp selection Criteria

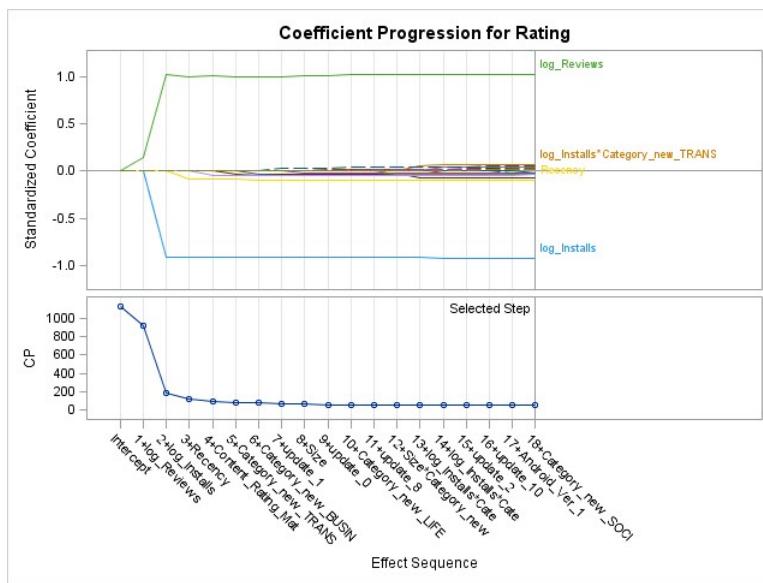
The GLMSELECT Procedure

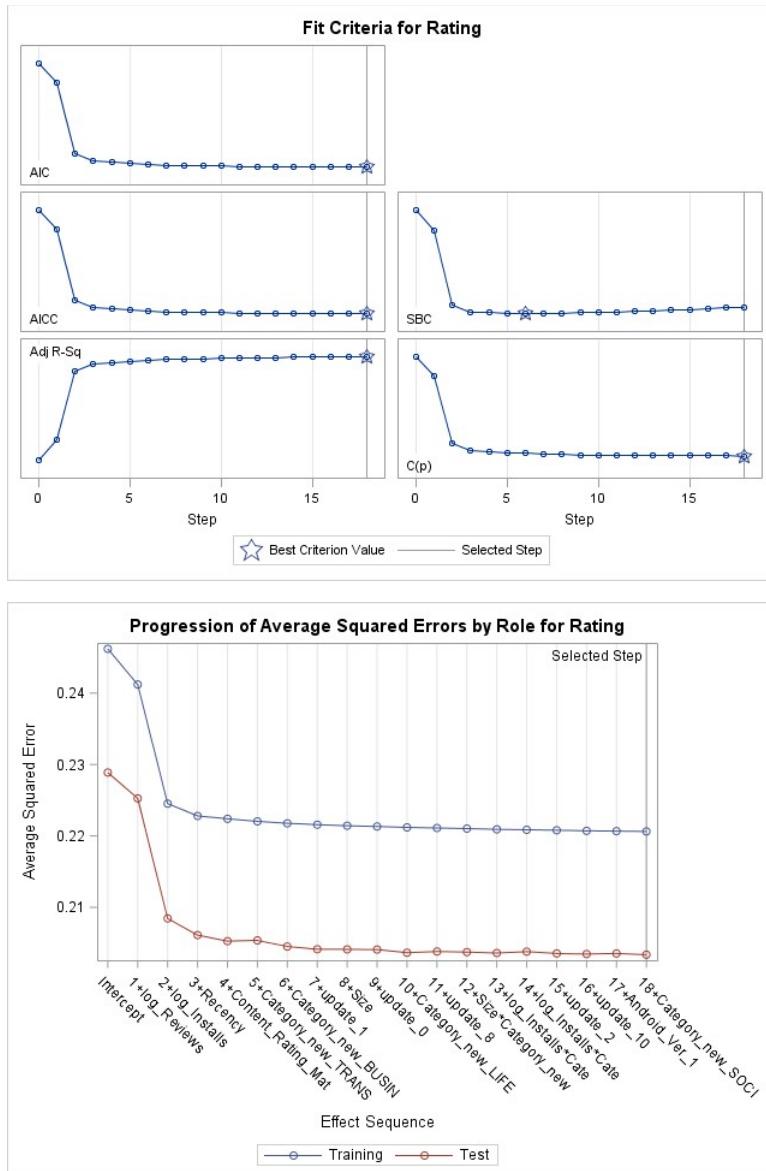
Stepwise Selection Summary						
Step	Effect Entered	Effect Removed	Number Effects In	CP	ASE	Test ASE
0	Intercept		1	1129.6152	0.2462	0.2289
1	log_Reviews		2	913.0293	0.2412	0.2253
2	log_Installs		3	186.3675	0.2245	0.2084
3	Recency		4	112.7282	0.2228	0.2061
4	Content_Rating_Mature_1		5	97.4066	0.2224	0.2053
5	Category_new_TRANS		6	83.4354	0.2220	0.2054
6	Category_new_BUSIN		7	73.9668	0.2218	0.2045
7	update_1		8	66.9445	0.2216	0.2041
8	Size		9	63.2992	0.2214	0.2041
9	update_0		10	60.1146	0.2213	0.2041
10	Category_new_LIFES		11	56.7829	0.2212	0.2037
11	update_8		12	54.9387	0.2211	0.2038
12	Size*Category_new_TRANS		13	53.5577	0.2210	0.2037
13	log_Installs*Category_new_TRANS		14	51.0018	0.2209	0.2036
14	log_Installs*Category_new_LIFES		15	49.9244	0.2209	0.2038
15	update_2		16	49.2202	0.2208	0.2035
16	update_10		17	48.0135	0.2207	0.2035
17	Android_Ver_1		18	47.7416	0.2207	0.2035
18	Category_new_SOCIA		19	47.5860*	0.2206	0.2034

* Optimal Value of Criterion

Selection stopped at a local minimum of the C(p) criterion.

Stop Details			
Candidate For	Effect	Candidate C(p)	Compare C(p)
Entry	Category_new_TOOLS	47.8131	> 47.5860
Removal	Category_new_SOCIA	47.7416	> 47.5860





Stepwise Selection based on Mallows Cp selection Criteria

The GLMSELECT Procedure
Selected Model

The selected model is the model at the last step (Step 18).

Effects:	Intercept Category_new_BUSIN Category_new_LIFES Category_new_SOCIA Category_new_TRANS Size Size*Category_new_TRANS log_Installs log_Installs*Category_new_LIFES log_Installs*Category_new_TRANS log_Reviews Content_Rating_Mature 1 Recency Android_Ver_1 update_0 update_1 update_2 update_8 update_10
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	18	246.41170	13.68954	61.93	<.0001
Error	9611	2124.54813	0.22105		
Corrected Total	9629	2370.95983			

Root MSE	0.47016
Dependent Mean	4.17479
R-Square	0.1039
Adj R-Sq	0.1023
AIC	-4884.05100
AICC	-4883.96358
BIC	-14514
C(p)	47.58602
SBC	-14380
ASE (Train)	0.22062
ASE (Test)	0.20337

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	4.502712	0.023635	190.51	<.0001
Category_new_BUSIN	1	-0.053893	0.018648	-2.89	0.0039
Category_new_LIFES	1	-0.025219	0.031939	-0.79	0.4298
Category_new_SOCIA	1	-0.024036	0.016396	-1.47	0.1427
Category_new_TRANS	1	-0.191900	0.076388	-2.51	0.0120
Size	1	-0.000505	0.000256	-1.97	0.0485
Size*Category_new_TRANS	1	-0.003026	0.001493	-2.03	0.0427
log_installs	1	-0.104536	0.003915	-26.70	<.0001
log_installs*Category_new_LIFES	1	0.004990	0.002872	1.74	0.0824
log_installs*Category_new_TRANS	1	0.014330	0.006235	2.30	0.0216
log_Reviews	1	0.119235	0.004052	29.43	<.0001
Content_Rating_Mature 1	1	-0.093657	0.025294	-3.70	0.0002
Recency	1	-0.000126	0.000012784	-9.86	<.0001
Android_Ver_1	1	-0.029279	0.019469	-1.50	0.1326
update_0	1	0.108148	0.038307	2.82	0.0048
update_1	1	0.056875	0.012792	4.45	<.0001
update_2	1	0.033471	0.015901	2.10	0.0353
update_8	1	0.099010	0.044188	2.24	0.0251
update_10	1	0.029385	0.017125	1.72	0.0862

forward selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	Rating
Selection Method	Forward
Select Criterion	Cross Validation
Stop Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	Single
Random Number Seed	2

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	* BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	* 0 1 2 3 4 5
Android_Ver	2	* 0 1
Content_Rating	5	* Adults o Everyone Mature 1 Teen Unrated
Type	2	* Free Paid
update	11	* 0 1 2 3 4 5 6 7 8 9 10

* Associated Parameters Split

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

forward selection with cross validation as criteria with 10-folds

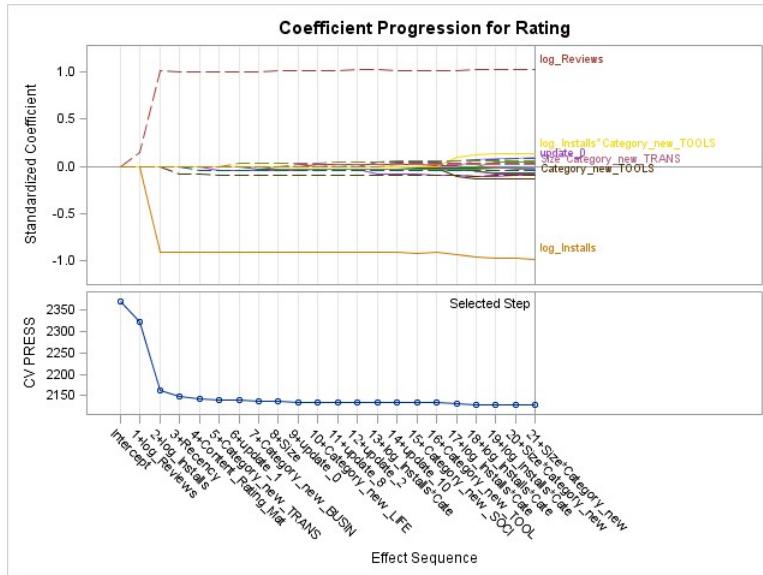
The GLMSELECT Procedure

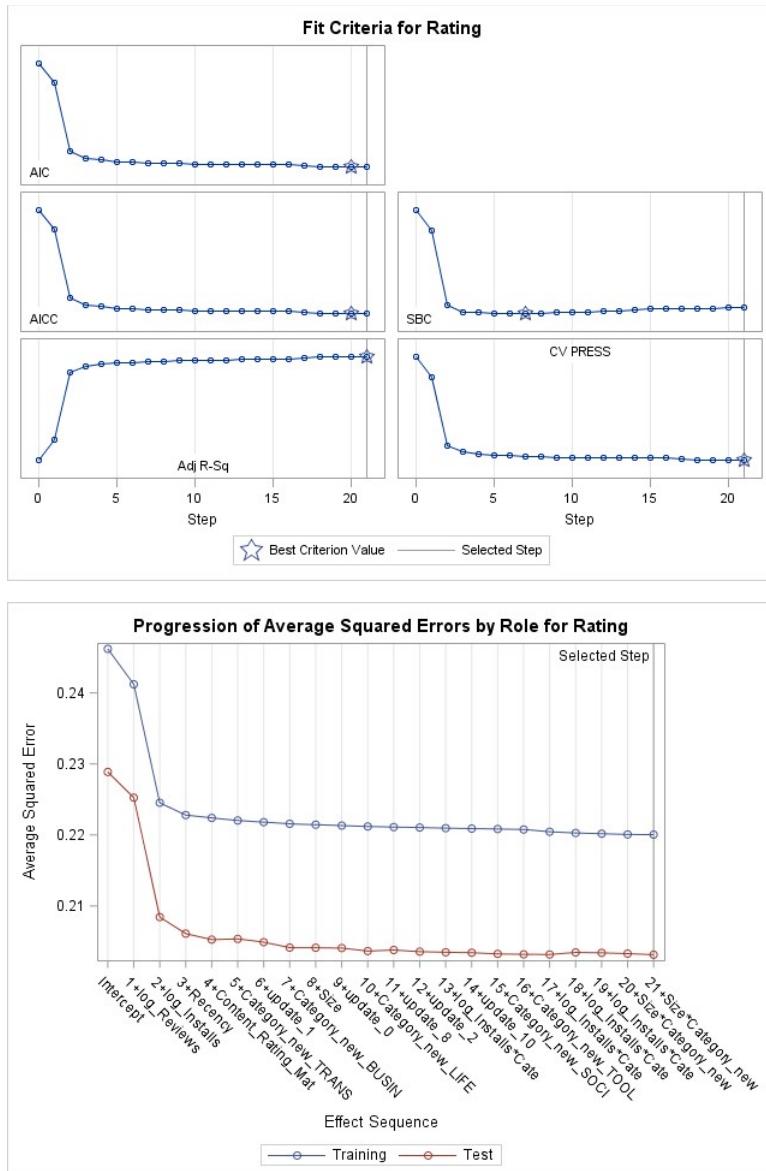
Forward Selection Summary						
Step	Effect Entered	Number Effects In	ASE	Test ASE	CV PRESS	
0	Intercept	1	0.2462	0.2289	2371.2617	
1	log_Reviews	2	0.2412	0.2253	2323.4621	
2	log_Installs	3	0.2245	0.2084	2163.5518	
3	Recency	4	0.2228	0.2061	2147.2632	
4	Content_Rating_Mature_1	5	0.2224	0.2053	2143.8966	
5	Category_new_TRANS	6	0.2220	0.2054	2140.7051	
6	update_1	7	0.2218	0.2049	2138.7705	
7	Category_new_BUSIN	8	0.2216	0.2041	2137.3561	
8	Size	9	0.2214	0.2041	2136.3231	
9	update_0	10	0.2213	0.2041	2135.6348	
10	Category_new_LIFES	11	0.2212	0.2037	2134.9902	
11	update_8	12	0.2211	0.2038	2134.6454	
12	update_2	13	0.2210	0.2036	2134.2855	
13	log_Installs*Category_new_TRANS	14	0.2210	0.2035	2133.9439	
14	update_10	15	0.2209	0.2034	2133.6505	
15	Category_new_SOCIA	16	0.2208	0.2033	2133.3781	
16	Category_new_TOOLS	17	0.2208	0.2032	2133.0760	
17	log_Installs*Category_new_TOOLS	18	0.2205	0.2032	2130.2966	
18	log_Installs*Category_new_LIFES	19	0.2203	0.2035	2128.9317	
19	log_Installs*Category_new_BUSIN	20	0.2202	0.2034	2128.4721	
20	Size*Category_new_TRANS	21	0.2201	0.2033	2128.4336	
21	Size*Category_new_LIFES	22	0.2200	0.2031	2128.3813*	

* Optimal Value of Criterion

Selection stopped at a local minimum of the cross validation PRESS.

Stop Details			
Candidate For	Effect	Candidate CV PRESS	Compare CV PRESS
Entry	Content_Rating_Unrated	2128.3857	> 2128.3813





forward selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure
Selected Model****The selected model is the model at the last step (Step 21).**

Effects:	Intercept Category_new_BUSIN Category_new_LIFES Category_new_SOCIA Category_new_TOOLS Category_new_TRANS Size Size*Category_new_LIFES Size*Category_new_TRANS log_Installs log_Installs*Category_new_BUSIN log_Installs*Category_new_LIFES log_Installs*Category_new_TOOLS log_Installs*Category_new_TRANS log_Reviews Content_Rating_Mature_1 Recency update_0 update_1 update_2 update_8 update_10
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	21	251.97474	11.99880	54.41	<.0001
Error	9608	2118.98509	0.22054		
Corrected Total	9629	2370.95983			

Root MSE	0.46962
Dependent Mean	4.17479
R-Square	0.1063
Adj R-Sq	0.1043
AIC	-4903.29983
AICC	-4903.18490
SBC	-14378
ASE (Train)	0.22004
ASE (Test)	0.20315
CV PRESS	2128.38133

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	4.561142	0.026831	169.99	<.0001
Category_new_BUSIN	1	-0.151098	0.043891	-3.44	0.0006
Category_new_LIFES	1	-0.077593	0.035005	-2.22	0.0267
Category_new_SOCIA	1	-0.026596	0.017467	-1.52	0.1279
Category_new_TOOLS	1	-0.165278	0.033313	-4.96	<.0001
Category_new_TRANS	1	-0.249183	0.077315	-3.22	0.0013
Size	1	-0.000288	0.000299	-0.96	0.3350
Size*Category_new_LIFES	1	-0.000826	0.000686	-1.21	0.2282
Size*Category_new_TRANS	1	-0.003332	0.001498	-2.22	0.0262
log_Installs	1	-0.110723	0.004116	-26.90	<.0001
log_Installs*Category_new_BUSIN	1	0.009057	0.004337	2.09	0.0368
log_Installs*Category_new_LIFES	1	0.010747	0.003136	3.43	0.0006
log_Installs*Category_new_TOOLS	1	0.013828	0.002841	4.87	<.0001
log_Installs*Category_new_TRANS	1	0.019626	0.006329	3.10	0.0019
log_Reviews	1	0.120262	0.004053	29.67	<.0001
Content_Rating_Mature_1	1	-0.093682	0.025297	-3.70	0.0002
Recency	1	-0.000124	0.000012715	-9.76	<.0001
update_0	1	0.108318	0.038267	2.83	0.0047
update_1	1	0.058651	0.012806	4.58	<.0001
update_2	1	0.035764	0.015894	2.25	0.0245
update_8	1	0.100280	0.044141	2.27	0.0231
update_10	1	0.028989	0.017083	1.70	0.0897

backward selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	Rating
Selection Method	Backward
Select Criterion	Cross Validation
Stop Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	Single
Random Number Seed	2

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	* BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	* 0 1 2 3 4 5
Android_Ver	2	* 0 1
Content_Rating	5	* Adults o Everyone Mature 1 Teen Unrated
Type	2	* Free Paid
update	11	* 0 1 2 3 4 5 6 7 8 9 10

* Associated Parameters Split

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

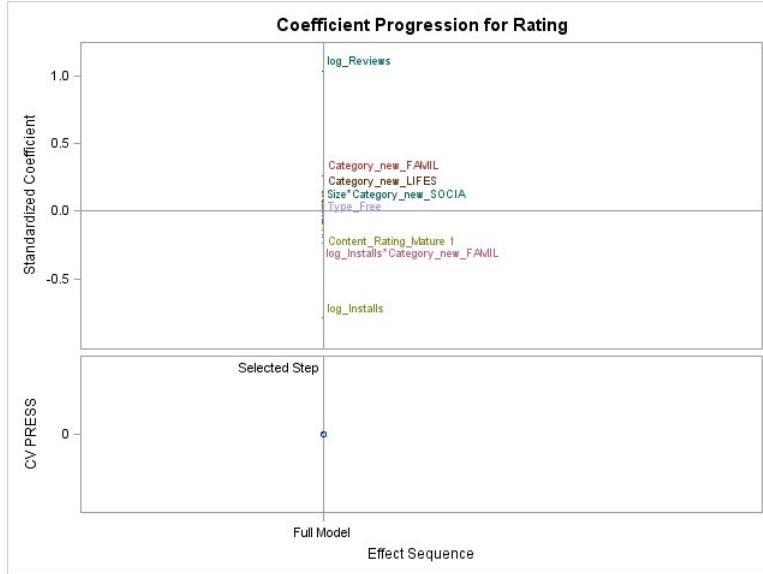
backward selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure**

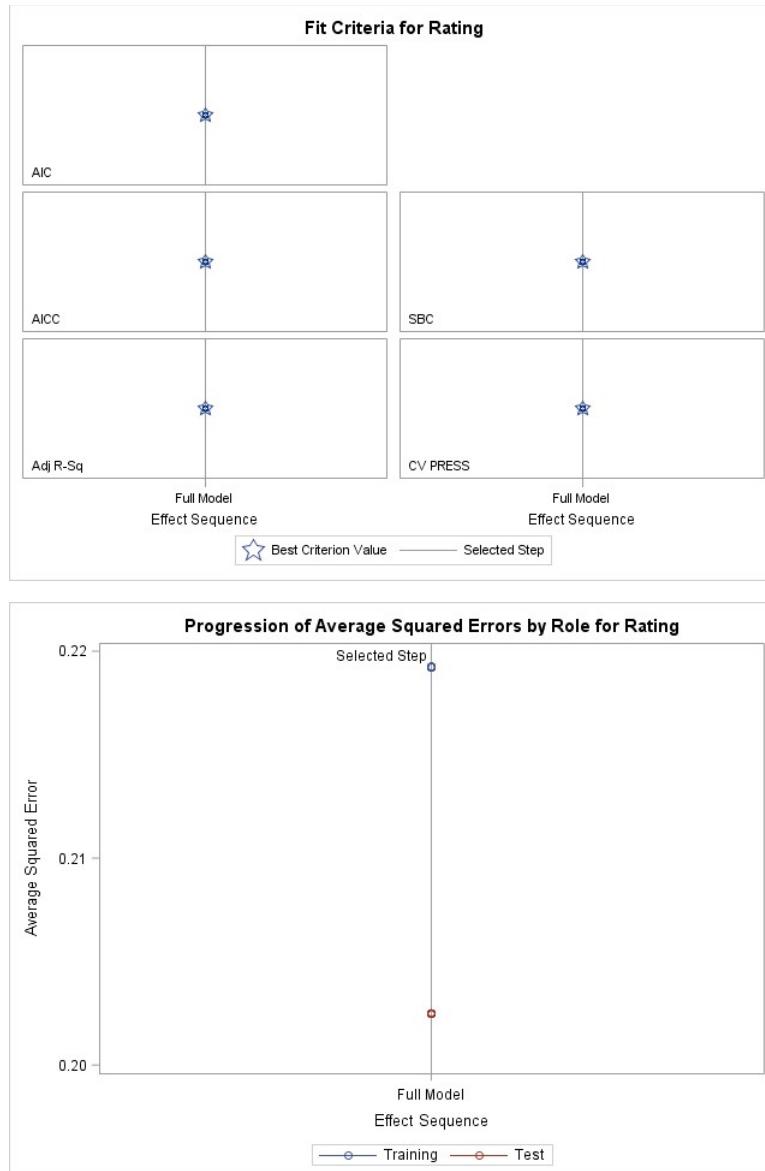
Backward Selection Summary					
Step	Effect Removed	Number Effects In	ASE	Test ASE	CV PRESS
0		70	0.2192	0.2025	0*
	Type_Paid*update_10	69	0.2192	0.2025	0*
	Type_Paid*update_8	68	0.2192	0.2025	0*
	Type_Paid*update_7	67	0.2192	0.2025	0*
	Type_Paid*update_6	66	0.2192	0.2025	0*
	Type_Paid*update_5	65	0.2192	0.2025	0*
	Type_Paid*update_4	64	0.2192	0.2025	0*
	Type_Paid*update_3	63	0.2192	0.2025	0*
	Type_Paid*update_2	62	0.2192	0.2025	0*
	Type_Paid*update_1	61	0.2192	0.2025	0*
	Type_Paid*update_0	60	0.2192	0.2025	0*
	Type_Free*update_10	59	0.2192	0.2025	0*
	Type_Free*update_9	58	0.2192	0.2025	0*
	Type_Paid	57	0.2192	0.2025	0*
	update_10	56	0.2192	0.2025	0*
	Android_Ver_1	55	0.2192	0.2025	0*
	Content_Rating_Unrated	54	0.2192	0.2025	0*
	log_Installs*Category_new_TRANS	53	0.2192	0.2025	0*
	Size*Category_new_TRANS	52	0.2192	0.2025	0*
	Category_new_TRANS	51	0.2192	0.2025	0*

Note: Effects dropped at step 0 are redundant.

Selection stopped at a local minimum of the cross validation PRESS.

Stop Details			
Candidate For	Effect	Candidate CV PRESS	Compare CV PRESS
Removal	Size*Category_new_MEDIA	2131.4246	> 0





backward selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure
Selected Model****The selected model is the model at the last step (Step 0).**

Effects:	Intercept Category_new_BUSIN Category_new_FAMILY Category_new_GAME Category_new_LIFES Category_new_MEDIA Category_new_SOCIA Category_new_TOOLS Size Size*Category_new_BUSIN Size*Category_new_FAMILY Size*Category_new_GAME Size*Category_new_LIFES Size*Category_new_MEDIA Size*Category_new_SOCIA Size*Category_new_TOOLS log_Installs log_Installs*Category_new_BUSIN log_Installs*Category_new_FAMILY log_Installs*Category_new_GAME log_Installs*Category_new_LIFES log_Installs*Category_new_MEDIA log_Installs*Category_new_SOCIA log_Installs*Category_new_TOOLS log_Reviews Content_Rating_Adults_o Content_Rating_Everyone Content_Rating_Mature_1 Content_Rating_Teen Recency Android_Ver_0 update_0 update_1 update_2 update_3 update_4 update_5 update_6 update_7 update_8 update_9 Type_Free Type_Free*update_0 Type_Free*update_1 Type_Free*update_2 Type_Free*update_3 Type_Free*update_4 Type_Free*update_5 Type_Free*update_6 Type_Free*update_7 Type_Free*update_8
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	50	259.76475	5.19530	23.57	<.0001
Error	9579	2111.19507	0.22040		
Corrected Total	9629	2370.95983			

Root MSE	0.46947
Dependent Mean	4.17479
R-Square	0.1096
Adj R-Sq	0.1049
AIC	-4880.76778
AICC	-4880.19224
SBC	-14147
ASE (Train)	0.21923
ASE (Test)	0.20248
CV PRESS	0

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	4.679638	0.346142	13.52	<.0001
Category_new_BUSIN	1	0.112815	0.085013	1.33	0.1845
Category_new_FAMILY	1	0.319321	0.081009	3.94	<.0001
Category_new_GAME	1	0.168809	0.092053	1.83	0.0667
Category_new_LIFES	1	0.174453	0.080124	2.18	0.0295
Category_new_MEDIA	1	0.254868	0.089700	2.84	0.0045
Category_new_SOCIA	1	0.201844	0.083823	2.41	0.0161
Category_new_TOOLS	1	0.084462	0.079882	1.06	0.2904
Size	1	-0.003583	0.001473	-2.43	0.0150
Size*Category_new_BUSIN	1	0.002049	0.001842	1.11	0.2659
Size*Category_new_FAMILY	1	0.003609	0.001549	2.33	0.0199
Size*Category_new_GAME	1	0.004036	0.001599	2.52	0.0116
Size*Category_new_LIFES	1	0.002583	0.001597	1.62	0.1057
Size*Category_new_MEDIA	1	-0.000003345	0.002024	-0.00	0.9987
Size*Category_new_SOCIA	1	0.002770	0.001815	1.53	0.1270
Size*Category_new_TOOLS	1	0.004001	0.001695	2.36	0.0183
log_Installs	1	-0.089992	0.007245	-12.42	<.0001
log_Installs*Category_new_BUSIN	1	-0.009715	0.007338	-1.32	0.1856
log_Installs*Category_new_FAMILY	1	-0.027596	0.006829	-4.04	<.0001
log_Installs*Category_new_GAME	1	-0.015847	0.007362	-2.15	0.0314
log_Installs*Category_new_LIFES	1	-0.009280	0.006635	-1.40	0.1620
log_Installs*Category_new_MEDIA	1	-0.015496	0.007436	-2.08	0.0372
log_Installs*Category_new_SOCIA	1	-0.016978	0.006859	-2.48	0.0133
log_Installs*Category_new_TOOLS	1	-0.006502	0.006514	-1.00	0.3182
log_Reviews	1	0.119870	0.004242	28.26	<.0001
Content_Rating_Adults_o	1	-0.313641	0.429778	-0.73	0.4655
Content_Rating_Everyone	1	-0.285959	0.332884	-0.86	0.3903
Content_Rating_Mature_1	1	-0.381185	0.333853	-1.14	0.2536
Content_Rating_Teen	1	-0.287421	0.333246	-0.86	0.3884

Recency	1	-0.000125	0.000013027	-9.57	<.0001
Android_Ver_0	1	0.026281	0.019620	1.34	0.1804
update_0	1	0.039260	0.150195	0.26	0.7938
update_1	1	-0.083953	0.055253	-1.52	0.1287
update_2	1	-0.125164	0.068784	-1.82	0.0688
update_3	1	-0.082946	0.083153	-1.00	0.3185
update_4	1	0.067317	0.101943	0.66	0.5090
update_5	1	-0.192006	0.144795	-1.33	0.1849
update_6	1	-0.009587	0.144594	-0.07	0.9471
update_7	1	-0.102704	0.164429	-0.62	0.5322
update_8	1	0.024104	0.184556	0.13	0.8961
update_9	1	-0.091563	0.061893	-1.48	0.1391
Type_Free	1	-0.098875	0.052998	-1.87	0.0621
Type_Free*update_0	1	0.052673	0.155592	0.34	0.7350
Type_Free*update_1	1	0.129732	0.057704	2.25	0.0246
Type_Free*update_2	1	0.148918	0.071486	2.08	0.0373
Type_Free*update_3	1	0.063895	0.086018	0.74	0.4576
Type_Free*update_4	1	-0.092020	0.105004	-0.88	0.3809
Type_Free*update_5	1	0.186699	0.147679	1.26	0.2062
Type_Free*update_6	1	-0.019611	0.148722	-0.13	0.8951
Type_Free*update_7	1	0.106004	0.169843	0.62	0.5326
Type_Free*update_8	1	0.055517	0.190383	0.29	0.7706

stepwise selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	Rating
Selection Method	Stepwise
Select Criterion	Cross Validation
Stop Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	Single
Random Number Seed	2

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	* BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	* 0 1 2 3 4 5
Android_Ver	2	* 0 1
Content_Rating	5	* Adults o Everyone Mature 1 Teen Unrated
Type	2	* Free Paid
update	11	* 0 1 2 3 4 5 6 7 8 9 10

* Associated Parameters Split

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

stepwise selection with cross validation as criteria with 10-folds

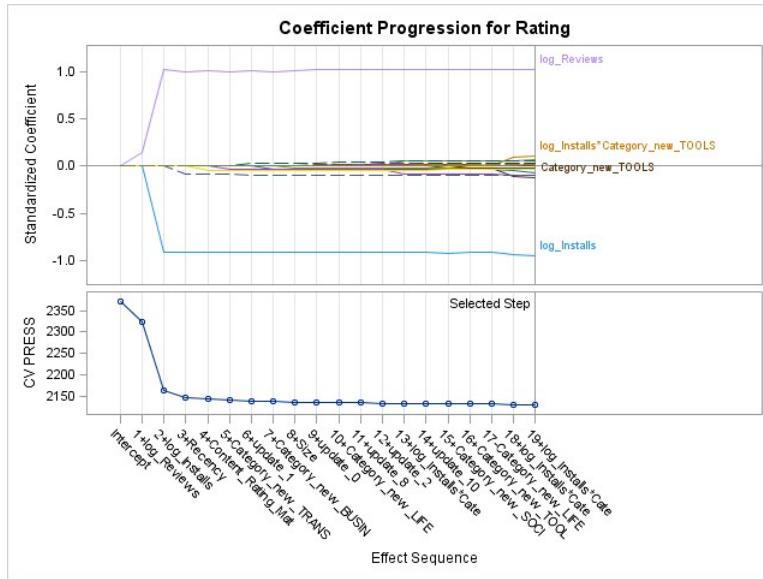
The GLMSELECT Procedure

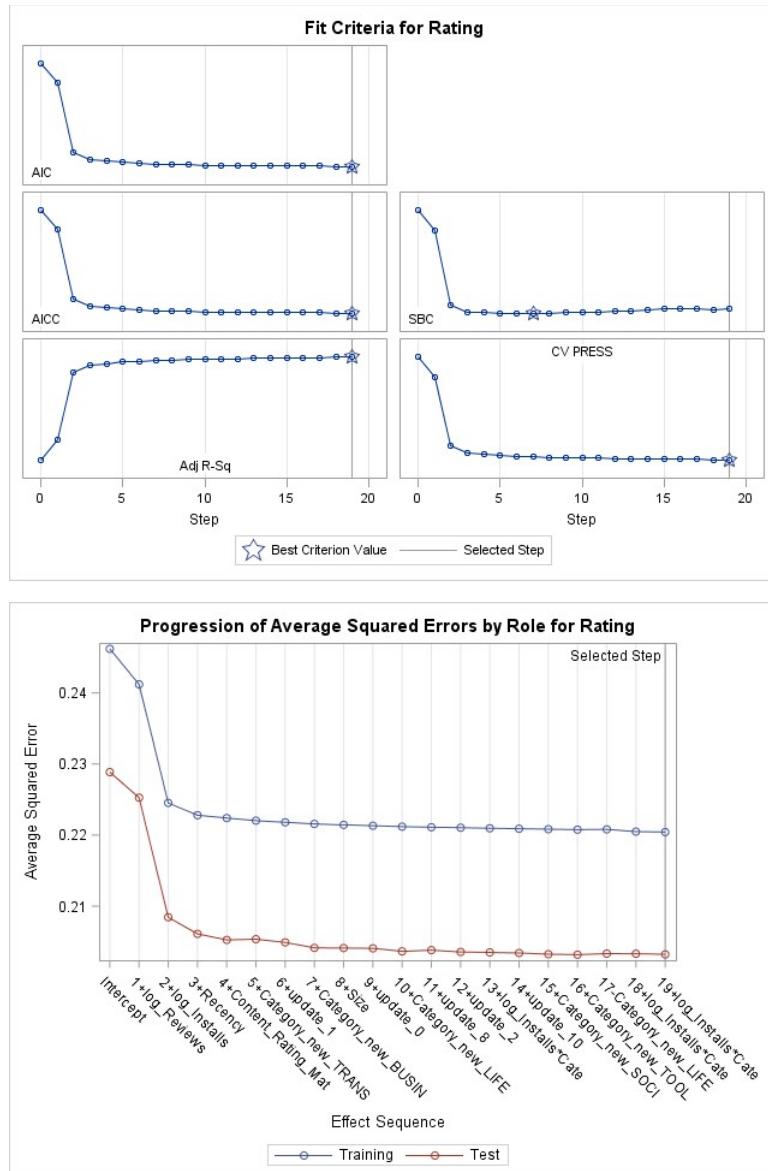
Stepwise Selection Summary						
Step	Effect Entered	Effect Removed	Number Effects In	ASE	Test ASE	CV PRESS
0	Intercept		1	0.2462	0.2289	2371.2617
1	log_Reviews		2	0.2412	0.2253	2323.4621
2	log_Installs		3	0.2245	0.2084	2163.5518
3	Recency		4	0.2228	0.2061	2147.2632
4	Content_Rating_Mature_1		5	0.2224	0.2053	2143.8966
5	Category_new_TRANS		6	0.2220	0.2054	2140.7051
6	update_1		7	0.2218	0.2049	2138.7705
7	Category_new_BUSIN		8	0.2216	0.2041	2137.3561
8	Size		9	0.2214	0.2041	2136.3231
9	update_0		10	0.2213	0.2041	2135.6348
10	Category_new_LIFES		11	0.2212	0.2037	2134.9902
11	update_8		12	0.2211	0.2038	2134.6454
12	update_2		13	0.2210	0.2036	2134.2855
13	log_Installs*Category_new_TRANS		14	0.2210	0.2035	2133.9439
14	update_10		15	0.2209	0.2034	2133.6505
15	Category_new_SOCIA		16	0.2208	0.2033	2133.3781
16	Category_new_TOOLS		17	0.2208	0.2032	2133.0760
17		Category_new_LIFES	16	0.2208	0.2033	2132.8544
18	log_Installs*Category_new_TOOLS		17	0.2205	0.2033	2130.0301
19	log_Installs*Category_new_BUSIN		18	0.2204	0.2032	2129.9583*

* Optimal Value of Criterion

Selection stopped at a local minimum of the cross validation PRESS.

Stop Details			
Candidate For	Effect	Candidate CV PRESS	Compare CV PRESS
Entry	Content_Rating_Unrated	2129.9628	> 2129.9583
Removal	log_Installs*Category_new_BUSIN	2130.0301	> 2129.9583





stepwise selection with cross validation as criteria with 10-folds
**The GLMSELECT Procedure
Selected Model**

The selected model is the model at the last step (Step 19).

Effects:	Intercept Category_new_BUSIN Category_new_SOCIA Category_new_TOOLS Category_new_TRANS Size log_Installs log_Installs*Category_new_BUSIN log_Installs*Category_new_TOOLS log_Installs*Category_new_TRANS log_Reviews Content_Rating_Mature_1 Recency update_0 update_1 update_2 update_8 update_10
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	17	248.14263	14.59663	66.09	<.0001
Error	9612	2122.81719	0.22085		
Corrected Total	9629	2370.95983			

Root MSE	0.46995
Dependent Mean	4.17479
R-Square	0.1047
Adj R-Sq	0.1031
AIC	-4893.90005
AICC	-4893.82097
SBC	-14397
ASE (Train)	0.22044
ASE (Test)	0.20323
CV PRESS	2129.95831

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	4.539367	0.023508	193.10	<.0001
Category_new_BUSIN	1	-0.126742	0.042344	-2.99	0.0028
Category_new_SOCIA	1	-0.037080	0.016526	-2.24	0.0249
Category_new_TOOLS	1	-0.140914	0.031278	-4.51	<.0001
Category_new_TRANS	1	-0.271200	0.073443	-3.69	0.0002
Size	1	-0.000640	0.000264	-2.42	0.0154
log_Installs	1	-0.106952	0.003971	-26.94	<.0001
log_Installs*Category_new_BUSIN	1	0.006023	0.004244	1.42	0.1559
log_Installs*Category_new_TOOLS	1	0.010633	0.002687	3.96	<.0001
log_Installs*Category_new_TRANS	1	0.014484	0.006189	2.34	0.0193
log_Reviews	1	0.119586	0.004045	29.57	<.0001
Content_Rating_Mature_1	1	-0.093947	0.025290	-3.71	0.0002
Recency	1	-0.000125	0.000012655	-9.90	<.0001
update_0	1	0.107706	0.038263	2.81	0.0049
update_1	1	0.057789	0.012710	4.55	<.0001
update_2	1	0.036272	0.015894	2.28	0.0225
update_8	1	0.106033	0.044137	2.40	0.0163
update_10	1	0.031417	0.017083	1.84	0.0659

LASSO regression with Cross_Validation as criteria**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	Rating
Selection Method	LASSO
Stop Criterion	None
Choose Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	None
Random Number Seed	2

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	0 1 2 3 4 5
Android_Ver	2	0 1
Content_Rating	5	Adults o Everyone Mature 1 Teen Unrated
Type	2	Free Paid
update	11	0 1 2 3 4 5 6 7 8 9 10

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

LASSO regression with Cross_Validation as criteria

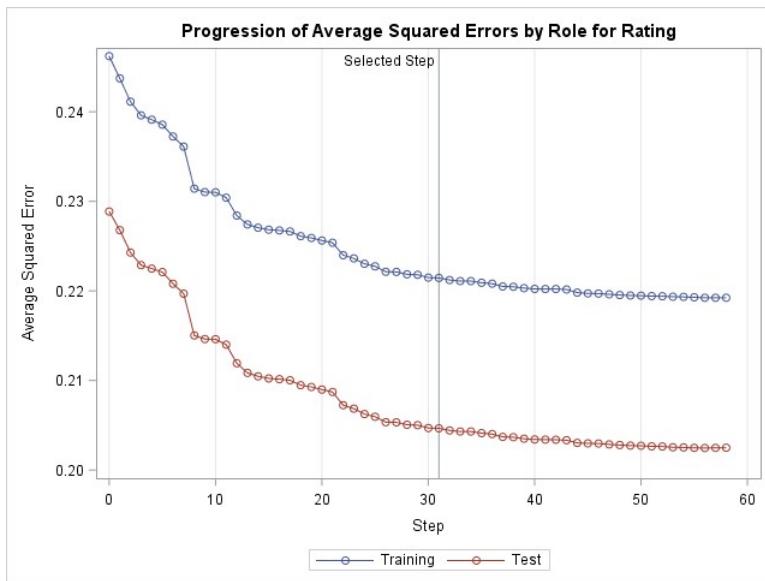
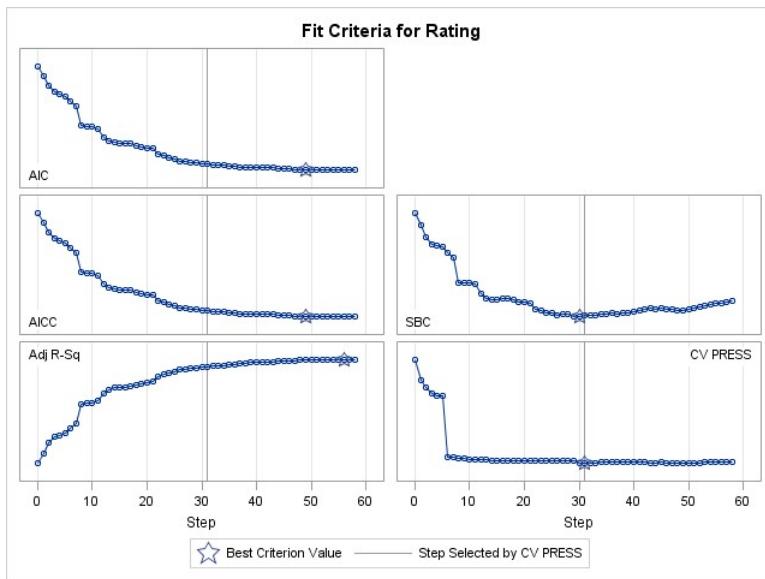
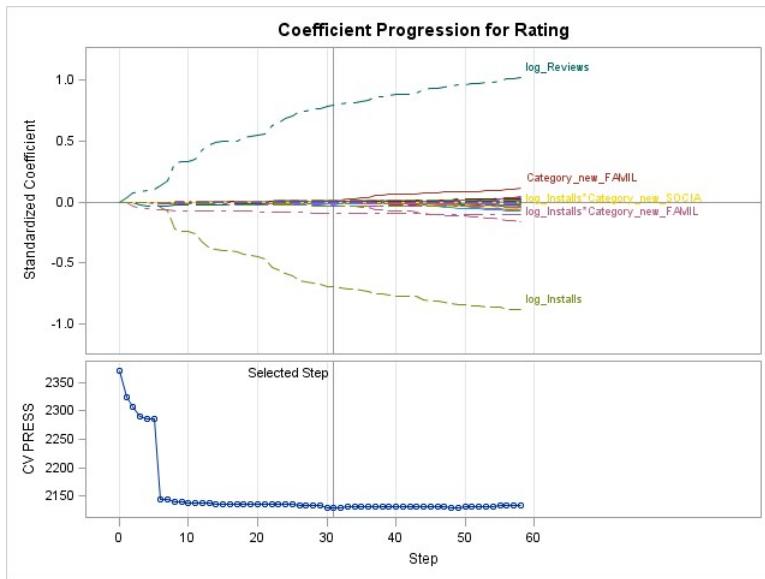
The GLMSELECT Procedure

LASSO Selection Summary						
Step	Effect Entered	Effect Removed	Number Effects In	ASE	Test ASE	CV PRESS
0	Intercept		1	0.2462	0.2289	2371.2617
1	log_Reviews		2	0.2437	0.2268	2323.4621
2	Recency		3	0.2411	0.2243	2306.6055
3	Type_Free		4	0.2396	0.2229	2290.9769
4	Size*Category_new_TRANS		5	0.2391	0.2225	2285.1687
5	Category_new_TRANS		6	0.2386	0.2221	2286.0201
6	log_Installs		7	0.2372	0.2208	2144.4863
7	Type_Paid*update_10		8	0.2361	0.2197	2144.0802
8	Content_Rating_Mature_1		9	0.2314	0.2150	2140.4871
9	log_Installs*Category_new_BUSIN		10	0.2310	0.2146	2139.3188
10	update_1		11	0.2310	0.2146	2137.3026
11	Type_Free*update_3		12	0.2304	0.2140	2137.2810
12	Category_new_LIFES		13	0.2284	0.2119	2136.4175
13	Category_new_BUSIN		14	0.2274	0.2109	2136.4258
14	log_Installs*Category_new_SOCIA		15	0.2271	0.2105	2135.8746
15	Type_Paid*update_4		16	0.2268	0.2102	2135.1606
16	update_0		17	0.2267	0.2101	2134.5427
17	Size*Category_new_BUSIN		18	0.2266	0.2100	2134.4258
18	Android_Ver_0		19	0.2261	0.2095	2134.4858
19		log_Installs*Category_new_BUSIN	18	0.2259	0.2093	2134.3297
20	update_9		19	0.2256	0.2090	2134.3141
21	Type_Free*update_4		20	0.2254	0.2087	2134.2452
22	Type_Free*update_6		21	0.2240	0.2072	2134.3248
23	update_8		22	0.2236	0.2069	2134.1973
24	log_Installs*Category_new_LIFES		23	0.2230	0.2062	2134.3713
25	Size*Category_new_MEDIA		24	0.2227	0.2060	2134.4128
26	log_Installs*Category_new_FAMIL		25	0.2221	0.2053	2134.0011
27	Category_new_TOOLS		26	0.2221	0.2053	2133.3922
28	Size*Category_new_SOCIA		27	0.2219	0.2051	2133.5833
29		Type_Free	26	0.2218	0.2050	2133.5282
30	Category_new_FAMIL		27	0.2215	0.2047	2129.7362
31	Category_new_MEDIA		28	0.2214	0.2047	2128.6881*
32	Size		29	0.2212	0.2044	2128.7427
33	Type_Paid*update_5		30	0.2211	0.2043	2130.1493
34	Type_Free*update_1		31	0.2211	0.2043	2130.6497
35	Content_Rating_Unrated		32	0.2209	0.2041	2130.6245
36	Type_Paid*update_6		33	0.2208	0.2040	2130.6286
37	update_5		34	0.2205	0.2037	2131.1184
38	Type_Paid*update_2		35	0.2205	0.2037	2131.1992
39	Type_Paid*update_0		36	0.2203	0.2035	2131.4227
40	Size*Category_new_LIFES		37	0.2202	0.2034	2131.3609
41	Type_Free*update_2		38	0.2202	0.2034	2131.4561
42	Type_Paid*update_8		39	0.2202	0.2034	2131.7956
43	log_Installs*Category_new_GAME		40	0.2201	0.2033	2130.2857
44	log_Installs*Category_new_TOOLS		41	0.2198	0.2030	2130.3200
45	Size*Category_new_TOOLS		42	0.2197	0.2030	2130.7110
46		Size	41	0.2197	0.2030	2130.3744
47	log_Installs*Category_new_TRANS		42	0.2196	0.2029	2130.0584
48		Category_new_LIFES	41	0.2195	0.2028	2129.1701
49	Type_Paid*update_3		42	0.2195	0.2027	2129.8937
50	Size*Category_new_GAME		43	0.2195	0.2027	2130.1670
51	log_Installs*Category_new_MEDIA		44	0.2194	0.2026	2130.1537
52	Content_Rating_Everyone		45	0.2194	0.2026	2130.3127
53	Category_new_GAME		46	0.2193	0.2025	2130.8394
54	Type_Free*update_10		47	0.2193	0.2025	2131.4529
55	Category_new_SOCIA		48	0.2193	0.2025	2132.1180
56	Content_Rating_Adults_o		49	0.2192	0.2025	2132.3798

57	Type_Paid*update_7	50	0.2192	0.2025	2132.5993
58	Size*Category_new_FAMILY	51	0.2192	0.2025	2132.8420

* Optimal Value of Criterion

Selection stopped because the change of the maximum absolute correction is tiny.



LASSO regression with Cross_Validation as criteria**The GLMSELECT Procedure
Selected Model****The selected model, based on Cross Validation, is the model at Step 31.**

Effects:	Intercept Category_new_BUSIN Category_new_FAMILY Category_new_LIFES Category_new_MEDIA Category_new_TOOLS Category_new_TRANS Size*Category_new_BUSIN Size*Category_new_MEDIA Size*Category_new_SOCIA Size*Category_new_TRANS log_Installs*Category_new_FAMILY log_Installs*Category_new_LIFES log_Installs*Category_new_SOCIA log_Reviews Content_Rating_Mature_1 Recency Android_Ver_0 update_0 update_1 update_8 update_9 Type_Free*update_3 Type_Free*update_4 Type_Free*update_6 Type_Paid*update_4 Type_Paid*update_10
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	27	238.43923	8.83108	39.76	<.0001
Error	9602	2132.52060	0.22209		
Corrected Total	9629	2370.95983			

Root MSE	0.47127
Dependent Mean	4.17479
R-Square	0.1006
Adj R-Sq	0.0980
AIC	-4829.98159
AICC	-4829.80034
SBC	-14261
ASE (Train)	0.22145
ASE (Test)	0.20466
CV PRESS	2128.68813

Parameter Estimates		
Parameter	DF	Estimate
Intercept	1	4.398904
Category_new_BUSIN	1	-0.026009
Category_new_FAMILY	1	0.015688
Category_new_LIFES	1	0.001556
Category_new_MEDIA	1	0.000624
Category_new_TOOLS	1	-0.004674
Category_new_TRANS	1	-0.031974
Size*Category_new_BUSIN	1	-0.000783
Size*Category_new_MEDIA	1	-0.000640
Size*Category_new_SOCIA	1	-0.000115
Size*Category_new_TRANS	1	-0.002613
log_Installs	1	-0.077997
log_Installs*Category_new_FAMILY	1	-0.002128
log_Installs*Category_new_LIFES	1	0.001173
log_Installs*Category_new_SOCIA	1	-0.001603
log_Reviews	1	0.092776
Content_Rating_Mature_1	1	-0.072431
Recency	1	-0.000111
Android_Ver_0	1	0.017029
update_0	1	0.046239
update_1	1	0.019242
update_8	1	0.032726
update_9	1	-0.056017
Type_Free*update_3	1	-0.022533
Type_Free*update_4	1	-0.019602
Type_Free*update_6	1	-0.021686
Type_Paid*update_4	1	0.102843
Type_Paid*update_10	1	0.084064

Elasticnet regression with Cross_Validation as criteria**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	Rating
Selection Method	ELASTICNET
Stop Criterion	None
Choose Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	None
Random Number Seed	2

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	0 1 2 3 4 5
Android_Ver	2	0 1
Content_Rating	5	Adults o Everyone Mature 1 Teen Unrated
Type	2	Free Paid
update	11	0 1 2 3 4 5 6 7 8 9 10

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

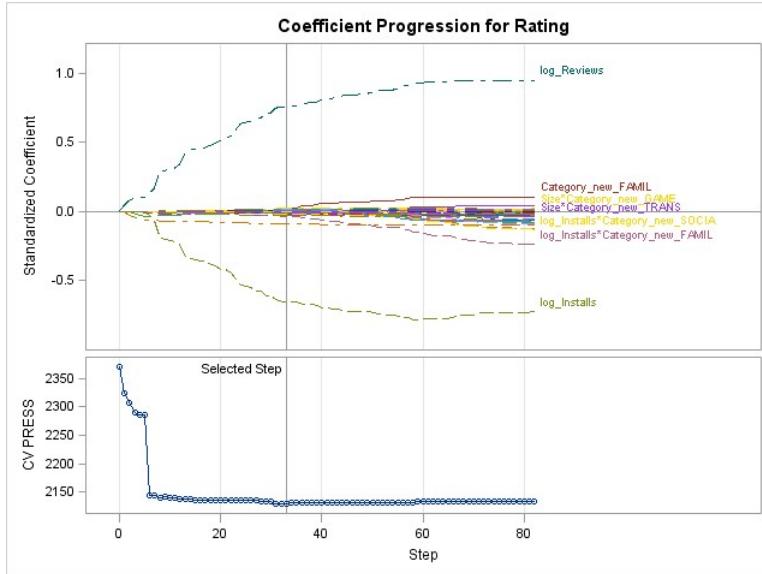
Elasticnet regression with Cross_Validation as criteria**The GLMSELECT Procedure**

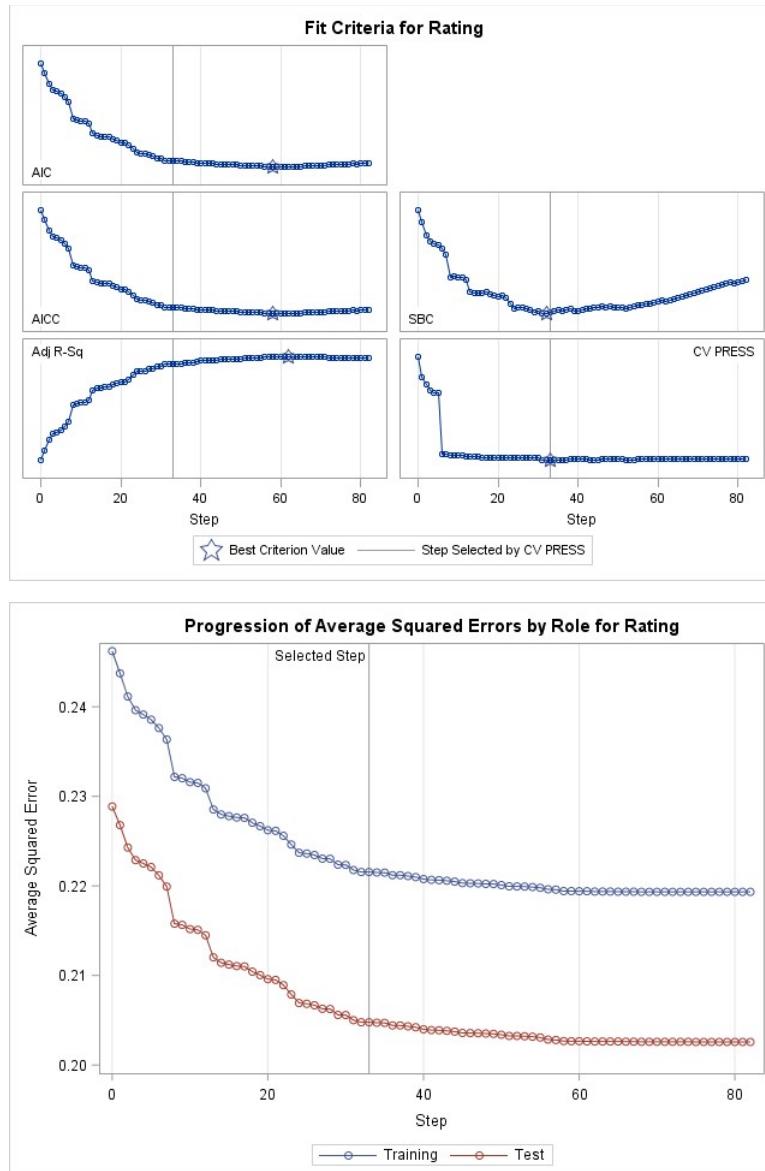
Elastic Net Selection Summary						
Step	Effect Entered	Effect Removed	Number Effects In	ASE	Test ASE	CV PRESS
0	Intercept		1	0.2462	0.2289	2371.2617
1	log_Reviews		2	0.2437	0.2268	2323.4621
2	Recency		3	0.2411	0.2243	2306.6055
3	Type_Free		4	0.2396	0.2229	2290.9769
4	Size*Category_new_TRANS		5	0.2391	0.2225	2285.1687
5	Category_new_TRANS		6	0.2386	0.2221	2286.0201
6	log_Installs		7	0.2376	0.2212	2144.4863
7	Type_Paid*update_10		8	0.2364	0.2199	2144.0802
8	Content_Rating_Mature_1		9	0.2322	0.2158	2140.4871
9	Size*Category_new_GAME		10	0.2320	0.2156	2140.8303
10	log_Installs*Category_new_BUSIN		11	0.2316	0.2152	2139.7029
11	Type_Free*update_3		12	0.2315	0.2151	2138.9519
12	update_1		13	0.2309	0.2145	2137.6895
13	Category_new_LIFES		14	0.2285	0.2120	2136.7824
14	Category_new_BUSIN		15	0.2280	0.2114	2136.7828
15	log_Installs*Category_new_SOCIA		16	0.2278	0.2112	2136.2375
16	Type_Paid*update_4		17	0.2276	0.2111	2135.5272
17	Android_Ver_0		18	0.2276	0.2110	2135.5717
18	update_0		19	0.2271	0.2104	2134.9250
19	Size*Category_new_BUSIN		20	0.2267	0.2100	2134.8434
20	update_9		21	0.2262	0.2096	2134.8145
21	Type_Free*update_6		22	0.2262	0.2095	2134.9563
22	Type_Free*update_4		23	0.2256	0.2089	2134.8302
23		log_Installs*Category_new_BUSIN	22	0.2246	0.2079	2134.6833
24	update_8		23	0.2237	0.2069	2134.5465
25	log_Installs*Category_new_LIFES		24	0.2236	0.2068	2134.7050
26	Size*Category_new_MEDIA		25	0.2234	0.2067	2134.7487
27	log_Installs*Category_new_FAMIL		26	0.2231	0.2063	2134.2373
28		Size*Category_new_GAME	25	0.2230	0.2063	2134.0011
29	Category_new_TOOLS		26	0.2224	0.2056	2133.3922
30	Size*Category_new_SOCIA		27	0.2223	0.2056	2133.5833
31	Category_new_FAMIL		28	0.2218	0.2050	2129.7183
32	Category_new_MEDIA		29	0.2216	0.2048	2128.7195
33	Type_Paid*update_6		30	0.2215	0.2048	2128.6526*
34	Type_Paid*update_5		31	0.2215	0.2047	2130.0852
35	Content_Rating_Unrated		32	0.2215	0.2047	2130.0626
36	Size		33	0.2212	0.2044	2130.1369
37	Type_Paid*update_0		34	0.2212	0.2044	2130.3054
38	update_5		35	0.2211	0.2043	2130.7733
39		Type_Free	34	0.2210	0.2042	2130.8150
40	Type_Paid*update_8		35	0.2208	0.2040	2131.1464
41	Type_Free*update_1		36	0.2207	0.2039	2131.6788
42	Size*Category_new_LIFES		37	0.2206	0.2039	2131.6236
43	log_Installs*Category_new_GAME		38	0.2206	0.2038	2130.2006
44	Type_Paid*update_2		39	0.2205	0.2037	2130.2949
45	Type_Free*update_2		40	0.2203	0.2036	2130.2857
46	Type_Paid*update_3		41	0.2203	0.2036	2130.9921
47		log_Installs*Category_new_LIFES	40	0.2203	0.2036	2130.5409
48	log_Installs*Category_new_BUSIN		41	0.2202	0.2035	2130.8096
49		Size	40	0.2202	0.2035	2130.5234
50	Size*Category_new_TOOLS		41	0.2201	0.2034	2130.8286
51	log_Installs*Category_new_TOOLS		42	0.2199	0.2033	2131.0431
52		Category_new_LIFES	41	0.2199	0.2032	2130.2236
53	log_Installs*Category_new_MEDIA		42	0.2199	0.2032	2129.8962
54	log_Installs*Category_new_TRANS		43	0.2199	0.2032	2129.8789
55	Type_Free*update_10		44	0.2198	0.2031	2130.4931
56	Size*Category_new_GAME		45	0.2196	0.2028	2130.7693

57	Category_new_GAME			46	0.2196	0.2028	2131.2845
58	Category_new_SOCIA			47	0.2194	0.2027	2131.9474
59	Content_Rating_Adults_0			48	0.2194	0.2027	2132.2082
60	log_Installs*Category_new_LIFES			49	0.2194	0.2027	2132.2082
61	Size*Category_new_FAMILY			50	0.2194	0.2026	2132.4470
62		log_Installs*Category_new_TOOLS		49	0.2194	0.2026	2132.4470
63	Type_Free*update_7			50	0.2194	0.2026	2132.6701
64	Content_Rating_Teen			51	0.2194	0.2026	2132.8420
65	Type_Free*update_0			52	0.2194	0.2026	2132.8420
66	log_Installs*Category_new_TOOLS			53	0.2194	0.2026	2132.8420
67	Type_Free*update_8			54	0.2193	0.2026	2132.8420
68	update_3			55	0.2193	0.2026	2132.8420
69	update_7			56	0.2193	0.2026	2132.8420
70	update_4			57	0.2193	0.2026	2132.8420
71	update_6			58	0.2193	0.2026	2132.8420
72	Type_Free*update_5			59	0.2193	0.2026	2132.8420
73	Size			60	0.2193	0.2026	2132.8420
74	update_2			61	0.2193	0.2026	2132.8420
75	Content_Rating_Everyone			62	0.2193	0.2026	2132.8420
76	Type_Paid*update_1			63	0.2193	0.2026	2132.8420
77	Type_Free			64	0.2193	0.2026	2132.8420
78	update_10			65	0.2193	0.2026	2132.8420
79		log_Installs*Category_new_TRANS		64	0.2193	0.2026	2132.8420
80	Type_Paid*update_7			65	0.2193	0.2026	2132.8420
81	log_Installs*Category_new_TRANS			66	0.2193	0.2026	2132.8420
82	Category_new_LIFES			67	0.2193	0.2026	2132.8420

* Optimal Value of Criterion

Selection stopped because all candidate effects for entry are linearly dependent on effects in the model.





Elasticnet regression with Cross_Validation as criteria**The GLMSELECT Procedure
Selected Model****The selected model, based on Cross Validation, is the model at Step 33.**

Effects:	Intercept Category_new_BUSIN Category_new_FAMILY Category_new_LIFES Category_new_MEDIA Category_new_TOOLS Category_new_TRANS Size*Category_new_BUSIN Size*Category_new_MEDIA Size*Category_new_SOCIA Size*Category_new_TRANS log_Installs log_Installs*Category_new_FAMILY log_Installs*Category_new_LIFES log_Installs*Category_new_SOCIA log_Reviews Content_Rating_Mature_1 Recency Android_Ver_0 update_0 update_1 update_8 update_9 Type_Free Type_Free*update_3 Type_Free*update_4 Type_Free*update_6 Type_Paid Type_Paid*update_4 Type_Paid*update_6 Type_Paid*update_10
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	29	237.45492	8.18810	36.84	<.0001
Error	9600	2133.50490	0.22224		
Corrected Total	9629	2370.95983			

Root MSE	0.47142
Dependent Mean	4.17479
R-Square	0.1002
Adj R-Sq	0.0974
AIC	-4821.53771
AICC	-4821.33100
SBC	-14238
ASE (Train)	0.22155
ASE (Test)	0.20477
CV PRESS	2128.65257

Parameter Estimates		
Parameter	DF	Estimate
Intercept	1	4.382386
Category_new_BUSIN	1	-0.027635
Category_new_FAMILY	1	0.032878
Category_new_LIFES	1	0.006905
Category_new_MEDIA	1	0.004469
Category_new_TOOLS	1	-0.008024
Category_new_TRANS	1	-0.036184
Size*Category_new_BUSIN	1	-0.000811
Size*Category_new_MEDIA	1	-0.000947
Size*Category_new_SOCIA	1	-0.000101
Size*Category_new_TRANS	1	-0.002665
log_Installs	1	-0.073634
log_Installs*Category_new_FAMILY	1	-0.003881
log_Installs*Category_new_LIFES	1	0.000568
log_Installs*Category_new_SOCIA	1	-0.001916
log_Reviews	1	0.088754
Content_Rating_Mature_1	1	-0.074092
Recency	1	-0.000113
Android_Ver_0	1	0.019451
update_0	1	0.051182
update_1	1	0.020120
update_8	1	0.037384
update_9	1	-0.062554
Type_Free	1	-0.003175
Type_Free*update_3	1	-0.024029
Type_Free*update_4	1	-0.020698
Type_Free*update_6	1	-0.024959
Type_Paid*update_4	1	0.115177
Type_Paid*update_6	1	0.000278
Type_Paid*update_10	1	0.093344

linear regression**The GLM Procedure**

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL LIFES MEDIA SOCIA TOOLS TRANS GAME
Android_Ver	2	1 0
Content_Rating	5	Adults o Mature 1 Teen Unrated Everyone
Type	2	Paid Free
update	11	1 2 3 4 5 6 7 8 9 10 0

Number of Observations Read	9630
Number of Observations Used	9630

linear regression**The GLM Procedure****Dependent Variable: log_Installs**

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	50	54537.8949	1090.7579	79.72	<.0001
Error	9579	131062.5505	13.6823		
Corrected Total	9629	185600.4454			

R-Square	Coeff Var	Root MSE	log_Installs Mean
0.293846	34.56143	3.698956	10.70256

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Category_new	7	9712.20234	1387.45748	101.41	<.0001
Size	1	9896.85618	9896.85618	723.33	<.0001
Size*Category_new	7	663.12048	94.73150	6.92	<.0001
Rating	1	369.93387	369.93387	27.04	<.0001
Rating*Category_new	7	573.11926	81.87418	5.98	<.0001
Content_Rating	4	141.56725	35.39181	2.59	0.0350
Recency	1	2708.19586	2708.19586	197.93	<.0001
Android_Ver	1	150.08837	150.08837	10.97	0.0009
update	10	21176.18633	2117.61863	154.77	<.0001
Type	1	8303.57735	8303.57735	606.89	<.0001
Type*update	9	804.53692	89.39299	6.53	<.0001
Price	1	38.51073	38.51073	2.81	0.0934

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Category_new	7	267.291052	38.184436	2.79	0.0067
Size	1	2638.152442	2638.152442	192.82	<.0001
Size*Category_new	7	1071.677518	153.096788	11.19	<.0001
Rating	1	334.736596	334.736596	24.46	<.0001
Rating*Category_new	7	474.359592	67.765656	4.95	<.0001
Content_Rating	4	35.225816	8.806454	0.64	0.6314
Recency	1	173.170775	173.170775	12.66	0.0004
Android_Ver	1	11.347321	11.347321	0.83	0.3625
update	10	3828.134013	382.813401	27.98	<.0001
Type	1	2009.860854	2009.860854	146.90	<.0001
Type*update	9	814.160306	90.462256	6.61	<.0001
Price	1	38.510733	38.510733	2.81	0.0934

Parameter	Estimate	Standard Error	t Value	Pr > t
Intercept	6.119184129	B	1.40773157	4.35 <.0001
Category_new BUSIN	-0.629373692	B	1.68732881	-0.37 0.7092
Category_new FAMIL	2.920339354	B	1.55422855	1.88 0.0603
Category_new LIFES	-0.428867610	B	1.52458208	-0.28 0.7785
Category_new MEDIA	-1.029892063	B	1.82941929	-0.56 0.5735
Category_new SOCIA	1.059170756	B	1.72757628	0.61 0.5398
Category_new TOOLS	-0.644114494	B	1.52533603	-0.42 0.6728
Category_new TRANS	-1.841169973	B	2.16332896	-0.85 0.3947
Category_new GAME	0.000000000	B	.	.
Size	0.040150646	B	0.00470140	8.54 <.0001
Size*Category_new BUSIN	-0.008220425	B	0.00974905	-0.84 0.3991
Size*Category_new FAMIL	0.023025033	B	0.00584141	3.94 <.0001
Size*Category_new LIFES	-0.003679565	B	0.00671964	-0.55 0.5840
Size*Category_new MEDIA	-0.004201567	B	0.01180045	-0.36 0.7218
Size*Category_new SOCIA	0.026555977	B	0.00929555	2.86 0.0043
Size*Category_new TOOLS	-0.035292777	B	0.00812457	-4.34 <.0001
Size*Category_new TRANS	-0.004213395	B	0.01242088	-0.34 0.7345
Size*Category_new GAME	0.000000000	B	.	.
Rating	0.926342634	B	0.32355688	2.86 0.0042
Rating*Category_new BUSIN	-0.749372419	B	0.40090992	-1.87 0.0616
Rating*Category_new FAMIL	-1.311833023	B	0.36820773	-3.56 0.0004
Rating*Category_new LIFES	-0.543895194	B	0.36002896	-1.51 0.1309

Rating*Category_new MEDIA	-0.263046907	B	0.43120055	-0.61	0.5419
Rating*Category_new SOCIA	-0.763545823	B	0.40923815	-1.87	0.0621
Rating*Category_new TOOLS	-0.056433085	B	0.36175998	-0.16	0.8760
Rating*Category_new TRANS	-0.032073455	B	0.51564528	-0.06	0.9504
Rating*Category_new GAME	0.000000000	B	.	.	.
Content_Rating Adults o	2.008604562	B	2.13904519	0.94	0.3477
Content_Rating Mature 1	0.075758656	B	0.20376004	0.37	0.7100
Content_Rating Teen	0.155352120	B	0.12951854	1.20	0.2304
Content_Rating Unrated	-1.247690607	B	2.62257445	-0.48	0.6343
Content_Rating Everyone	0.000000000	B	.	.	.
Recency	-0.000366533		0.00010303	-3.56	0.0004
Android_Ver 1	-0.140711910	B	0.15451242	-0.91	0.3625
Android_Ver 0	0.000000000	B	.	.	.
update 1	0.791940652	B	0.30501403	2.60	0.0094
update 2	2.419476301	B	0.31597015	7.66	<.0001
update 3	2.500486154	B	0.32653920	7.66	<.0001
update 4	3.430678108	B	0.34125141	10.05	<.0001
update 5	3.384480473	B	0.36055508	9.39	<.0001
update 6	3.828050476	B	0.38988703	9.82	<.0001
update 7	2.980559269	B	0.43315110	6.88	<.0001
update 8	2.684000300	B	0.46121792	5.82	<.0001
update 9	5.580395428	B	0.56184704	9.93	<.0001
update 10	5.473996204	B	0.32079070	17.06	<.0001
update 0	0.000000000	B	.	.	.
Type Paid	-3.084142469	B	1.15798125	-2.66	0.0077
Type Free	0.000000000	B	.	.	.
Type*update Paid 1	-0.164769184	B	1.17241595	-0.14	0.8882
Type*update Paid 2	-0.570316250	B	1.21953805	-0.47	0.6400
Type*update Paid 3	-0.534906491	B	1.27778897	-0.42	0.6755
Type*update Paid 4	-0.756537524	B	1.36211852	-0.56	0.5786
Type*update Paid 5	-2.493848698	B	1.59082276	-1.57	0.1170
Type*update Paid 6	-1.770342717	B	1.59822155	-1.11	0.2680
Type*update Paid 7	0.475193384	B	1.72652524	0.28	0.7831
Type*update Paid 8	0.450213466	B	1.84846816	0.24	0.8076
Type*update Paid 10	-3.460452259	B	1.22605052	-2.82	0.0048
Type*update Paid 0	0.000000000	B	.	.	.
Type*update Free 1	0.000000000	B	.	.	.
Type*update Free 2	0.000000000	B	.	.	.
Type*update Free 3	0.000000000	B	.	.	.
Type*update Free 4	0.000000000	B	.	.	.
Type*update Free 5	0.000000000	B	.	.	.
Type*update Free 6	0.000000000	B	.	.	.
Type*update Free 7	0.000000000	B	.	.	.
Type*update Free 8	0.000000000	B	.	.	.
Type*update Free 9	0.000000000	B	.	.	.
Type*update Free 10	0.000000000	B	.	.	.
Type*update Free 0	0.000000000	B	.	.	.
Price	0.050885444		0.03033066	1.68	0.0934

Note: The X'X matrix has been found to be singular, and a generalized inverse was used to solve the normal equations. Terms whose estimates are followed by the letter 'B' are not uniquely estimable.

Forward Selection based on Mallows Cp selection Criteria**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	log_Installs
Selection Method	Forward
Select Criterion	C(p)
Stop Criterion	C(p)
Effect Hierarchy Enforced	Single

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	* BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	* 0 1 2 3 4 5
Android_Ver	2	* 0 1
Content_Rating	5	* Adults o Everyone Mature 1 Teen Unrated
Type	2	* Free Paid
update	11	* 0 1 2 3 4 5 6 7 8 9 10

*** Associated Parameters Split**

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

Forward Selection based on Mallows Cp selection Criteria

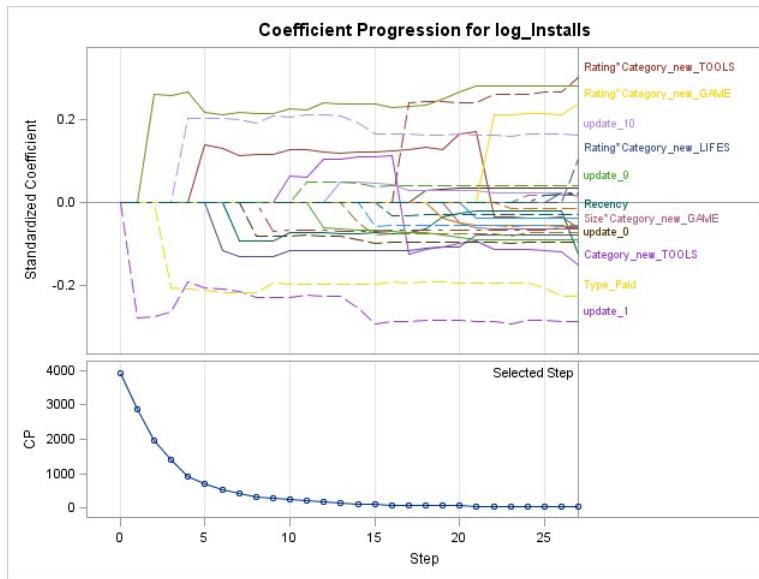
The GLMSELECT Procedure

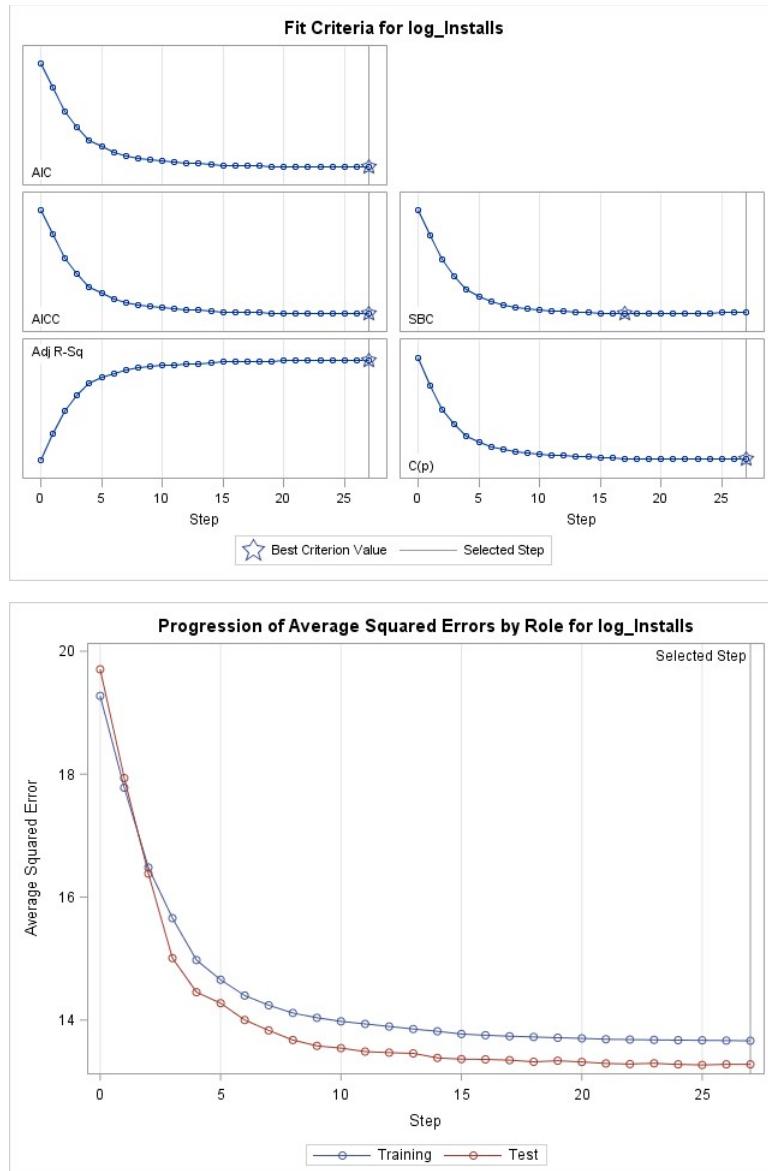
Forward Selection Summary					
Step	Effect Entered	Number Effects In	CP	ASE	Test ASE
0	Intercept	1	3937.0242	19.2732	19.7047
1	update_1	2	2886.9088	17.7783	17.9345
2	Size	3	1976.4452	16.4819	16.3815
3	Type_Paid	4	1397.5262	15.6565	15.0079
4	update_10	5	919.8610	14.9750	14.4536
5	Category_new_GAME	6	696.8295	14.6553	14.2747
6	Category_new_BUSIN	7	518.3122	14.3988	14.0016
7	Category_new_LIFES	8	409.1980	14.2409	13.8311
8	update_0	9	321.9916	14.1142	13.6746
9	Type_Paid*update_10	10	270.3641	14.0380	13.5795
10	Category_new_TOOLS	11	231.2302	13.9796	13.5428
11	update_9	12	203.2544	13.9370	13.4882
12	Size*Category_new_TOOLS	13	175.8396	13.8952	13.4699
13	Rating	14	148.6037	13.8536	13.4571
14	update_2	15	124.7416	13.8169	13.3841
15	update_3	16	95.4045	13.7724	13.3655
16	Recency	17	83.9939	13.7533	13.3609
17	Rating*Category_new_TOOLS	18	74.9970	13.7377	13.3470
18	Category_new_SOCIA	19	68.3944	13.7255	13.3210
19	Size*Category_new_LIFES	20	61.5957	13.7130	13.3384
20	Size*Category_new_GAME	21	55.6541	13.7017	13.3181
21	Size*Category_new_BUSIN	22	48.5518	13.6887	13.2931
22	Rating*Category_new_GAME	23	45.9024	13.6821	13.2840
23	update_8	24	44.2590	13.6770	13.2971
24	update_6	25	43.6396	13.6732	13.2785
25	Price	26	43.3902	13.6700	13.2685
26	Type_Paid*update_1	27	43.0789	13.6668	13.2786
27	Rating*Category_new_LIFES	28	43.0590*	13.6639	13.2796

* Optimal Value of Criterion

Selection stopped at a local minimum of the C(p) criterion.

Stop Details			
Candidate For	Effect	Candidate C(p)	Compare C(p)
Entry	Content_Rating_Everyone	43.2800	> 43.0590





Forward Selection based on Mallows Cp selection Criteria**The GLMSELECT Procedure
Selected Model****The selected model is the model at the last step (Step 27).**

Effects:	Intercept Category_new_BUSIN Category_new_GAME Category_new_LIFES Category_new_SOCIA Category_new_TOOLS Size Size*Category_new_BUSIN Size*Category_new_GAME Size*Category_new_LIFES Size*Category_new_TOOLS Rating Rating*Category_new_GAME Rating*Category_new_LIFES Rating*Category_new_TOOLS Recency update_0 update_1 update_2 update_3 update_6 update_8 update_9 update_10 Type_Paid Type_Paid*update_1 Type_Paid*update_10 Price
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	27	54017	2000.63560	145.99	<.0001
Error	9602	131583	13.70374		
Corrected Total	9629	185600			

Root MSE	3.70186
Dependent Mean	10.70256
R-Square	0.2910
Adj R-Sq	0.2890
AIC	34868
AICC	34868
BIC	25238
C(p)	43.05900
SBC	25437
ASE (Train)	13.66389
ASE (Test)	13.27962

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	10.393538	0.478041	21.74	<.0001
Category_new_BUSIN	1	-1.317069	0.212557	-6.20	<.0001
Category_new_GAME	1	-0.895050	1.440592	-0.62	0.5344
Category_new_LIFES	1	-1.380533	0.819919	-1.68	0.0923
Category_new_SOCIA	1	0.478580	0.135099	3.54	0.0004
Category_new_TOOLS	1	-1.628090	0.822828	-1.98	0.0479
Size	1	0.059514	0.002913	20.43	<.0001
Size*Category_new_BUSIN	1	-0.027548	0.009032	-3.05	0.0023
Size*Category_new_GAME	1	-0.018944	0.005482	-3.46	0.0006
Size*Category_new_LIFES	1	-0.023179	0.005609	-4.13	<.0001
Size*Category_new_TOOLS	1	-0.054086	0.007242	-7.47	<.0001
Rating	1	0.110335	0.109006	1.01	0.3115
Rating*Category_new_GAME	1	0.809433	0.340932	2.37	0.0176
Rating*Category_new_LIFES	1	0.273371	0.192496	1.42	0.1556
Rating*Category_new_TOOLS	1	0.763536	0.195833	3.90	<.0001
Recency	1	-0.000339	0.000102	-3.32	0.0009
update_0	1	-3.293819	0.311748	-10.57	<.0001
update_1	1	-2.532235	0.130039	-19.47	<.0001
update_2	1	-0.906199	0.149795	-6.05	<.0001
update_3	1	-0.838708	0.169102	-4.96	<.0001
update_6	1	0.430299	0.266547	1.61	0.1065
update_8	1	-0.579749	0.356984	-1.62	0.1044
update_9	1	2.217533	0.488052	4.54	<.0001
update_10	1	2.156127	0.159361	13.53	<.0001
Type_Paid	1	-3.759352	0.290204	-12.95	<.0001
Type_Paid*update_1	1	0.485147	0.319156	1.52	0.1285
Type_Paid*update_10	1	-2.778929	0.478806	-5.80	<.0001
Price	1	0.048443	0.030144	1.61	0.1081

Backward Selection based on Mallows Cp selection Criteria**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	log_Installs
Selection Method	Backward
Select Criterion	C(p)
Stop Criterion	C(p)
Effect Hierarchy Enforced	Single

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	* BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	* 0 1 2 3 4 5
Android_Ver	2	* 0 1
Content_Rating	5	* Adults o Everyone Mature 1 Teen Unrated
Type	2	* Free Paid
update	11	* 0 1 2 3 4 5 6 7 8 9 10

*** Associated Parameters Split**

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

Backward Selection based on Mallows Cp selection Criteria

The GLMSELECT Procedure

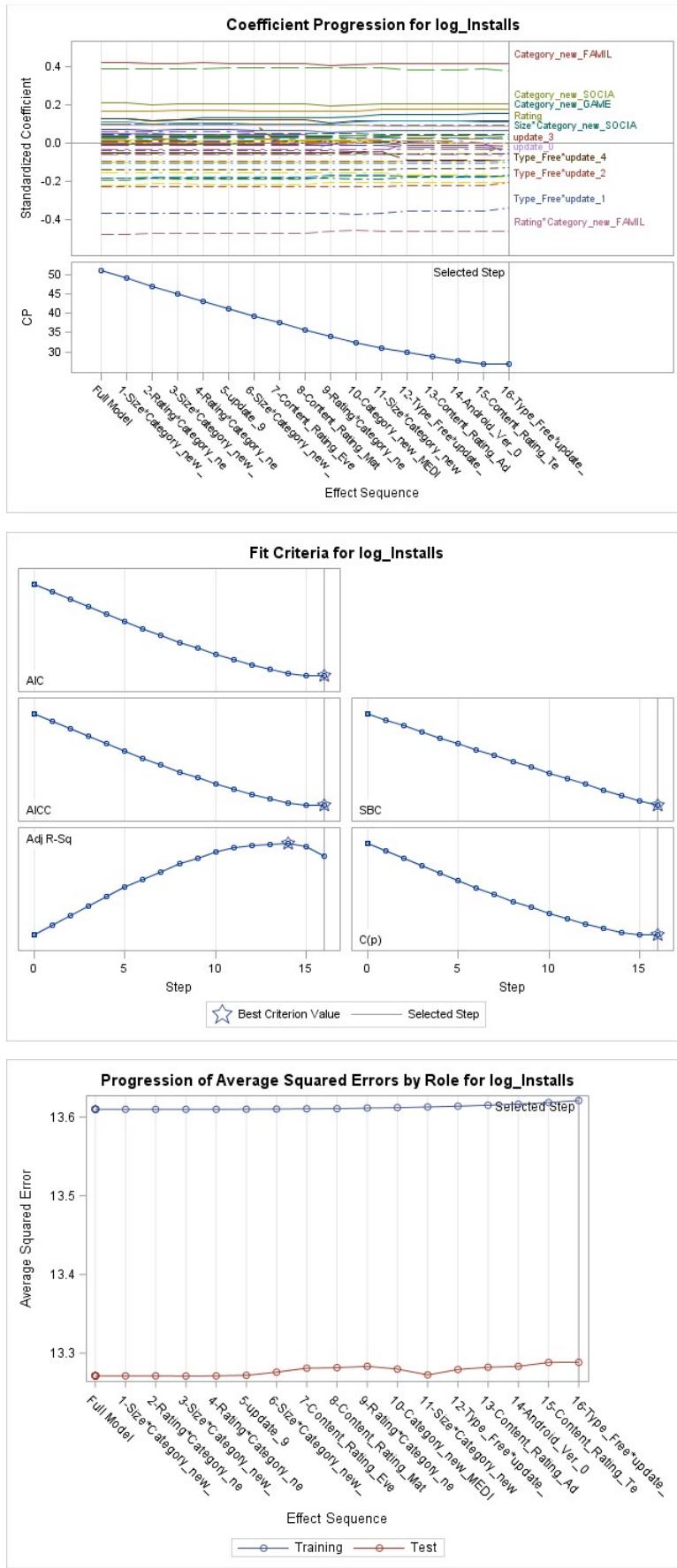
Backward Selection Summary					
Step	Effect Removed	Number Effects In	CP	ASE	Test ASE
0		70	51.0000	13.6098	13.2712
	Type_Paid*update_10	69	51.0000	13.6098	13.2712
	Type_Paid*update_8	68	51.0000	13.6098	13.2712
	Type_Paid*update_7	67	51.0000	13.6098	13.2712
	Type_Paid*update_6	66	51.0000	13.6098	13.2712
	Type_Paid*update_5	65	51.0000	13.6098	13.2712
	Type_Paid*update_4	64	51.0000	13.6098	13.2712
	Type_Paid*update_3	63	51.0000	13.6098	13.2712
	Type_Paid*update_2	62	51.0000	13.6098	13.2712
	Type_Paid*update_1	61	51.0000	13.6098	13.2712
	Type_Paid*update_0	60	51.0000	13.6098	13.2712
	Type_Free*update_10	59	51.0000	13.6098	13.2712
	Type_Free*update_9	58	51.0000	13.6098	13.2712
	Type_Paid	57	51.0000	13.6098	13.2712
	update_10	56	51.0000	13.6098	13.2712
	Android_Ver_1	55	51.0000	13.6098	13.2712
	Content_Rating_Unrated	54	51.0000	13.6098	13.2712
	Rating*Category_new_TRANS	53	51.0000	13.6098	13.2712
	Size*Category_new_TRANS	52	51.0000	13.6098	13.2712
	Category_new_TRANS	51	51.0000	13.6098	13.2712
1	Size*Category_new_MEDIA	50	49.0000	13.6098	13.2712
2	Rating*Category_new_TOOLS	49	47.0032	13.6098	13.2712
3	Size*Category_new_LIFES	48	45.0067	13.6098	13.2710
4	Rating*Category_new_GAME	47	43.0287	13.6099	13.2711
5	update_9	46	41.0770	13.6099	13.2718
6	Size*Category_new_BUSIN	45	39.2896	13.6102	13.2759
7	Content_Rating_Everyone	44	37.5162	13.6106	13.2809
8	Content_Rating_Mature_1	43	35.6535	13.6107	13.2816
9	Rating*Category_new_MEDIA	42	34.1398	13.6114	13.2832
10	Category_new_MEDIA	41	32.5010	13.6120	13.2798
11	Size*Category_new_GAME	40	31.1058	13.6128	13.2725
12	Type_Free*update_5	39	29.8521	13.6139	13.2793
13	Content_Rating_Adults_o	38	28.7017	13.6151	13.2821
14	Android_Ver_0	37	27.6088	13.6164	13.2833
15	Content_Rating_Teen	36	27.0007	13.6183	13.2882
16	Type_Free*update_6	35	26.8960*	13.6210	13.2884

* Optimal Value of Criterion

Note: Effects dropped at step 0 are redundant.

Selection stopped at a local minimum of the C(p) criterion.

Stop Details			
Candidate For	Effect	Candidate C(p)	Compare C(p)
Removal	Price	28.1385	> 26.8960



Backward Selection based on Mallows Cp selection Criteria**The GLMSELECT Procedure
Selected Model****The selected model is the model at the last step (Step 16).**

Effects:	Intercept Category_new_BUSIN Category_new_FAMILY Category_new_GAME Category_new_LIFES Category_new_SOCIA Category_new_TOOLS Size Size*Category_new_FAMILY Size*Category_new_SOCIA Size*Category_new_TOOLS Rating*Rating*Category_new_BUSIN Rating*Category_new_FAMILY Rating*Category_new_LIFES Rating*Category_new_SOCIA Recency update_0 update_1 update_2 update_3 update_4 update_5 update_6 update_7 update_8 Type_Free Type_Free*update_0 Type_Free*update_1 Type_Free*update_2 Type_Free*update_3 Type_Free*update_4 Type_Free*update_7 Type_Free*update_8 Price
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	34	54430	1600.87822	117.10	<.0001
Error	9595	131171	13.67072		
Corrected Total	9629	185600			

Root MSE	3.69739
Dependent Mean	10.70256
R-Square	0.2933
Adj R-Sq	0.2908
AIC	34852
AICC	34852
BIC	25222
C(p)	26.89602
SBC	25471
ASE (Train)	13.62104
ASE (Test)	13.28844

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	3.522744	0.664912	5.30	<.0001
Category_new_BUSIN	1	1.108701	1.113287	1.00	0.3193
Category_new_FAMILY	1	4.704277	0.910751	5.17	<.0001
Category_new_GAME	1	2.267163	0.184775	12.27	<.0001
Category_new_LIFES	1	1.283156	0.849965	1.51	0.1312
Category_new_SOCIA	1	2.851648	1.172367	2.43	0.0150
Category_new_TOOLS	1	1.216371	0.166093	7.32	<.0001
Size	1	0.037454	0.002915	12.85	<.0001
Size*Category_new_FAMILY	1	0.025968	0.004534	5.73	<.0001
Size*Category_new_SOCIA	1	0.029804	0.008515	3.50	0.0005
Size*Category_new_TOOLS	1	-0.032744	0.007216	-4.54	<.0001
Rating	1	0.847065	0.123332	6.87	<.0001
Rating*Category_new_BUSIN	1	-0.687085	0.266982	-2.57	0.0101
Rating*Category_new_FAMILY	1	-1.234517	0.215445	-5.73	<.0001
Rating*Category_new_LIFES	1	-0.456753	0.200572	-2.28	0.0228
Rating*Category_new_SOCIA	1	-0.683159	0.277997	-2.46	0.0140
Recency	1	-0.000371	0.000102	-3.63	0.0003
update_0	1	-2.281113	1.170656	-1.95	0.0514
update_1	1	-1.647856	0.395937	-4.16	<.0001
update_2	1	-0.418003	0.510754	-0.82	0.4131
update_3	1	-0.301936	0.629419	-0.48	0.6314
update_4	1	0.393165	0.781926	0.50	0.6151
update_5	1	-2.069874	0.221526	-9.34	<.0001
update_6	1	-1.585965	0.262716	-6.04	<.0001
update_7	1	1.187815	1.284622	0.92	0.3552
update_8	1	0.851709	1.442315	0.59	0.5549
Type_Free	1	6.299691	0.386267	16.31	<.0001
Type_Free*update_0	1	-3.190524	1.210798	-2.64	0.0084
Type_Free*update_1	1	-3.028055	0.407600	-7.43	<.0001
Type_Free*update_2	1	-2.636033	0.526548	-5.01	<.0001

Type_Free*update_3	1	-2.663059	0.647409	-4.11	<.0001
Type_Free*update_4	1	-2.431854	0.802438	-3.03	0.0024
Type_Free*update_7	1	-3.679933	1.324279	-2.78	0.0055
Type_Free*update_8	1	-3.632686	1.485373	-2.45	0.0145
Price	1	0.054455	0.030229	1.80	0.0717

Stepwise Selection based on Mallows Cp selection Criteria
The GLMSELECT Procedure

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	log_Installs
Selection Method	Stepwise
Select Criterion	C(p)
Stop Criterion	C(p)
Effect Hierarchy Enforced	Single

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	* BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	* 0 1 2 3 4 5
Android_Ver	2	* 0 1
Content_Rating	5	* Adults o Everyone Mature 1 Teen Unrated
Type	2	* Free Paid
update	11	* 0 1 2 3 4 5 6 7 8 9 10

*** Associated Parameters Split**

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

Stepwise Selection based on Mallows Cp selection Criteria

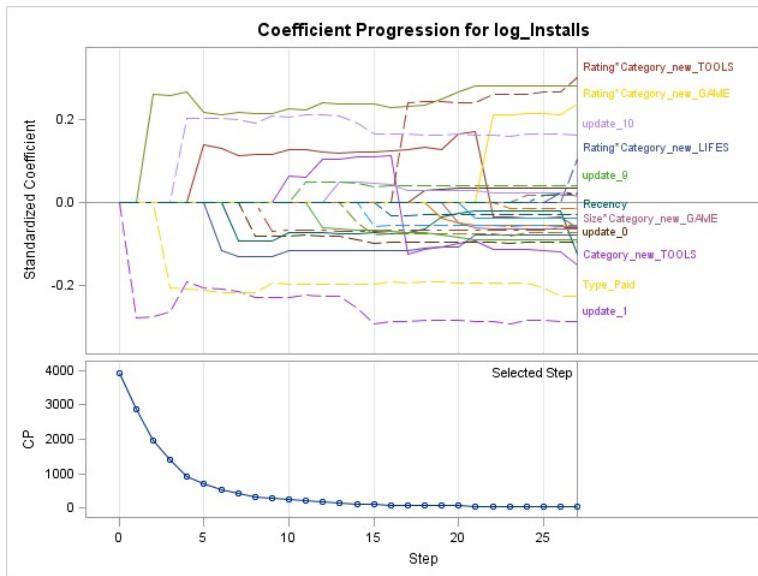
The GLMSELECT Procedure

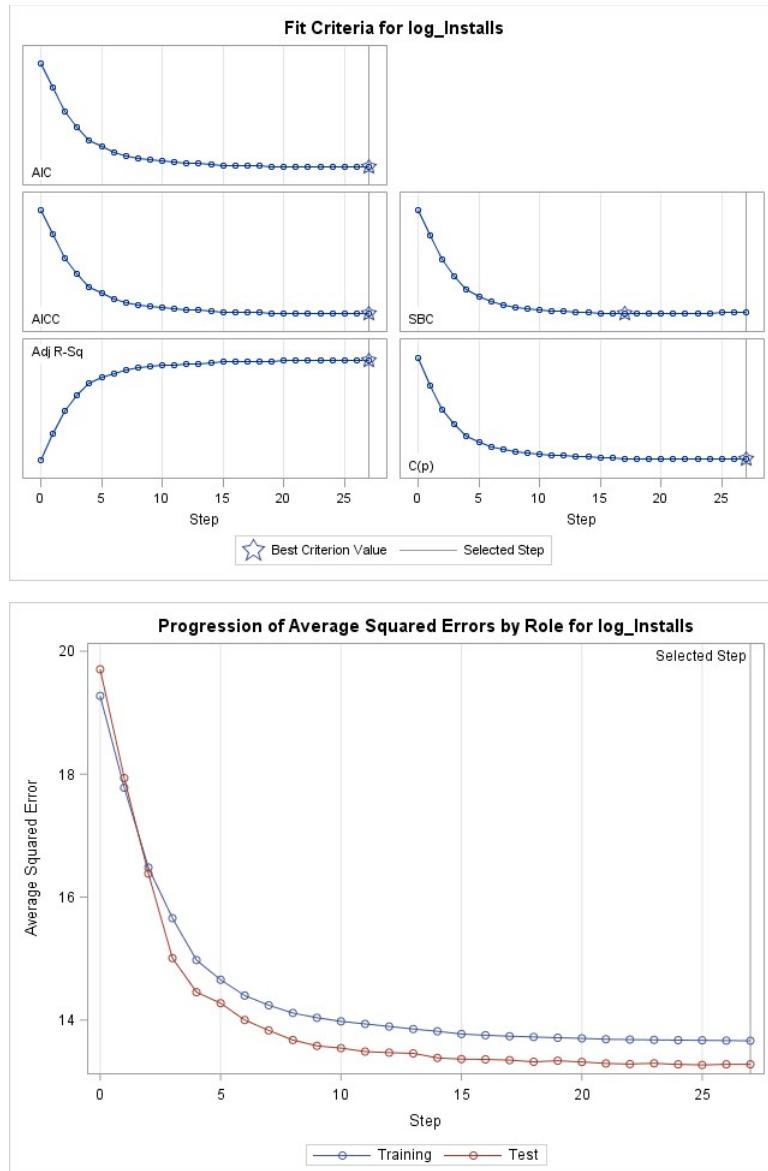
Stepwise Selection Summary						
Step	Effect Entered	Effect Removed	Number Effects In	CP	ASE	Test ASE
0	Intercept		1	3937.0242	19.2732	19.7047
1	update_1		2	2886.9088	17.7783	17.9345
2	Size		3	1976.4452	16.4819	16.3815
3	Type_Paid		4	1397.5262	15.6565	15.0079
4	update_10		5	919.8610	14.9750	14.4536
5	Category_new_GAME		6	696.8295	14.6553	14.2747
6	Category_new_BUSIN		7	518.3122	14.3988	14.0016
7	Category_new_LIFES		8	409.1980	14.2409	13.8311
8	update_0		9	321.9916	14.1142	13.6746
9	Type_Paid*update_10		10	270.3641	14.0380	13.5795
10	Category_new_TOOLS		11	231.2302	13.9796	13.5428
11	update_9		12	203.2544	13.9370	13.4882
12	Size*Category_new_TOOLS		13	175.8396	13.8952	13.4699
13	Rating		14	148.6037	13.8536	13.4571
14	update_2		15	124.7416	13.8169	13.3841
15	update_3		16	95.4045	13.7724	13.3655
16	Recency		17	83.9939	13.7533	13.3609
17	Rating*Category_new_TOOLS		18	74.9970	13.7377	13.3470
18	Category_new_SOCIA		19	68.3944	13.7255	13.3210
19	Size*Category_new_LIFES		20	61.5957	13.7130	13.3384
20	Size*Category_new_GAME		21	55.6541	13.7017	13.3181
21	Size*Category_new_BUSIN		22	48.5518	13.6887	13.2931
22	Rating*Category_new_GAME		23	45.9024	13.6821	13.2840
23	update_8		24	44.2590	13.6770	13.2971
24	update_6		25	43.6396	13.6732	13.2785
25	Price		26	43.3902	13.6700	13.2685
26	Type_Paid*update_1		27	43.0789	13.6668	13.2786
27	Rating*Category_new_LIFES		28	43.0590*	13.6639	13.2796

* Optimal Value of Criterion

Selection stopped at a local minimum of the C(p) criterion.

Stop Details			
Candidate For	Effect	Candidate C(p)	Compare C(p)
Entry	Content_Rating_Everyone	43.2800	> 43.0590
Removal	Rating*Category_new_LIFES	43.0789	> 43.0590





Stepwise Selection based on Mallows Cp selection Criteria**The GLMSELECT Procedure
Selected Model****The selected model is the model at the last step (Step 27).**

Effects:	Intercept Category_new_BUSIN Category_new_GAME Category_new_LIFES Category_new_SOCIA Category_new_TOOLS Size Size*Category_new_BUSIN Size*Category_new_GAME Size*Category_new_LIFES Size*Category_new_TOOLS Rating Rating*Category_new_GAME Rating*Category_new_LIFES Rating*Category_new_TOOLS Recency update_0 update_1 update_2 update_3 update_6 update_8 update_9 update_10 Type_Paid Type_Paid*update_1 Type_Paid*update_10 Price
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	27	54017	2000.63560	145.99	<.0001
Error	9602	131583	13.70374		
Corrected Total	9629	185600			

Root MSE	3.70186
Dependent Mean	10.70256
R-Square	0.2910
Adj R-Sq	0.2890
AIC	34868
AICC	34868
BIC	25238
C(p)	43.05900
SBC	25437
ASE (Train)	13.66389
ASE (Test)	13.27962

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	10.393538	0.478041	21.74	<.0001
Category_new_BUSIN	1	-1.317069	0.212557	-6.20	<.0001
Category_new_GAME	1	-0.895050	1.440592	-0.62	0.5344
Category_new_LIFES	1	-1.380533	0.819919	-1.68	0.0923
Category_new_SOCIA	1	0.478580	0.135099	3.54	0.0004
Category_new_TOOLS	1	-1.628090	0.822828	-1.98	0.0479
Size	1	0.059514	0.002913	20.43	<.0001
Size*Category_new_BUSIN	1	-0.027548	0.009032	-3.05	0.0023
Size*Category_new_GAME	1	-0.018944	0.005482	-3.46	0.0006
Size*Category_new_LIFES	1	-0.023179	0.005609	-4.13	<.0001
Size*Category_new_TOOLS	1	-0.054086	0.007242	-7.47	<.0001
Rating	1	0.110335	0.109006	1.01	0.3115
Rating*Category_new_GAME	1	0.809433	0.340932	2.37	0.0176
Rating*Category_new_LIFES	1	0.273371	0.192496	1.42	0.1556
Rating*Category_new_TOOLS	1	0.763536	0.195833	3.90	<.0001
Recency	1	-0.000339	0.000102	-3.32	0.0009
update_0	1	-3.293819	0.311748	-10.57	<.0001
update_1	1	-2.532235	0.130039	-19.47	<.0001
update_2	1	-0.906199	0.149795	-6.05	<.0001
update_3	1	-0.838708	0.169102	-4.96	<.0001
update_6	1	0.430299	0.266547	1.61	0.1065
update_8	1	-0.579749	0.356984	-1.62	0.1044
update_9	1	2.217533	0.488052	4.54	<.0001
update_10	1	2.156127	0.159361	13.53	<.0001
Type_Paid	1	-3.759352	0.290204	-12.95	<.0001
Type_Paid*update_1	1	0.485147	0.319156	1.52	0.1285
Type_Paid*update_10	1	-2.778929	0.478806	-5.80	<.0001
Price	1	0.048443	0.030144	1.61	0.1081

forward selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	log_Installs
Selection Method	Forward
Select Criterion	Cross Validation
Stop Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	Single
Random Number Seed	2

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	* BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	* 0 1 2 3 4 5
Android_Ver	2	* 0 1
Content_Rating	5	* Adults o Everyone Mature 1 Teen Unrated
Type	2	* Free Paid
update	11	* 0 1 2 3 4 5 6 7 8 9 10

* Associated Parameters Split

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

forward selection with cross validation as criteria with 10-folds

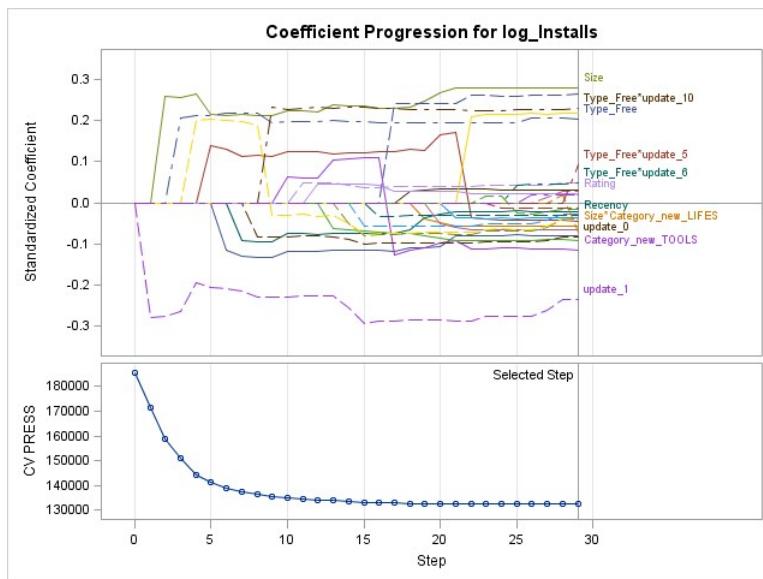
The GLMSELECT Procedure

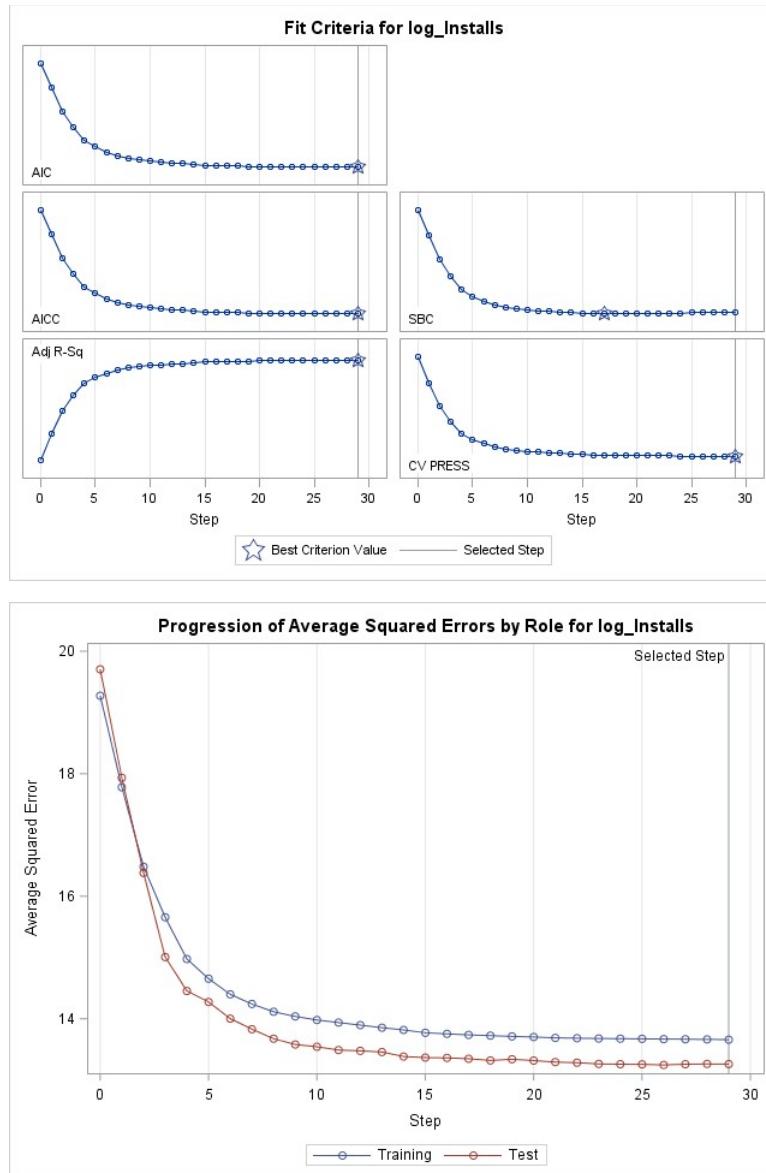
Forward Selection Summary					
Step	Effect Entered	Number Effects In	ASE	Test ASE	CV PRESS
0	Intercept	1	19.2732	19.7047	185622.879
1	update_1	2	17.7783	17.9345	171302.862
2	Size	3	16.4819	16.3815	158839.279
3	Type_Free	4	15.6565	15.0079	150897.320
4	update_10	5	14.9750	14.4536	144344.303
5	Category_new_GAME	6	14.6553	14.2747	141296.859
6	Category_new_BUSIN	7	14.3988	14.0016	138830.406
7	Category_new_LIFES	8	14.2409	13.8311	137339.797
8	update_0	9	14.1142	13.6746	136150.221
9	Type_Free*update_10	10	14.0380	13.5795	135439.785
10	Category_new_TOOLS	11	13.9796	13.5428	134917.540
11	update_9	12	13.9370	13.4882	134535.227
12	Rating	13	13.8970	13.4756	134165.705
13	Size*Category_new_TOOLS	14	13.8536	13.4571	133784.352
14	update_2	15	13.8169	13.3841	133442.380
15	update_3	16	13.7724	13.3655	133029.066
16	Recency	17	13.7533	13.3609	132862.518
17	Rating*Category_new_TOOLS	18	13.7377	13.3470	132738.999
18	Category_new_SOCIA	19	13.7255	13.3210	132644.592
19	Size*Category_new_LIFES	20	13.7130	13.3384	132571.224
20	Size*Category_new_GAME	21	13.7017	13.3181	132478.864
21	Size*Category_new_BUSIN	22	13.6887	13.2931	132387.879
22	Rating*Category_new_GAME	23	13.6821	13.2840	132367.728
23	update_6	24	13.6772	13.2644	132347.301
24	Content_Rating_Everyone	25	13.6744	13.2591	132336.284
25	Type_Free*update_6	26	13.6726	13.2551	132328.523
26	Price	27	13.6692	13.2451	132321.050
27	update_4	28	13.6669	13.2581	132316.684
28	update_5	29	13.6642	13.2626	132311.602
29	Type_Free*update_5	30	13.6589	13.2603	132306.087*

* Optimal Value of Criterion

Selection stopped at a local minimum of the cross validation PRESS.

Stop Details			
Candidate For	Effect	Candidate CV PRESS	Compare CV PRESS
Entry	Rating*Category_new_LIFES	132307.390	> 132306.087





forward selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure
Selected Model****The selected model is the model at the last step (Step 29).**

Effects:	Intercept Category_new_BUSIN Category_new_GAME Category_new_LIFES Category_new_SOCIA Category_new_TOOLS Size Size*Category_new_BUSIN Size*Category_new_GAME Size*Category_new_LIFES Size*Category_new_TOOLS Rating Rating*Category_new_GAME Rating*Category_new_TOOLS Content_Rating_Everyone Recency update_0 update_1 update_2 update_3 update_4 update_5 update_6 update_9 update_10 Type_Free Type_Free*update_5 Type_Free*update_6 Type_Free*update_10 Price
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	29	54066	1864.32951	136.07	<.0001
Error	9600	131535	13.70155		
Corrected Total	9629	185600			

Root MSE	3.70156
Dependent Mean	10.70256
R-Square	0.2913
Adj R-Sq	0.2892
AIC	34869
AICC	34869
SBC	25452
ASE (Train)	13.65887
ASE (Test)	13.26027
CV PRESS	132306

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	6.363158	0.505809	12.58	<.0001
Category_new_BUSIN	1	-1.301009	0.212803	-6.11	<.0001
Category_new_GAME	1	-0.646904	1.417778	-0.46	0.6482
Category_new_LIFES	1	-0.232770	0.159789	-1.46	0.1452
Category_new_SOCIA	1	0.433159	0.138519	3.13	0.0018
Category_new_TOOLS	1	-1.234036	0.782820	-1.58	0.1150
Size	1	0.059243	0.002918	20.30	<.0001
Size*Category_new_BUSIN	1	-0.027226	0.009034	-3.01	0.0026
Size*Category_new_GAME	1	-0.019135	0.005487	-3.49	0.0005
Size*Category_new_LIFES	1	-0.022795	0.005607	-4.07	<.0001
Size*Category_new_TOOLS	1	-0.054216	0.007245	-7.48	<.0001
Rating	1	0.195553	0.090072	2.17	0.0299
Rating*Category_new_GAME	1	0.744160	0.335235	2.22	0.0265
Rating*Category_new_TOOLS	1	0.672753	0.186033	3.62	0.0003
Content_Rating_Everyone	1	-0.159547	0.115056	-1.39	0.1656
Recency	1	-0.000340	0.000102	-3.33	0.0009
update_0	1	-2.873508	0.367662	-7.82	<.0001
update_1	1	-2.082312	0.233534	-8.92	<.0001
update_2	1	-0.488610	0.245849	-1.99	0.0469
update_3	1	-0.421374	0.257985	-1.63	0.1024
update_4	1	0.504943	0.274516	1.84	0.0659
update_5	1	-1.660233	1.105117	-1.50	0.1330
update_6	1	-0.475442	1.104261	-0.43	0.6668
update_9	1	2.660297	0.525409	5.06	<.0001
update_10	1	-0.553095	0.474370	-1.17	0.2437
Type_Free	1	3.377827	0.201169	16.79	<.0001
Type_Free*update_5	1	2.137552	1.101050	1.94	0.0522
Type_Free*update_6	1	1.400607	1.110593	1.26	0.2073
Type_Free*update_10	1	3.150784	0.435246	7.24	<.0001
Price	1	0.049275	0.030150	1.63	0.1022

backward selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	log_Installs
Selection Method	Backward
Select Criterion	Cross Validation
Stop Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	Single
Random Number Seed	2

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	* BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	* 0 1 2 3 4 5
Android_Ver	2	* 0 1
Content_Rating	5	* Adults o Everyone Mature 1 Teen Unrated
Type	2	* Free Paid
update	11	* 0 1 2 3 4 5 6 7 8 9 10

* Associated Parameters Split

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

backward selection with cross validation as criteria with 10-folds
The GLMSELECT Procedure

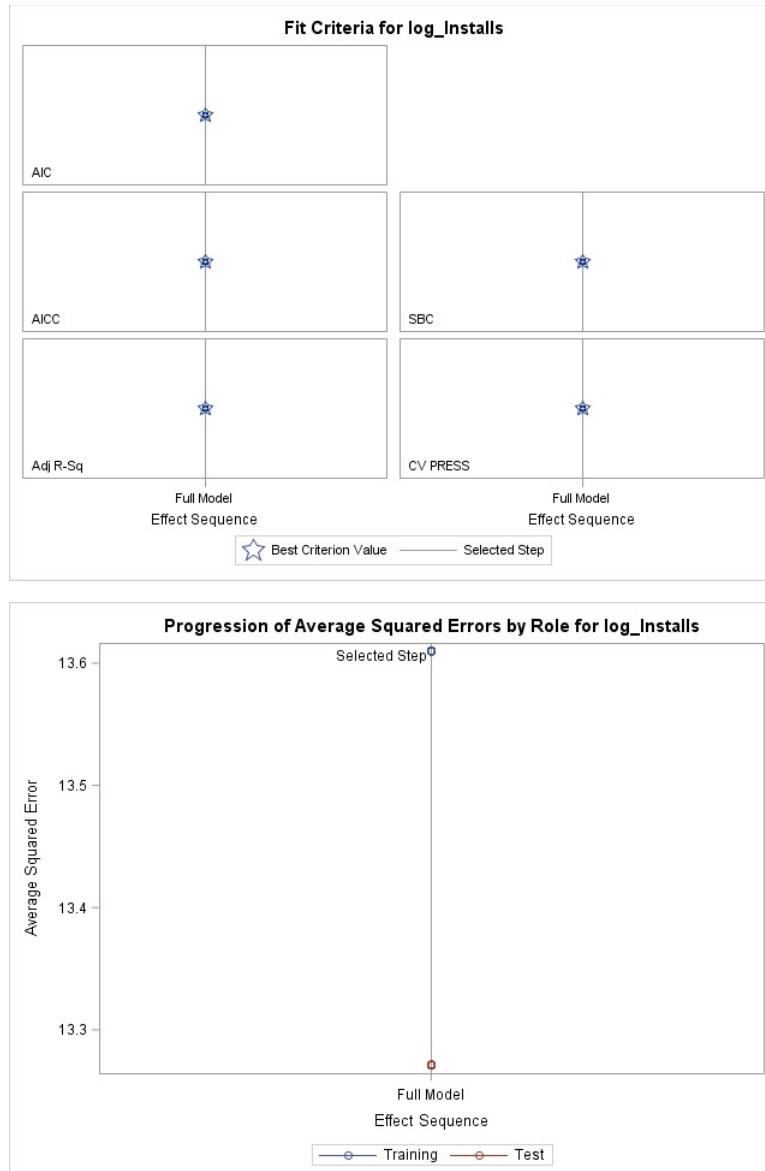
Backward Selection Summary					
Step	Effect Removed	Number Effects In	ASE	Test ASE	CV PRESS
0		70	13.6098	13.2712	0*
	Type_Paid*update_10	69	13.6098	13.2712	0*
	Type_Paid*update_8	68	13.6098	13.2712	0*
	Type_Paid*update_7	67	13.6098	13.2712	0*
	Type_Paid*update_6	66	13.6098	13.2712	0*
	Type_Paid*update_5	65	13.6098	13.2712	0*
	Type_Paid*update_4	64	13.6098	13.2712	0*
	Type_Paid*update_3	63	13.6098	13.2712	0*
	Type_Paid*update_2	62	13.6098	13.2712	0*
	Type_Paid*update_1	61	13.6098	13.2712	0*
	Type_Paid*update_0	60	13.6098	13.2712	0*
	Type_Free*update_10	59	13.6098	13.2712	0*
	Type_Free*update_9	58	13.6098	13.2712	0*
	Type_Paid	57	13.6098	13.2712	0*
	update_10	56	13.6098	13.2712	0*
	Android_Ver_1	55	13.6098	13.2712	0*
	Content_Rating_Unrated	54	13.6098	13.2712	0*
	Rating*Category_new_TRANS	53	13.6098	13.2712	0*
	Size*Category_new_TRANS	52	13.6098	13.2712	0*
	Category_new_TRANS	51	13.6098	13.2712	0*

Note: Effects dropped at step 0 are redundant.

Selection stopped at a local minimum of the cross validation PRESS.

Stop Details			
Candidate For	Effect	Candidate CV PRESS	Compare CV PRESS
Removal	Size*Category_new_GAME	132325.058	> 0





backward selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure
Selected Model****The selected model is the model at the last step (Step 0).**

Effects:	Intercept Category_new_BUSIN Category_new_FAMILY Category_new_GAME Category_new_LIFES Category_new_MEDIA Category_new_SOCIA Category_new_TOOLS Size Size*Category_new_BUSIN Size*Category_new_FAMILY Size*Category_new_GAME Size*Category_new_LIFES Size*Category_new_MEDIA Size*Category_new_SOCIA Size*Category_new_TOOLS Rating Rating*Category_new_BUSIN Rating*Category_new_FAMILY Rating*Category_new_GAME Rating*Category_new_LIFES Rating*Category_new_MEDIA Rating*Category_new_SOCIA Rating*Category_new_TOOLS Content_Rating_Adults_0 Content_Rating_Everyone Content_Rating_Mature_1 Content_Rating_Teen Recency Android_Ver_0 update_0 update_1 update_2 update_3 update_4 update_5 update_6 update_7 update_8 update_9 Type_Free Type_Free*update_0 Type_Free*update_1 Type_Free*update_2 Type_Free*update_3 Type_Free*update_4 Type_Free*update_5 Type_Free*update_6 Type_Free*update_7 Type_Free*update_8 Price
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	50	54538	1090.75790	79.72	<.0001
Error	9579	131063	13.68228		
Corrected Total	9629	185600			

Root MSE	3.69896
Dependent Mean	10.70256
R-Square	0.2938
Adj R-Sq	0.2902
AIC	34876
AICC	34876
SBC	25610
ASE (Train)	13.60982
ASE (Test)	13.27122
CV PRESS	0

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	1.819013	3.150839	0.58	0.5637
Category_new_BUSIN	1	1.211796	1.949916	0.62	0.5343
Category_new_FAMILY	1	4.761509	1.836494	2.59	0.0095
Category_new_GAME	1	1.841170	2.163329	0.85	0.3947
Category_new_LIFES	1	1.412302	1.809105	0.78	0.4350
Category_new_MEDIA	1	0.811278	2.073763	0.39	0.6957
Category_new_SOCIA	1	2.900341	1.983584	1.46	0.1437
Category_new_TOOLS	1	1.197055	1.810116	0.66	0.5084
Size	1	0.035937	0.011509	3.12	0.0018
Size*Category_new_BUSIN	1	-0.004007	0.014320	-0.28	0.7796
Size*Category_new_FAMILY	1	0.027238	0.012023	2.27	0.0235
Size*Category_new_GAME	1	0.004213	0.012421	0.34	0.7345
Size*Category_new_LIFES	1	0.000534	0.012453	0.04	0.9658
Size*Category_new_MEDIA	1	0.000011828	0.015788	0.00	0.9994
Size*Category_new_SOCIA	1	0.030769	0.014039	2.19	0.0284
Size*Category_new_TOOLS	1	-0.031079	0.013261	-2.34	0.0191
Rating	1	0.894269	0.401866	2.23	0.0261
Rating*Category_new_BUSIN	1	-0.717299	0.466897	-1.54	0.1245
Rating*Category_new_FAMILY	1	-1.279760	0.439150	-2.91	0.0036
Rating*Category_new_GAME	1	0.032073	0.515645	0.06	0.9504
Rating*Category_new_LIFES	1	-0.511822	0.431998	-1.18	0.2361
Rating*Category_new_MEDIA	1	-0.230973	0.493010	-0.47	0.6394
Rating*Category_new_SOCIA	1	-0.731472	0.473514	-1.54	0.1224
Rating*Category_new_TOOLS	1	-0.024360	0.433363	-0.06	0.9552
Content_Rating_Adults_0	1	3.256295	3.385289	0.96	0.3361
Content_Rating_Everyone	1	1.247691	2.622574	0.48	0.6343
Content_Rating_Mature_1	1	1.323449	2.630261	0.50	0.6149
Content_Rating_Teen	1	1.403043	2.625288	0.53	0.5931
Recency	1	-0.000367	0.000103	-3.56	0.0004
Android_Ver_0	1	0.140712	0.154512	0.91	0.3625

update_0	1	-2.013544	1.184109	-1.70	0.0891
update_1	1	-1.386372	0.432793	-3.20	0.0014
update_2	1	-0.164384	0.540170	-0.30	0.7609
update_3	1	-0.047964	0.654231	-0.07	0.9416
update_4	1	0.660597	0.802138	0.82	0.4102
update_5	1	-1.122912	1.140845	-0.98	0.3250
update_6	1	0.044164	1.140034	0.04	0.9691
update_7	1	1.442209	1.298033	1.11	0.2666
update_8	1	1.120670	1.453690	0.77	0.4408
update_9	1	0.106399	0.487540	0.22	0.8272
Type_Free	1	6.544595	0.428141	15.29	<.0001
Type_Free*update_0	1	-3.460452	1.226051	-2.82	0.0048
Type_Free*update_1	1	-3.295683	0.449857	-7.33	<.0001
Type_Free*update_2	1	-2.890136	0.560266	-5.16	<.0001
Type_Free*update_3	1	-2.925546	0.675883	-4.33	<.0001
Type_Free*update_4	1	-2.703915	0.825324	-3.28	0.0011
Type_Free*update_5	1	-0.966604	1.163748	-0.83	0.4062
Type_Free*update_6	1	-1.690110	1.172249	-1.44	0.1494
Type_Free*update_7	1	-3.935646	1.339826	-2.94	0.0033
Type_Free*update_8	1	-3.910666	1.498635	-2.61	0.0091
Price	1	0.050885	0.030331	1.68	0.0934

stepwise selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	log_Installs
Selection Method	Stepwise
Select Criterion	Cross Validation
Stop Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	Single
Random Number Seed	2

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	* BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	* 0 1 2 3 4 5
Android_Ver	2	* 0 1
Content_Rating	5	* Adults o Everyone Mature 1 Teen Unrated
Type	2	* Free Paid
update	11	* 0 1 2 3 4 5 6 7 8 9 10

* Associated Parameters Split

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

stepwise selection with cross validation as criteria with 10-folds

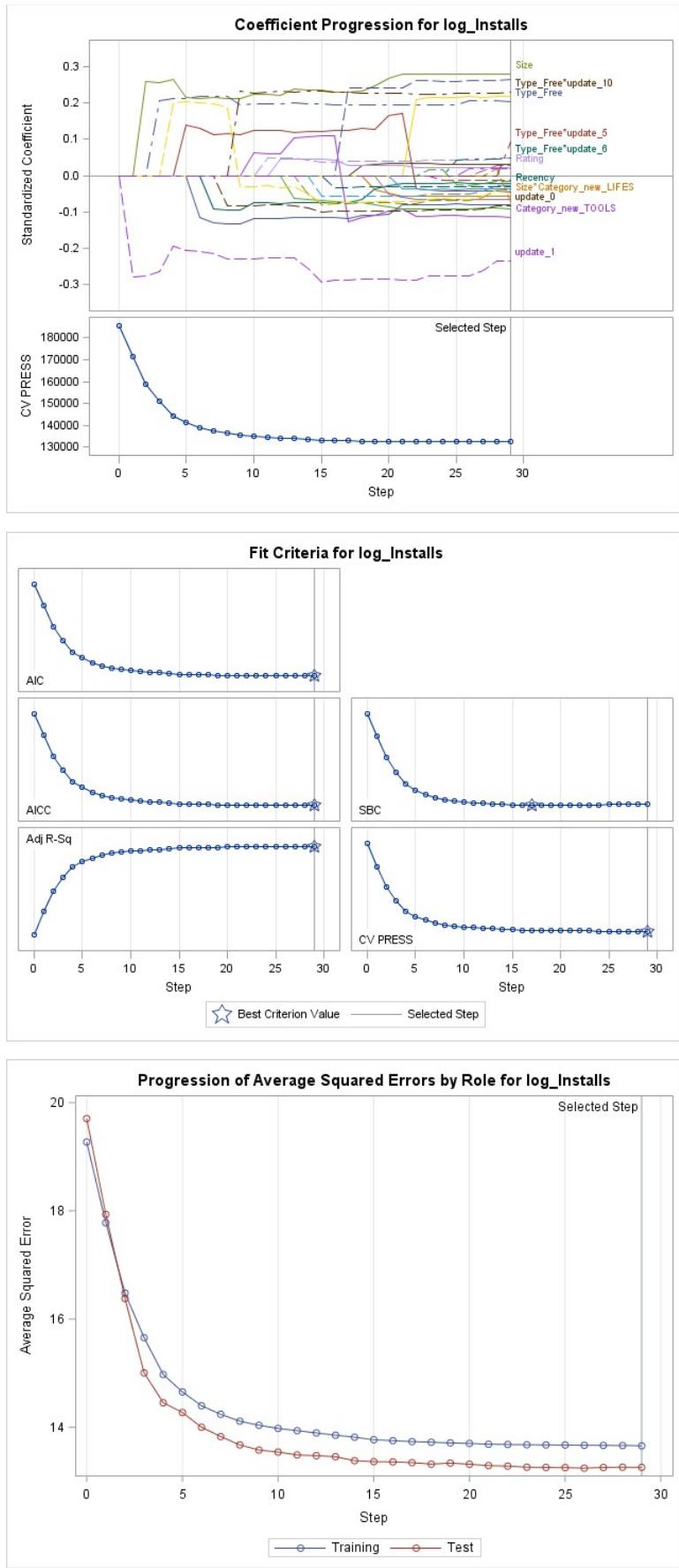
The GLMSELECT Procedure

Stepwise Selection Summary						
Step	Effect Entered	Effect Removed	Number Effects In	ASE	Test ASE	CV PRESS
0	Intercept		1	19.2732	19.7047	185622.879
1	update_1		2	17.7783	17.9345	171302.862
2	Size		3	16.4819	16.3815	158839.279
3	Type_Free		4	15.6565	15.0079	150897.320
4	update_10		5	14.9750	14.4536	144344.303
5	Category_new_GAME		6	14.6553	14.2747	141296.859
6	Category_new_BUSIN		7	14.3988	14.0016	138830.406
7	Category_new_LIFES		8	14.2409	13.8311	137339.797
8	update_0		9	14.1142	13.6746	136150.221
9	Type_Free*update_10		10	14.0380	13.5795	135439.785
10	Category_new_TOOLS		11	13.9796	13.5428	134917.540
11	update_9		12	13.9370	13.4882	134535.227
12	Rating		13	13.8970	13.4756	134165.705
13	Size*Category_new_TOOLS		14	13.8536	13.4571	133784.352
14	update_2		15	13.8169	13.3841	133442.380
15	update_3		16	13.7724	13.3655	133029.066
16	Recency		17	13.7533	13.3609	132862.518
17	Rating*Category_new_TOOLS		18	13.7377	13.3470	132738.999
18	Category_new_SOCIA		19	13.7255	13.3210	132644.592
19	Size*Category_new_LIFES		20	13.7130	13.3384	132571.224
20	Size*Category_new_GAME		21	13.7017	13.3181	132478.864
21	Size*Category_new_BUSIN		22	13.6887	13.2931	132387.879
22	Rating*Category_new_GAME		23	13.6821	13.2840	132367.728
23	update_6		24	13.6772	13.2644	132347.301
24	Content_Rating_Everyone		25	13.6744	13.2591	132336.284
25	Type_Free*update_6		26	13.6726	13.2551	132328.523
26	Price		27	13.6692	13.2451	132321.050
27	update_4		28	13.6669	13.2581	132316.684
28	update_5		29	13.6642	13.2626	132311.602
29	Type_Free*update_5		30	13.6589	13.2603	132306.087*

* Optimal Value of Criterion

Selection stopped at a local minimum of the cross validation PRESS.

Stop Details				
Candidate For	Effect	Candidate CV PRESS	Compare CV PRESS	
Entry	Rating*Category_new_LIFES	132307.390	>	132306.087
Removal	Type_Free*update_5	132311.602	>	132306.087



stepwise selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure
Selected Model****The selected model is the model at the last step (Step 29).**

Effects:	Intercept Category_new_BUSIN Category_new_GAME Category_new_LIFES Category_new_SOCIA Category_new_TOOLS Size Size*Category_new_BUSIN Size*Category_new_GAME Size*Category_new_LIFES Size*Category_new_TOOLS Rating Rating*Category_new_GAME Rating*Category_new_TOOLS Content_Rating_Everyone Recency update_0 update_1 update_2 update_3 update_4 update_5 update_6 update_9 update_10 Type_Free Type_Free*update_5 Type_Free*update_6 Type_Free*update_10 Price
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	29	54066	1864.32951	136.07	<.0001
Error	9600	131535	13.70155		
Corrected Total	9629	185600			

Root MSE	3.70156
Dependent Mean	10.70256
R-Square	0.2913
Adj R-Sq	0.2892
AIC	34869
AICC	34869
SBC	25452
ASE (Train)	13.65887
ASE (Test)	13.26027
CV PRESS	132306

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	6.363158	0.505809	12.58	<.0001
Category_new_BUSIN	1	-1.301009	0.212803	-6.11	<.0001
Category_new_GAME	1	-0.646904	1.417778	-0.46	0.6482
Category_new_LIFES	1	-0.232770	0.159789	-1.46	0.1452
Category_new_SOCIA	1	0.433159	0.138519	3.13	0.0018
Category_new_TOOLS	1	-1.234036	0.782820	-1.58	0.1150
Size	1	0.059243	0.002918	20.30	<.0001
Size*Category_new_BUSIN	1	-0.027226	0.009034	-3.01	0.0026
Size*Category_new_GAME	1	-0.019135	0.005487	-3.49	0.0005
Size*Category_new_LIFES	1	-0.022795	0.005607	-4.07	<.0001
Size*Category_new_TOOLS	1	-0.054216	0.007245	-7.48	<.0001
Rating	1	0.195553	0.090072	2.17	0.0299
Rating*Category_new_GAME	1	0.744160	0.335235	2.22	0.0265
Rating*Category_new_TOOLS	1	0.672753	0.186033	3.62	0.0003
Content_Rating_Everyone	1	-0.159547	0.115056	-1.39	0.1656
Recency	1	-0.000340	0.000102	-3.33	0.0009
update_0	1	-2.873508	0.367662	-7.82	<.0001
update_1	1	-2.082312	0.233534	-8.92	<.0001
update_2	1	-0.488610	0.245849	-1.99	0.0469
update_3	1	-0.421374	0.257985	-1.63	0.1024
update_4	1	0.504943	0.274516	1.84	0.0659
update_5	1	-1.660233	1.105117	-1.50	0.1330
update_6	1	-0.475442	1.104261	-0.43	0.6668
update_9	1	2.660297	0.525409	5.06	<.0001
update_10	1	-0.553095	0.474370	-1.17	0.2437
Type_Free	1	3.377827	0.201169	16.79	<.0001
Type_Free*update_5	1	2.137552	1.101050	1.94	0.0522
Type_Free*update_6	1	1.400607	1.110593	1.26	0.2073
Type_Free*update_10	1	3.150784	0.435246	7.24	<.0001
Price	1	0.049275	0.030150	1.63	0.1022

LASSO regression with Cross_Validation as criteria**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	log_installs
Selection Method	LASSO
Stop Criterion	None
Choose Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	None
Random Number Seed	2

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	0 1 2 3 4 5
Android_Ver	2	0 1
Content_Rating	5	Adults o Everyone Mature 1 Teen Unrated
Type	2	Free Paid
update	11	0 1 2 3 4 5 6 7 8 9 10

Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

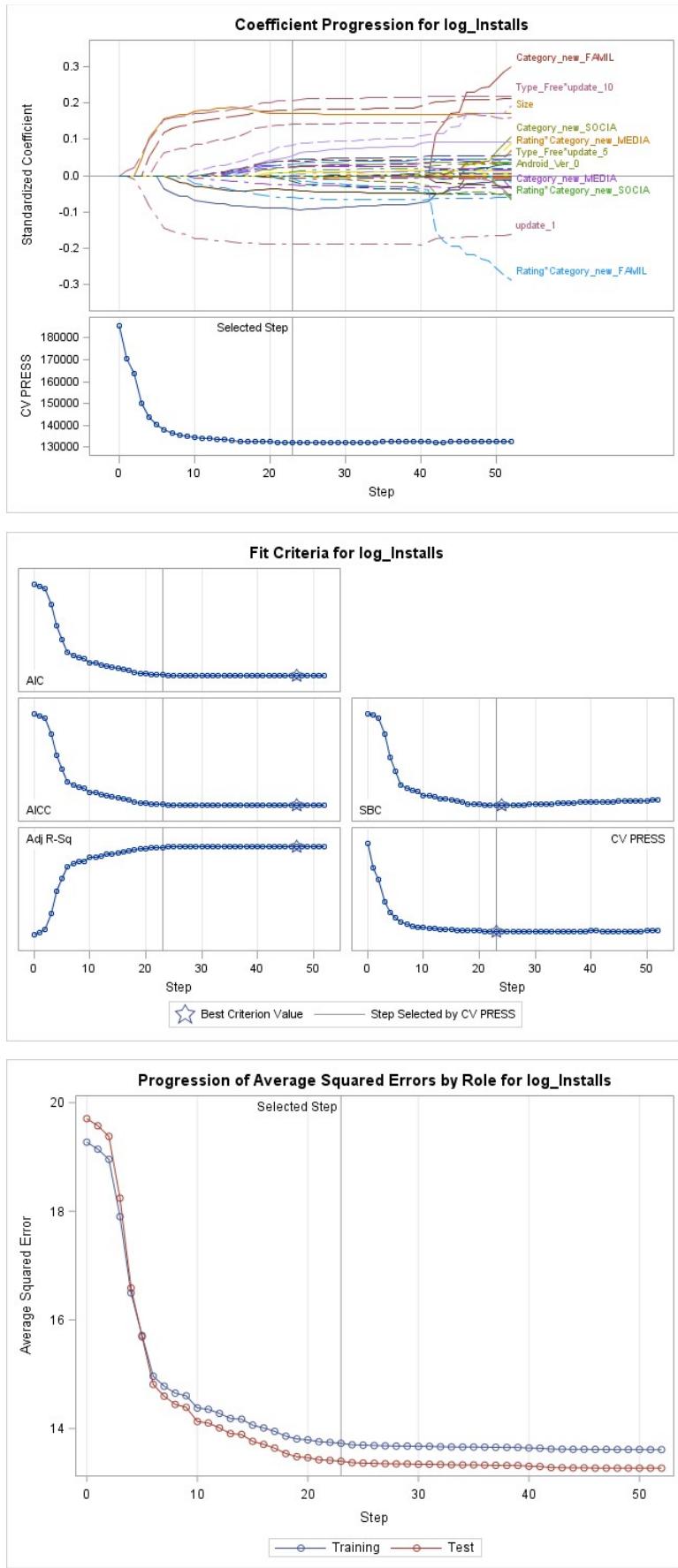
LASSO regression with Cross_Validation as criteria

The GLMSELECT Procedure

LASSO Selection Summary						
Step	Effect Entered	Effect Removed	Number Effects In	ASE	Test ASE	CV PRESS
0	Intercept		1	19.2732	19.7047	185622.879
1	Type_Free*update_10		2	19.1425	19.5743	170404.445
2	update_1		3	18.9550	19.3780	163494.015
3	Size		4	17.9008	18.2415	150197.449
4	Type_Free		5	16.4970	16.5872	143621.986
5	Rating*Category_new_GAME		6	15.7113	15.6862	140497.414
6	Category_new_BUSIN		7	14.9642	14.8134	138027.608
7	Category_new_LIFES		8	14.7785	14.5945	136539.736
8	update_0		9	14.6500	14.4434	135350.338
9	Rating*Category_new_TOOLS		10	14.6027	14.3890	134694.884
10	Recency		11	14.3775	14.1291	134473.764
11	update_9		12	14.3528	14.1001	134083.131
12	Size*Category_new_SOCIA		13	14.2777	14.0109	133823.465
13	Type_Free*update_4		14	14.1841	13.9050	133596.922
14	Rating		15	14.1709	13.8904	133394.493
15	Type_Free*update_6		16	14.0611	13.7634	133136.256
16	Size*Category_new_FAMIL		17	14.0100	13.7071	132629.627
17	Type_Free*update_5		18	13.9475	13.6381	132385.803
18	Content_Rating_Everyone		19	13.8599	13.5392	132376.384
19	Size*Category_new_GAME		20	13.8073	13.4805	132371.010
20	update_4		21	13.7914	13.4623	132375.520
21	Size*Category_new_TOOLS		22	13.7570	13.4252	132142.017
22	Rating*Category_new_FAMIL		23	13.7433	13.4121	132017.136
23	update_7		24	13.7270	13.3964	132000.244*
24	Type_Paid*update_2		25	13.6997	13.3708	132025.761
25	Rating*Category_new_BUSIN		26	13.6922	13.3636	132043.319
26	Type_Paid*update_5		27	13.6858	13.3575	132076.190
27	update_2		28	13.6797	13.3516	132093.585
28	Content_Rating_Teen		29	13.6765	13.3484	132124.112
29	Content_Rating_Adults_o		30	13.6757	13.3475	132129.126
30	Android_Ver_0		31	13.6704	13.3420	132141.440
31	Size*Category_new_BUSIN		32	13.6700	13.3415	132179.814
32	Type_Paid*update_7		33	13.6647	13.3356	132175.555
33	Type_Free*update_0		34	13.6613	13.3317	132219.883
34	Price		35	13.6595	13.3294	132215.356
35	update_8		36	13.6589	13.3287	132246.146
36	Type_Paid*update_10		37	13.6566	13.3254	132262.036
37	Rating*Category_new_TRANS		38	13.6539	13.3217	132302.043
38	Type_Paid*update_3		39	13.6523	13.3199	132314.268
39	Type_Paid*update_8		40	13.6512	13.3187	132319.217
40	Content_Rating_Unrated		41	13.6413	13.3051	132367.377
41	Type_Free*update_1		42	13.6376	13.2994	132378.671
42	Category_new_FAMIL		43	13.6230	13.2811	132209.183
43	Rating*Category_new_MEDIA		44	13.6206	13.2782	132225.889
44	Category_new_SOCIA		45	13.6180	13.2753	132236.146
45	Size*Category_new_TRANS		46	13.6178	13.2751	132291.163
46	Category_new_GAME		47	13.6142	13.2712	132317.993
47	Category_new_LIFES		48	13.6142	13.2712	132297.512
48	Category_new_TRANS		49	13.6133	13.2696	132309.813
49	Size*Category_new_MEDIA		50	13.6130	13.2691	132334.589
50	Rating*Category_new_SOCIA		51	13.6115	13.2693	132345.315
51	Category_new_MEDIA		52	13.6104	13.2700	132363.427
52	Category_new_TOOLS			13.6098	13.2712	132388.682

* Optimal Value of Criterion

Selection stopped because the change of the maximum absolute correction is tiny.



LASSO regression with Cross_Validation as criteria**The GLMSELECT Procedure
Selected Model****The selected model, based on Cross Validation, is the model at Step 23.**

Effects:	Intercept Category_new_BUSIN Category_new_LIFES Size Size*Category_new_FAMILY Size*Category_new_FAMILY Size*Category_new_GAME Size*Category_new_SOCIA Size*Category_new_TOOLS Rating Rating*Category_new_FAMILY Rating*Category_new_GAME Rating*Category_new_TOOLS Content_Rating_Everyone Recency update_0 update_1 update_4 update_7 update_9 Type_Free Type_Free*update_4 Type_Free*update_5 Type_Free*update_6 Type_Free*update_10
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	23	53410	2322.15703	168.75	<.0001
Error	9606	132191	13.76128		
Corrected Total	9629	185600			

Root MSE	3.70962
Dependent Mean	10.70256
R-Square	0.2878
Adj R-Sq	0.2861
AIC	34904
AICC	34905
SBC	25445
ASE (Train)	13.72698
ASE (Test)	13.39640
CV PRESS	132000

Parameter Estimates		
Parameter	DF	Estimate
Intercept	1	6.588938
Category_new_BUSIN	1	-1.498611
Category_new_LIFES	1	-0.445764
Size	1	0.036449
Size*Category_new_FAMILY	1	0.015452
Size*Category_new_GAME	1	0.002322
Size*Category_new_SOCIA	1	0.025669
Size*Category_new_TOOLS	1	-0.008861
Rating	1	0.201181
Rating*Category_new_FAMILY	1	-0.019335
Rating*Category_new_GAME	1	0.483780
Rating*Category_new_TOOLS	1	0.208855
Content_Rating_Everyone	1	-0.089617
Recency	1	-0.000290
update_0	1	-2.060461
update_1	1	-1.653818
update_4	1	0.183737
update_7	1	0.053242
update_9	1	2.306719
Type_Free	1	3.007749
Type_Free*update_4	1	0.507513
Type_Free*update_5	1	0.548291
Type_Free*update_6	1	0.920395
Type_Free*update_10	1	2.844874

Elasticnet regression with Cross_Validation as criteria**The GLMSELECT Procedure**

Data Set	WORK.APP_NEW
Test Data Set	WORK.APP_NEW_TEST
Dependent Variable	log_Installs
Selection Method	ELASTICNET
Stop Criterion	None
Choose Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	None
Random Number Seed	2

Observation Profile for Analysis Data	
Number of Observations Read	9630
Number of Observations Used	9630
Number of Observations Used for Training	9630

Observation Profile for Test Data	
Number of Observations Read	1926
Number of Observations Used	1926

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	0 1 2 3 4 5
Android_Ver	2	0 1
Content_Rating	5	Adults o Everyone Mature 1 Teen Unrated
Type	2	Free Paid
update	11	0 1 2 3 4 5 6 7 8 9 10

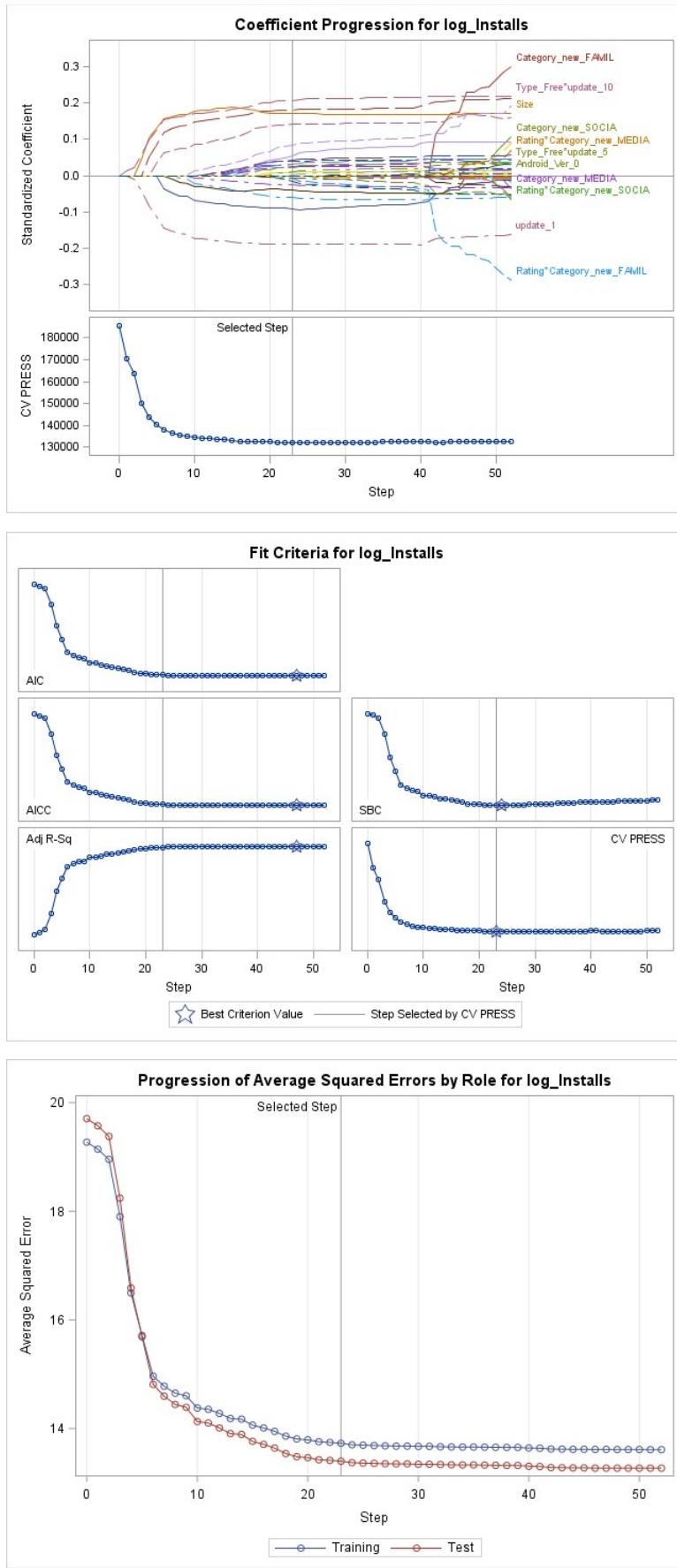
Dimensions	
Number of Effects	13
Number of Effects after Splits	70
Number of Parameters	70

Elasticnet regression with Cross_Validation as criteria**The GLMSELECT Procedure**

Elastic Net Selection Summary						
Step	Effect Entered	Effect Removed	Number Effects In	ASE	Test ASE	CV PRESS
0	Intercept		1	19.2732	19.7047	185622.879
1	Type_Free*update_10		2	19.1425	19.5743	170404.445
2	update_1		3	18.9550	19.3780	163494.015
3	Size		4	17.9008	18.2415	150197.449
4	Type_Free		5	16.4970	16.5872	143621.986
5	Rating*Category_new_GAME		6	15.7113	15.6862	140497.414
6	Category_new_BUSIN		7	14.9642	14.8134	138027.608
7	Category_new_LIFES		8	14.7785	14.5945	136539.736
8	update_0		9	14.6500	14.4434	135350.338
9	Rating*Category_new_TOOLS		10	14.6027	14.3890	134694.884
10	Recency		11	14.3775	14.1291	134473.764
11	update_9		12	14.3528	14.1001	134083.131
12	Size*Category_new_SOCIA		13	14.2777	14.0109	133823.465
13	Type_Free*update_4		14	14.1841	13.9050	133596.922
14	Rating		15	14.1709	13.8904	133394.493
15	Type_Free*update_6		16	14.0611	13.7634	133136.256
16	Size*Category_new_FAMIL		17	14.0100	13.7071	132629.627
17	Type_Free*update_5		18	13.9475	13.6381	132385.803
18	Content_Rating_Everyone		19	13.8599	13.5392	132376.384
19	Size*Category_new_GAME		20	13.8073	13.4805	132371.010
20	update_4		21	13.7914	13.4623	132375.520
21	Size*Category_new_TOOLS		22	13.7570	13.4252	132142.017
22	Rating*Category_new_FAMIL		23	13.7433	13.4121	132017.136
23	update_7		24	13.7270	13.3964	132000.244*
24	Type_Paid*update_2		25	13.6997	13.3708	132025.761
25	Rating*Category_new_BUSIN		26	13.6922	13.3636	132043.319
26	Type_Paid*update_5		27	13.6858	13.3575	132076.190
27	update_2		28	13.6797	13.3516	132093.585
28	Content_Rating_Teen		29	13.6765	13.3484	132124.112
29	Content_Rating_Adults_o		30	13.6757	13.3475	132129.126
30	Android_Ver_0		31	13.6704	13.3420	132141.440
31	Size*Category_new_BUSIN		32	13.6700	13.3415	132179.814
32	Type_Paid*update_7		33	13.6647	13.3356	132175.555
33	Type_Free*update_0		34	13.6613	13.3317	132219.883
34	Price		35	13.6595	13.3294	132215.356
35	update_8		36	13.6589	13.3287	132246.146
36	Type_Paid*update_10		37	13.6566	13.3254	132262.036
37	Rating*Category_new_TRANS		38	13.6539	13.3217	132302.043
38	Type_Paid*update_3		39	13.6523	13.3199	132314.268
39	Type_Paid*update_8		40	13.6512	13.3187	132319.217
40	Content_Rating_Unrated		41	13.6413	13.3051	132367.377
41	Type_Free*update_1		42	13.6376	13.2994	132378.671
42	Category_new_FAMIL		43	13.6230	13.2811	132209.183
43	Rating*Category_new_MEDIA		44	13.6206	13.2782	132225.889
44	Category_new_SOCIA		45	13.6180	13.2753	132236.146
45	Size*Category_new_TRANS		46	13.6178	13.2751	132291.163
46	Category_new_GAME		47	13.6142	13.2712	132317.993
47	Category_new_LIFES		48	13.6142	13.2712	132297.512
48	Category_new_TRANS		49	13.6133	13.2696	132309.813
49	Size*Category_new_MEDIA		50	13.6130	13.2691	132334.589
50	Rating*Category_new_SOCIA		51	13.6115	13.2693	132345.315
51	Category_new_MEDIA		52	13.6104	13.2700	132363.427
52	Category_new_TOOLS			13.6098	13.2712	132388.682

* Optimal Value of Criterion

Selection stopped because the change of the maximum absolute correction is tiny.



Elasticnet regression with Cross_Validation as criteria**The GLMSELECT Procedure
Selected Model****The selected model, based on Cross Validation, is the model at Step 23.**

Effects:	Intercept Category_new_BUSIN Category_new_LIFES Size Size*Category_new_FAMILY Size*Category_new_FAMILY Size*Category_new_GAME Size*Category_new_SOCIA Size*Category_new_TOOLS Rating Rating*Category_new_FAMILY Rating*Category_new_GAME Rating*Category_new_TOOLS Content_Rating_Everyone Recency update_0 update_1 update_4 update_7 update_9 Type_Free Type_Free*update_4 Type_Free*update_5 Type_Free*update_6 Type_Free*update_10
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	23	53410	2322.15703	168.75	<.0001
Error	9606	132191	13.76128		
Corrected Total	9629	185600			

Root MSE	3.70962
Dependent Mean	10.70256
R-Square	0.2878
Adj R-Sq	0.2861
AIC	34904
AICC	34905
SBC	25445
ASE (Train)	13.72698
ASE (Test)	13.39640
CV PRESS	132000

Parameter Estimates		
Parameter	DF	Estimate
Intercept	1	6.588938
Category_new_BUSIN	1	-1.498611
Category_new_LIFES	1	-0.445764
Size	1	0.036449
Size*Category_new_FAMILY	1	0.015452
Size*Category_new_GAME	1	0.002322
Size*Category_new_SOCIA	1	0.025669
Size*Category_new_TOOLS	1	-0.008861
Rating	1	0.201181
Rating*Category_new_FAMILY	1	-0.019335
Rating*Category_new_GAME	1	0.483780
Rating*Category_new_TOOLS	1	0.208855
Content_Rating_Everyone	1	-0.089617
Recency	1	-0.000290
update_0	1	-2.060461
update_1	1	-1.653818
update_4	1	0.183737
update_7	1	0.053242
update_9	1	2.306719
Type_Free	1	3.007749
Type_Free*update_4	1	0.507513
Type_Free*update_5	1	0.548291
Type_Free*update_6	1	0.920395
Type_Free*update_10	1	2.844874

linear regression**The GLM Procedure**

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL LIFES MEDIA SOCIA TOOLS TRANS GAME
Android_Ver	2	1 0
Content_Rating	3	Mature 1 Teen Everyone
update	10	1 2 3 4 5 6 7 8 10 0

Number of Observations Read	726
Number of Observations Used	726

linear regression**The GLM Procedure****Dependent Variable: Price**

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	52	3043.24947	58.52403	3.21	<.0001
Error	673	12253.84090	18.20779		
Corrected Total	725	15297.09037			

R-Square	Coeff Var	Root MSE	Price Mean
0.198943	102.8374	4.267058	4.149325

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Category_new	7	1473.385344	210.483621	11.56	<.0001
Size	1	2.114093	2.114093	0.12	0.7334
Size*Category_new	7	255.374274	36.482039	2.00	0.0524
Rating	1	6.416736	6.416736	0.35	0.5529
Rating*Category_new	7	149.425448	21.346493	1.17	0.3164
log_Reviews	1	26.434834	26.434834	1.45	0.2287
log_Revie*Category_n	7	585.133542	83.590506	4.59	<.0001
log_Installs	1	0.001513	0.001513	0.00	0.9927
log_Insta*Category_n	7	178.279312	25.468473	1.40	0.2028
Content_Rating	2	86.825403	43.412701	2.38	0.0929
Recency	1	88.597600	88.597600	4.87	0.0277
Android_Ver	1	0.305004	0.305004	0.02	0.8971
update	9	190.956365	21.217374	1.17	0.3145

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Category_new	7	57.7207869	8.2458267	0.45	0.8684
Size	1	17.5911720	17.5911720	0.97	0.3260
Size*Category_new	7	359.3698911	51.3385559	2.82	0.0067
Rating	1	0.6244275	0.6244275	0.03	0.8531
Rating*Category_new	7	187.3159434	26.7594205	1.47	0.1750
log_Reviews	1	0.0685892	0.0685892	0.00	0.9511
log_Revie*Category_n	7	236.5378807	33.7911258	1.86	0.0742
log_Installs	1	9.4190813	9.4190813	0.52	0.4722
log_Insta*Category_n	7	176.4130744	25.2018678	1.38	0.2090
Content_Rating	2	92.9679317	46.4839659	2.55	0.0786
Recency	1	58.1587312	58.1587312	3.19	0.0744
Android_Ver	1	0.2367074	0.2367074	0.01	0.9093
update	9	190.9563646	21.2173738	1.17	0.3145

Parameter	Estimate	Standard Error	t Value	Pr > t
Intercept	7.187341939	B	7.22380248	0.99 0.3201
Category_new BUSIN	-5.931057136	B	9.63469807	-0.62 0.5384
Category_new FAMIL	-5.882220249	B	7.74093161	-0.76 0.4476
Category_new LIFES	-0.272480270	B	8.07568981	-0.03 0.9731
Category_new MEDIA	-3.788459517	B	11.14197125	-0.34 0.7339
Category_new SOCIA	-1.564257535	B	9.15728226	-0.17 0.8644
Category_new TOOLS	0.386678681	B	7.76615181	0.05 0.9603
Category_new TRANS	-0.702076802	B	12.76258999	-0.06 0.9561
Category_new GAME	0.000000000	B	.	.
Size	-0.049691168	B	0.01959422	-2.54 0.0114
Size*Category_new BUSIN	0.220042504	B	0.11720078	1.88 0.0609
Size*Category_new FAMIL	0.034867877	B	0.02420927	1.44 0.1503
Size*Category_new LIFES	0.105093003	B	0.02704482	3.89 0.0001
Size*Category_new MEDIA	0.084499670	B	0.06363543	1.33 0.1847
Size*Category_new SOCIA	0.061381256	B	0.07875758	0.78 0.4360
Size*Category_new TOOLS	0.027159543	B	0.02982315	0.91 0.3628
Size*Category_new TRANS	0.024775382	B	0.05093195	0.49 0.6268
Size*Category_new GAME	0.000000000	B	.	.
Rating	-0.901134978	B	1.53925939	-0.59 0.5585
Rating*Category_new BUSIN	3.921769528	B	2.12563121	1.84 0.0655

Rating*Category_new FAMIL	1.267843024	B	1.66233476	0.76	0.4459
Rating*Category_new LIFES	-0.255779154	B	1.74115236	-0.15	0.8833
Rating*Category_new MEDIA	1.009426520	B	2.39161307	0.42	0.6731
Rating*Category_new SOCIA	0.739789040	B	1.94116017	0.38	0.7032
Rating*Category_new TOOLS	-0.487282058	B	1.67073157	-0.29	0.7706
Rating*Category_new TRANS	0.274771223	B	2.71101659	0.10	0.9193
Rating*Category_new GAME	0.000000000	B	.	.	.
log_Reviews	0.826282569	B	0.49683386	1.66	0.0968
log_Revie*Category_n BUSIN	-1.695317545	B	1.06980277	-1.58	0.1135
log_Revie*Category_n FAMIL	-0.502643695	B	0.57361929	-0.88	0.3812
log_Revie*Category_n LIFES	-1.726899504	B	0.59397909	-2.91	0.0038
log_Revie*Category_n MEDIA	-1.102730445	B	1.06103206	-1.04	0.2990
log_Revie*Category_n SOCIA	-0.352990938	B	0.98314373	-0.36	0.7197
log_Revie*Category_n TOOLS	-0.796160991	B	0.58664559	-1.36	0.1752
log_Revie*Category_n TRANS	-0.564302368	B	1.29741477	-0.43	0.6637
log_Revie*Category_n GAME	0.000000000	B	.	.	.
log_Installs	-0.543207895	B	0.46919069	-1.16	0.2474
log_Insta*Category_n BUSIN	-0.076610675	B	0.90646342	-0.08	0.9327
log_Insta*Category_n FAMIL	0.378492947	B	0.54928971	0.69	0.4910
log_Insta*Category_n LIFES	1.362176020	B	0.56663153	2.40	0.0165
log_Insta*Category_n MEDIA	0.416282569	B	1.00696126	0.41	0.6794
log_Insta*Category_n SOCIA	-0.150941147	B	0.92312788	-0.16	0.8702
log_Insta*Category_n TOOLS	0.602808921	B	0.55792016	1.08	0.2803
log_Insta*Category_n TRANS	0.417504956	B	1.19367250	0.35	0.7266
log_Insta*Category_n GAME	0.000000000	B	.	.	.
Content_Rating Mature 1	0.212096282	B	1.11651966	0.19	0.8494
Content_Rating Teen	1.568657245	B	0.69421299	2.26	0.0242
Content_Rating Everyone	0.000000000	B	.	.	.
Recency	-0.0000554406		0.00031020	-1.79	0.0744
Android_Ver 1	-0.076628910	B	0.67207122	-0.11	0.9093
Android_Ver 0	0.000000000	B	.	.	.
update 1	1.032523454	B	1.32111931	0.78	0.4348
update 2	1.077633199	B	1.37810347	0.78	0.4345
update 3	1.876494204	B	1.44940228	1.29	0.1959
update 4	1.604049184	B	1.57319834	1.02	0.3083
update 5	3.265186433	B	1.83144514	1.78	0.0751
update 6	2.947828071	B	1.81343745	1.63	0.1045
update 7	4.049993399	B	1.98509489	2.04	0.0417
update 8	1.572944707	B	2.12410837	0.74	0.4592
update 10	1.345750324	B	1.39493475	0.96	0.3350
update 0	0.000000000	B	.	.	.

Note: The X'X matrix has been found to be singular, and a generalized inverse was used to solve the normal equations. Terms whose estimates are followed by the letter 'B' are not uniquely estimable.

Forward Selection based on Mallows Cp selection Criteria**The GLMSELECT Procedure**

Data Set	WORK.APP_PAID
Dependent Variable	Price
Selection Method	Forward
Select Criterion	C(p)
Stop Criterion	C(p)
Effect Hierarchy Enforced	Single

Number of Observations Read	726
Number of Observations Used	726

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	0 1 2 3 4 5
Android_Ver	2	0 1
Content_Rating	3	Everyone Mature 1 Teen
update	10	0 1 2 3 4 5 6 7 8 10

Dimensions	
Number of Effects	14
Number of Parameters	61

Forward Selection based on Mallows Cp selection Criteria

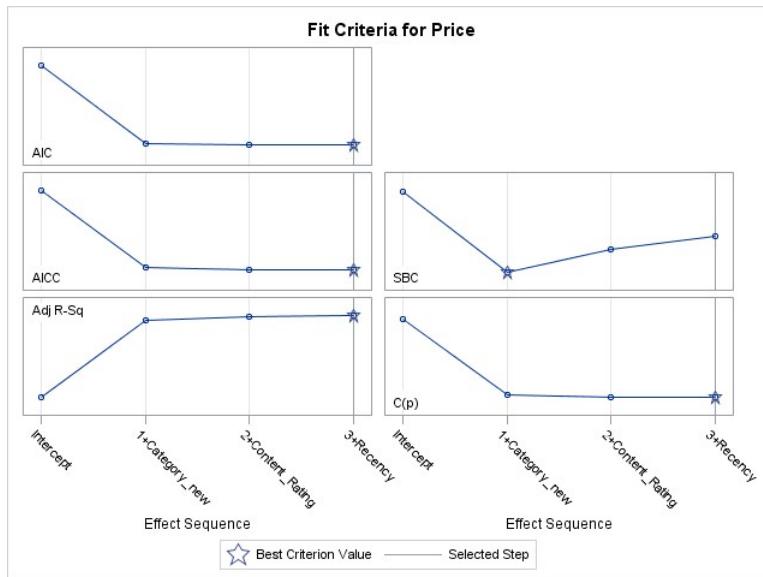
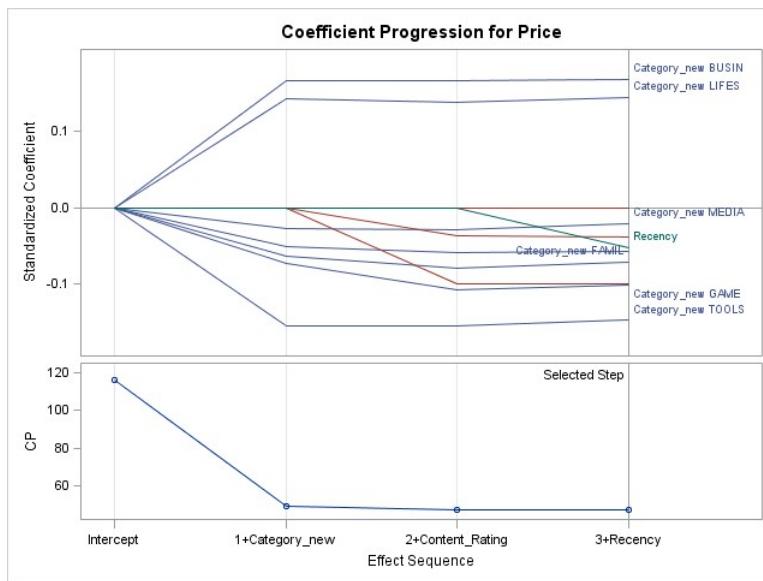
The GLMSELECT Procedure

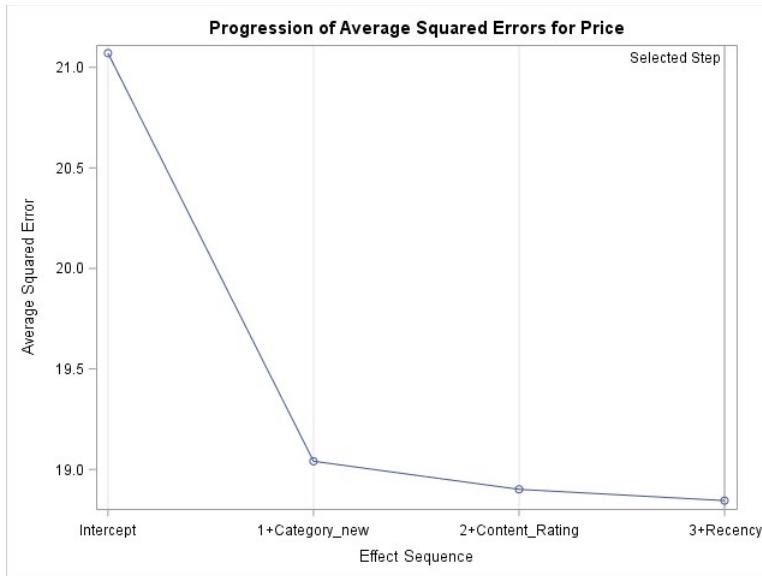
Forward Selection Summary				
Step	Effect Entered	Number Effects In	NumberParms In	CP
0	Intercept	1	1	116.1400
1	Category_new	2	8	49.2194
2	Content_Rating	3	10	47.6265
3	Recency	4	11	47.4036*

* Optimal Value of Criterion

Selection stopped at a local minimum of the C(p) criterion.

Stop Details			
Candidate For	Effect	Candidate C(p)	Compare C(p)
Entry	Rating	48.1546	> 47.4036





Forward Selection based on Mallows Cp selection Criteria**The GLMSELECT Procedure
Selected Model****The selected model is the model at the last step (Step 3).****Effects:** Intercept Category_new Content_Rating Recency**Note:** The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	10	1615.69335	161.56933	8.44	<.0001
Error	715	13681	19.13482		
Corrected Total	725	15297			

Root MSE	4.37434
Dependent Mean	4.14933
R-Square	0.1056
Adj R-Sq	0.0931
AIC	2881.71190
AICC	2882.14949
BIC	2154.96584
C(p)	47.40360
SBC	2204.17495

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	6.228558	1.266243	4.92	<.0001
Category_new BUSIN	1	4.621212	1.427416	3.24	0.0013
Category_new FAMIL	1	-0.765678	1.115757	-0.69	0.4928
Category_new GAME	1	-1.469220	1.187743	-1.24	0.2165
Category_new LIFES	1	1.676948	1.124252	1.49	0.1362
Category_new MEDIA	1	-0.442249	1.306747	-0.34	0.7351
Category_new SOCIA	1	-1.137084	1.272959	-0.89	0.3720
Category_new TOOLS	1	-1.480252	1.103252	-1.34	0.1801
Category_new TRANS	0	0	.	.	.
Content_Rating Everyone	1	-1.566410	0.685127	-2.29	0.0225
Content_Rating Mature 1	1	-1.146825	1.241978	-0.92	0.3561
Content_Rating Teen	0	0	.	.	.
Recency	1	-0.000428	0.000294	-1.45	0.1463

Backward Selection based on Mallows Cp selection Criteria**The GLMSELECT Procedure**

Data Set	WORK.APP_PAID
Dependent Variable	Price
Selection Method	Backward
Select Criterion	C(p)
Stop Criterion	C(p)
Effect Hierarchy Enforced	Single

Number of Observations Read	726
Number of Observations Used	726

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	0 1 2 3 4 5
Android_Ver	2	0 1
Content_Rating	3	Everyone Mature 1 Teen
update	10	0 1 2 3 4 5 6 7 8 10

Dimensions	
Number of Effects	14
Number of Parameters	61

Backward Selection based on Mallows Cp selection Criteria

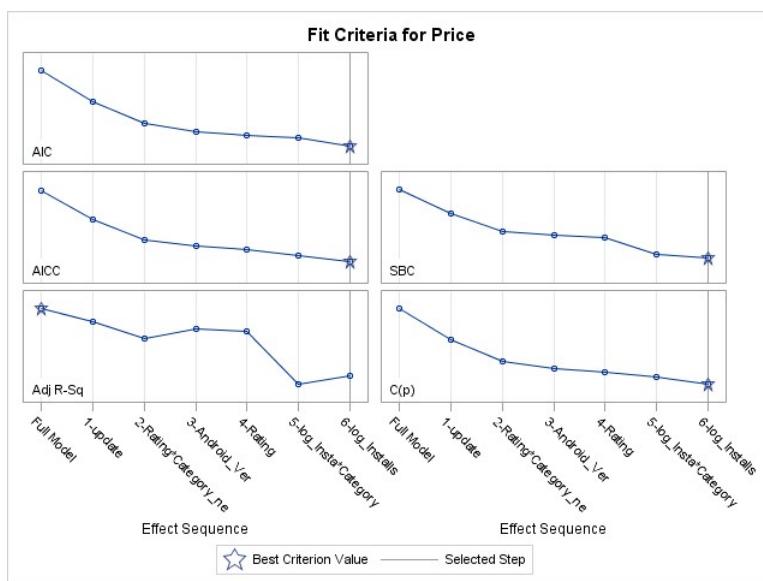
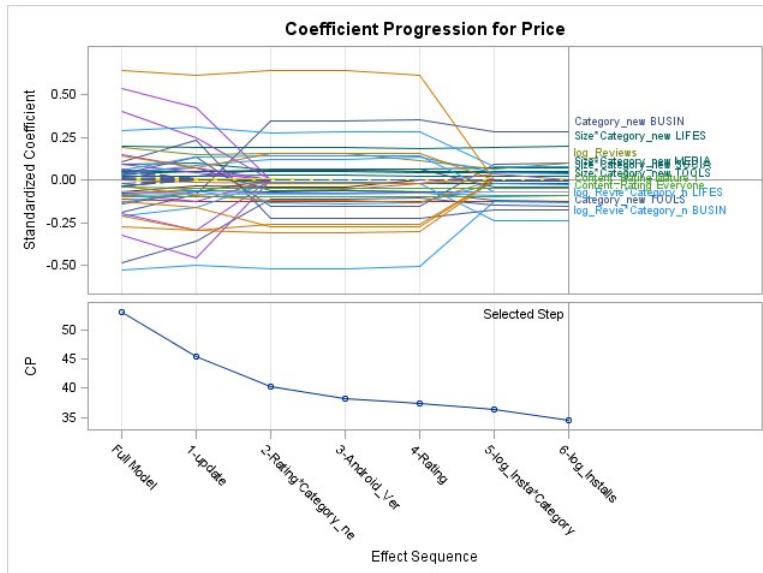
The GLMSELECT Procedure

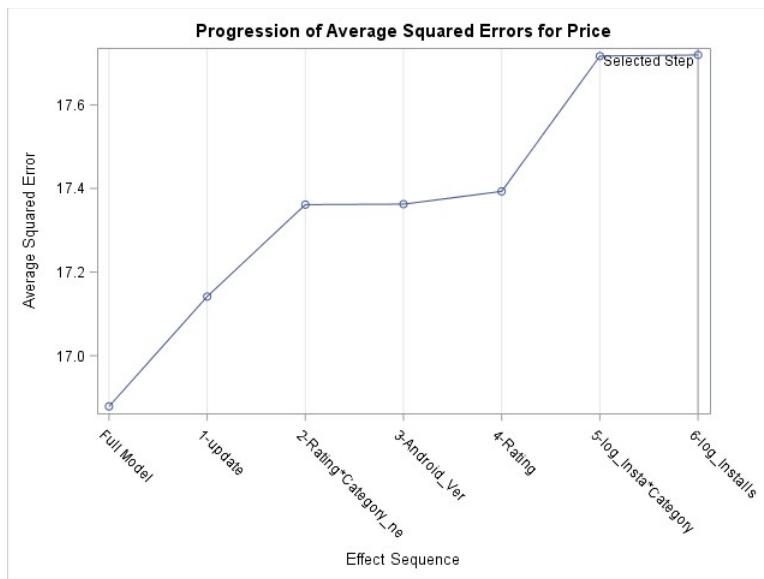
Backward Selection Summary				
Step	Effect Removed	Number Effects In	NumberParms In	CP
0		14	53	53.0000
1	update	13	44	45.4876
2	Rating*Category_new	12	37	40.2500
3	Android_Ver	11	36	38.2958
4	Rating	10	35	37.5102
5	log_Insta*Category_n	9	28	36.4142
6	log_Installs	8	27	34.5212*

* Optimal Value of Criterion

Selection stopped at a local minimum of the C(p) criterion.

Stop Details			
Candidate For	Effect	Candidate C(p)	Compare C(p)
Removal	Content_Rating	35.3091	> 34.5212





Backward Selection based on Mallows Cp selection Criteria

The GLMSELECT Procedure
Selected Model

The selected model is the model at the last step (Step 6).

Effects:	Intercept Category_new Size Size*Category_new log_Reviews log_Revie*Category_n Content_Rating Recency
-----------------	---

Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	26	2432.90297	93.57319	5.08	<.0001
Error	699	12864	18.40370		
Corrected Total	725	15297			

Root MSE	4.28995
Dependent Mean	4.14933
R-Square	0.1590
Adj R-Sq	0.1278
AIC	2868.99775
AICC	2871.32773
BIC	2144.48501
C(p)	34.52118
SBC	2264.86160

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	6.519383	2.967376	2.20	0.0283
Category_new BUSIN	1	7.663865	3.360687	2.28	0.0229
Category_new FAMIL	1	-1.624730	2.957844	-0.55	0.5830
Category_new GAME	1	-1.809196	3.071845	-0.59	0.5561
Category_new LIFES	1	1.115297	2.974892	0.37	0.7078
Category_new MEDIA	1	-0.195060	3.110673	-0.06	0.9500
Category_new SOCIA	1	-0.849289	3.120561	-0.27	0.7856
Category_new TOOLS	1	-1.765527	2.926259	-0.60	0.5465
Category_new TRANS	0	0	.	.	.
Size	1	-0.027204	0.046506	-0.58	0.5588
Size*Category_new BUSIN	1	0.150452	0.116167	1.30	0.1957
Size*Category_new FAMIL	1	0.011662	0.048673	0.24	0.8107
Size*Category_new GAME	1	-0.023868	0.050409	-0.47	0.6360
Size*Category_new LIFES	1	0.078312	0.050031	1.57	0.1180
Size*Category_new MEDIA	1	0.061765	0.075761	0.82	0.4152
Size*Category_new SOCIA	1	0.038868	0.087766	0.44	0.6580
Size*Category_new TOOLS	1	-0.010254	0.051018	-0.20	0.8408
Size*Category_new TRANS	0	0	.	.	.
log_Reviews	1	0.134910	0.383198	0.35	0.7249
log_Revie*Category_n BUSIN	1	-1.292828	0.486331	-2.66	0.0080
log_Revie*Category_n FAMIL	1	0.063933	0.394585	0.16	0.8713
log_Revie*Category_n GAME	1	0.149119	0.410020	0.36	0.7162
log_Revie*Category_n LIFES	1	-0.287886	0.406120	-0.71	0.4786
log_Revie*Category_n MEDIA	1	-0.529018	0.466407	-1.13	0.2571
log_Revie*Category_n SOCIA	1	-0.289012	0.448201	-0.64	0.5193
log_Revie*Category_n TOOLS	1	-0.044723	0.393959	-0.11	0.9096
log_Revie*Category_n TRANS	0	0	.	.	.
Content_Rating Everyone	1	-1.492135	0.686832	-2.17	0.0302
Content_Rating Mature 1	1	-1.438116	1.258071	-1.14	0.2534
Content_Rating Teen	0	0	.	.	.
Recency	1	-0.000595	0.000301	-1.98	0.0484

Stepwise Selection based on Mallows Cp selection Criteria**The GLMSELECT Procedure**

Data Set	WORK.APP_PAID
Dependent Variable	Price
Selection Method	Stepwise
Select Criterion	C(p)
Stop Criterion	C(p)
Effect Hierarchy Enforced	Single

Number of Observations Read	726
Number of Observations Used	726

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	0 1 2 3 4 5
Android_Ver	2	0 1
Content_Rating	3	Everyone Mature 1 Teen
update	10	0 1 2 3 4 5 6 7 8 10

Dimensions	
Number of Effects	14
Number of Parameters	61

Stepwise Selection based on Mallows Cp selection Criteria

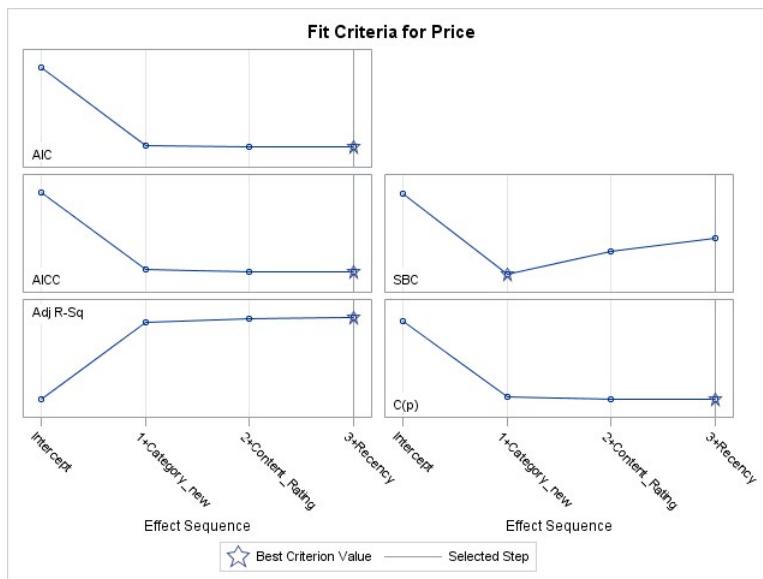
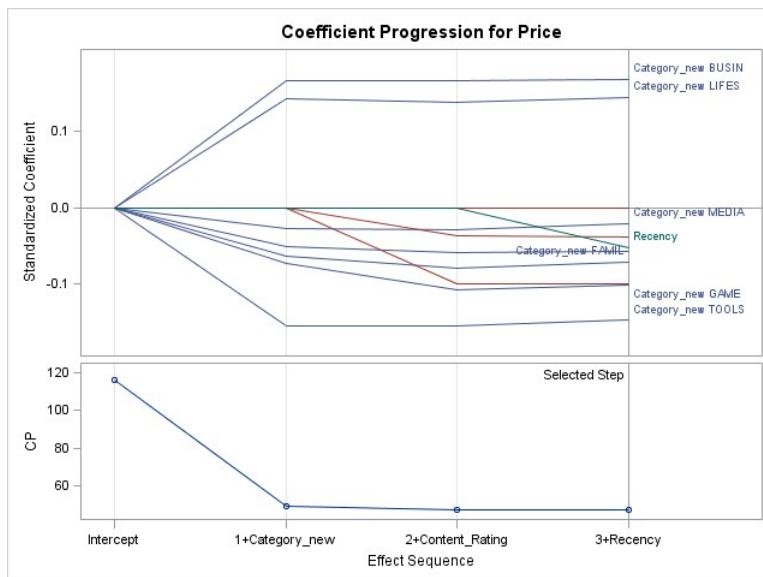
The GLMSELECT Procedure

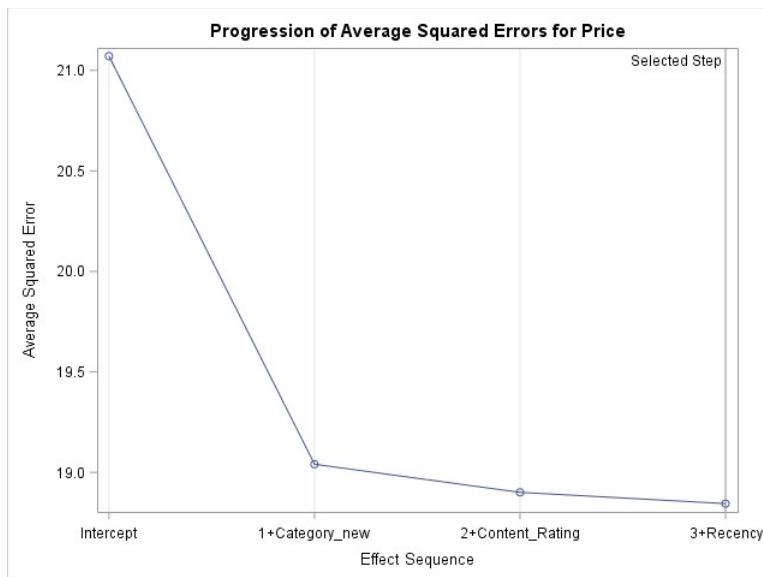
Stepwise Selection Summary					
Step	Effect Entered	Effect Removed	Number Effects In	NumberParms In	CP
0	Intercept		1	1	116.1400
1	Category_new		2	8	49.2194
2	Content_Rating		3	10	47.6265
3	Recency		4	11	47.4036*

* Optimal Value of Criterion

Selection stopped at a local minimum of the C(p) criterion.

Stop Details			
Candidate For	Effect	Candidate C(p)	Compare C(p)
Entry	Rating	48.1546	> 47.4036
Removal	Recency	47.6265	> 47.4036





Stepwise Selection based on Mallows Cp selection Criteria
**The GLMSELECT Procedure
Selected Model**

The selected model is the model at the last step (Step 3).

Effects:	Intercept Category_new Content_Rating Recency
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	10	1615.69335	161.56933	8.44	<.0001
Error	715	13681	19.13482		
Corrected Total	725	15297			

Root MSE	4.37434
Dependent Mean	4.14933
R-Square	0.1056
Adj R-Sq	0.0931
AIC	2881.71190
AICC	2882.14949
BIC	2154.96584
C(p)	47.40360
SBC	2204.17495

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	6.228558	1.266243	4.92	<.0001
Category_new BUSIN	1	4.621212	1.427416	3.24	0.0013
Category_new FAMIL	1	-0.765678	1.115757	-0.69	0.4928
Category_new GAME	1	-1.469220	1.187743	-1.24	0.2165
Category_new LIFES	1	1.676948	1.124252	1.49	0.1362
Category_new MEDIA	1	-0.442249	1.306747	-0.34	0.7351
Category_new SOCIA	1	-1.137084	1.272959	-0.89	0.3720
Category_new TOOLS	1	-1.480252	1.103252	-1.34	0.1801
Category_new TRANS	0	0	.	.	.
Content_Rating Everyone	1	-1.566410	0.685127	-2.29	0.0225
Content_Rating Mature 1	1	-1.146825	1.241978	-0.92	0.3561
Content_Rating Teen	0	0	.	.	.
Recency	1	-0.000428	0.000294	-1.45	0.1463

forward selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure**

Data Set	WORK.APP_PAID
Dependent Variable	Price
Selection Method	Forward
Select Criterion	Cross Validation
Stop Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	Single
Random Number Seed	582549001

Number of Observations Read	726
Number of Observations Used	726

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	0 1 2 3 4 5
Android_Ver	2	0 1
Content_Rating	3	Everyone Mature 1 Teen
update	10	0 1 2 3 4 5 6 7 8 10

Dimensions	
Number of Effects	14
Number of Parameters	61

forward selection with cross validation as criteria with 10-folds

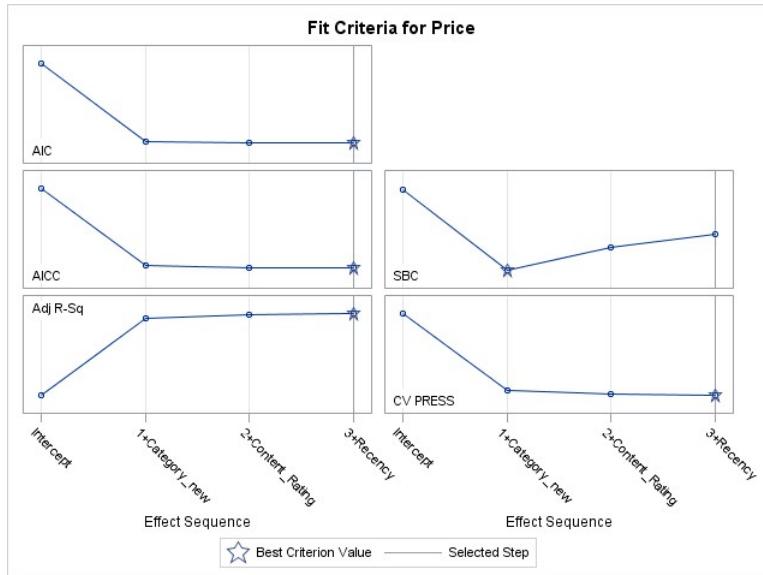
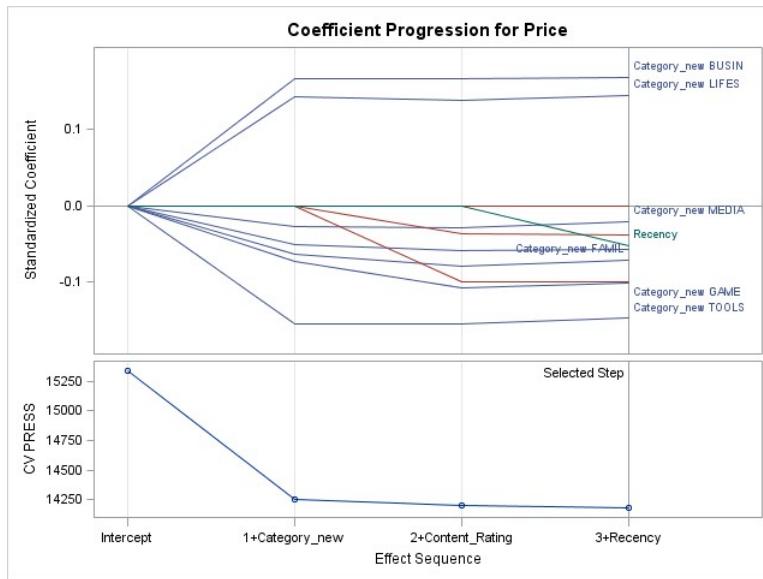
The GLMSELECT Procedure

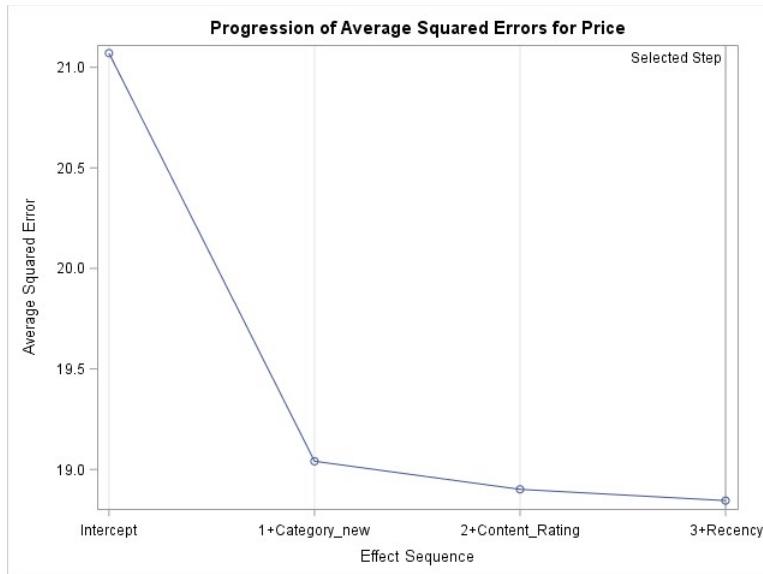
Forward Selection Summary				
Step	Effect Entered	Number Effects In	NumberParms In	CV PRESS
0	Intercept	1	1	15336.6294
1	Category_new	2	8	14257.2751
2	Content_Rating	3	10	14198.9477
3	Recency	4	11	14181.9537*

* Optimal Value of Criterion

Selection stopped at a local minimum of the cross validation PRESS.

Stop Details			
Candidate For	Effect	Candidate CV PRESS	Compare CV PRESS
Entry	Size	14182.2071	> 14181.9537





forward selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure
Selected Model****The selected model is the model at the last step (Step 3).****Effects:** Intercept Category_new Content_Rating Recency**Note:** The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	10	1615.69335	161.56933	8.44	<.0001
Error	715	13681	19.13482		
Corrected Total	725	15297			

Root MSE	4.37434
Dependent Mean	4.14933
R-Square	0.1056
Adj R-Sq	0.0931
AIC	2881.71190
AICC	2882.14949
SBC	2204.17495
CV PRESS	14182

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	6.228558	1.266243	4.92	<.0001
Category_new BUSIN	1	4.621212	1.427416	3.24	0.0013
Category_new FAMIL	1	-0.765678	1.115757	-0.69	0.4928
Category_new GAME	1	-1.469220	1.187743	-1.24	0.2165
Category_new LIFES	1	1.676948	1.124252	1.49	0.1362
Category_new MEDIA	1	-0.442249	1.306747	-0.34	0.7351
Category_new SOCIA	1	-1.137084	1.272959	-0.89	0.3720
Category_new TOOLS	1	-1.480252	1.103252	-1.34	0.1801
Category_new TRANS	0	0	.	.	.
Content_Rating Everyone	1	-1.566410	0.685127	-2.29	0.0225
Content_Rating Mature 1	1	-1.146825	1.241978	-0.92	0.3561
Content_Rating Teen	0	0	.	.	.
Recency	1	-0.000428	0.000294	-1.45	0.1463

backward selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure**

Data Set	WORK.APP_PAID
Dependent Variable	Price
Selection Method	Backward
Select Criterion	Cross Validation
Stop Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	Single
Random Number Seed	585831001

Number of Observations Read	726
Number of Observations Used	726

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	0 1 2 3 4 5
Android_Ver	2	0 1
Content_Rating	3	Everyone Mature 1 Teen
update	10	0 1 2 3 4 5 6 7 8 10

Dimensions	
Number of Effects	14
Number of Parameters	61

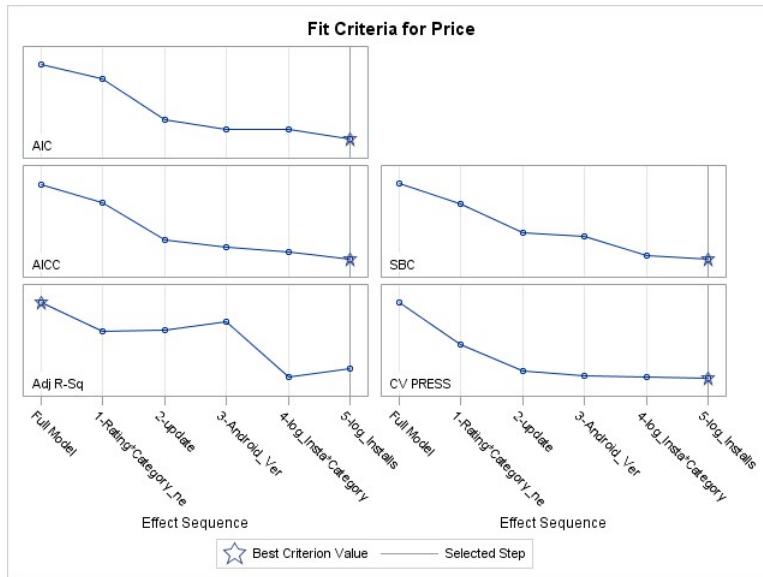
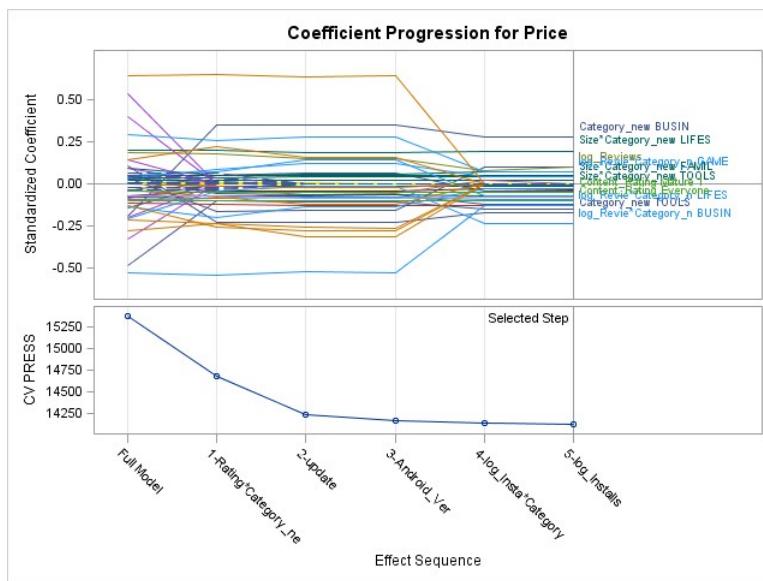
backward selection with cross validation as criteria with 10-folds
The GLMSELECT Procedure

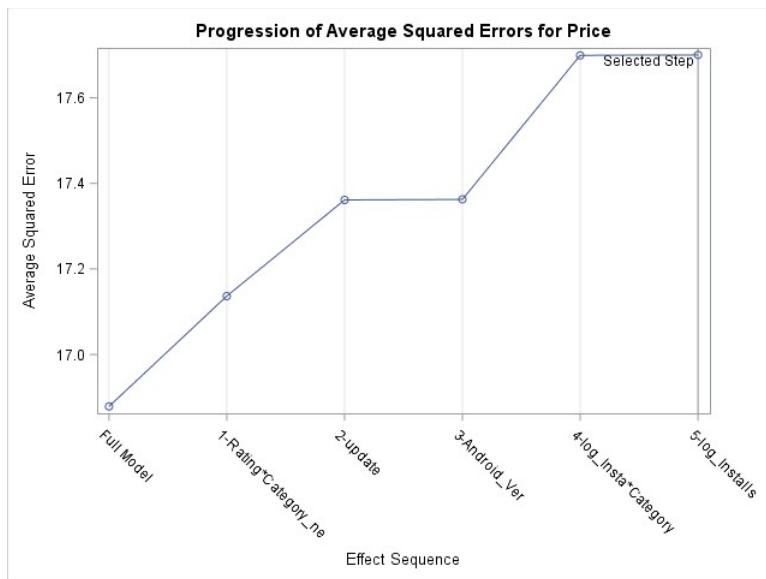
Backward Selection Summary				
Step	Effect Removed	Number Effects In	NumberParms In	CV PRESS
0		14	53	15380.5179
1	Rating*Category_new	13	46	14680.0317
2	update	12	37	14235.8505
3	Android_Ver	11	36	14167.4213
4	log_Insta*Category_n	10	29	14138.4490
5	log_Installs	9	28	14122.5100*

* Optimal Value of Criterion

Selection stopped at a local minimum of the cross validation PRESS.

Stop Details			
Candidate For	Effect	Candidate CV PRESS	Compare CV PRESS
Removal	Rating	14124.1405	> 14122.5100





backward selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure
Selected Model****The selected model is the model at the last step (Step 5).**

Effects:	Intercept Category_new Size Size*Category_new Rating log_Reviews log_Revie*Category_n Content_Rating Recency
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	27	2446.91413	90.62645	4.92	<.0001
Error	698	12850	18.40999		
Corrected Total	725	15297			

Root MSE	4.29069
Dependent Mean	4.14933
R-Square	0.1600
Adj R-Sq	0.1275
AIC	2870.20659
AICC	2872.70659
SBC	2270.65799
CV PRESS	14123

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	7.739847	3.281083	2.36	0.0186
Category_new BUSIN	1	7.608106	3.361869	2.26	0.0239
Category_new FAMIL	1	-1.592223	2.958584	-0.54	0.5906
Category_new GAME	1	-1.716038	3.074226	-0.56	0.5769
Category_new LIFES	1	1.159762	2.975837	0.39	0.6969
Category_new MEDIA	1	-0.085773	3.113726	-0.03	0.9780
Category_new SOCIA	1	-0.877489	3.121262	-0.28	0.7787
Category_new TOOLS	1	-1.743630	2.926867	-0.60	0.5515
Category_new TRANS	0	0	.	.	.
Size	1	-0.027895	0.046521	-0.60	0.5490
Size*Category_new BUSIN	1	0.143692	0.116445	1.23	0.2176
Size*Category_new FAMIL	1	0.011943	0.048683	0.25	0.8063
Size*Category_new GAME	1	-0.023401	0.050420	-0.46	0.6427
Size*Category_new LIFES	1	0.079314	0.050053	1.58	0.1135
Size*Category_new MEDIA	1	0.063120	0.075790	0.83	0.4052
Size*Category_new SOCIA	1	0.040860	0.087810	0.47	0.6418
Size*Category_new TOOLS	1	-0.006798	0.051180	-0.13	0.8944
Size*Category_new TRANS	0	0	.	.	.
Rating	1	-0.294113	0.337135	-0.87	0.3833
log_Reviews	1	0.141675	0.383342	0.37	0.7118
log_Revie*Category_n BUSIN	1	-1.269310	0.487160	-2.61	0.0094
log_Revie*Category_n FAMIL	1	0.068038	0.394680	0.17	0.8632
log_Revie*Category_n GAME	1	0.144405	0.410126	0.35	0.7249
log_Revie*Category_n LIFES	1	-0.286922	0.406191	-0.71	0.4802
log_Revie*Category_n MEDIA	1	-0.541904	0.466721	-1.16	0.2460
log_Revie*Category_n SOCIA	1	-0.288481	0.448278	-0.64	0.5201
log_Revie*Category_n TOOLS	1	-0.044262	0.394027	-0.11	0.9106
log_Revie*Category_n TRANS	0	0	.	.	.
Content_Rating Everyone	1	-1.525631	0.688022	-2.22	0.0269
Content_Rating Mature 1	1	-1.442443	1.258296	-1.15	0.2520
Content_Rating Teen	0	0	.	.	.
Recency	1	-0.000621	0.000303	-2.05	0.0405

stepwise selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure**

Data Set	WORK.APP_PAID
Dependent Variable	Price
Selection Method	Stepwise
Select Criterion	Cross Validation
Stop Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	Single
Random Number Seed	588732001

Number of Observations Read	726
Number of Observations Used	726

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	0 1 2 3 4 5
Android_Ver	2	0 1
Content_Rating	3	Everyone Mature 1 Teen
update	10	0 1 2 3 4 5 6 7 8 10

Dimensions	
Number of Effects	14
Number of Parameters	61

stepwise selection with cross validation as criteria with 10-folds

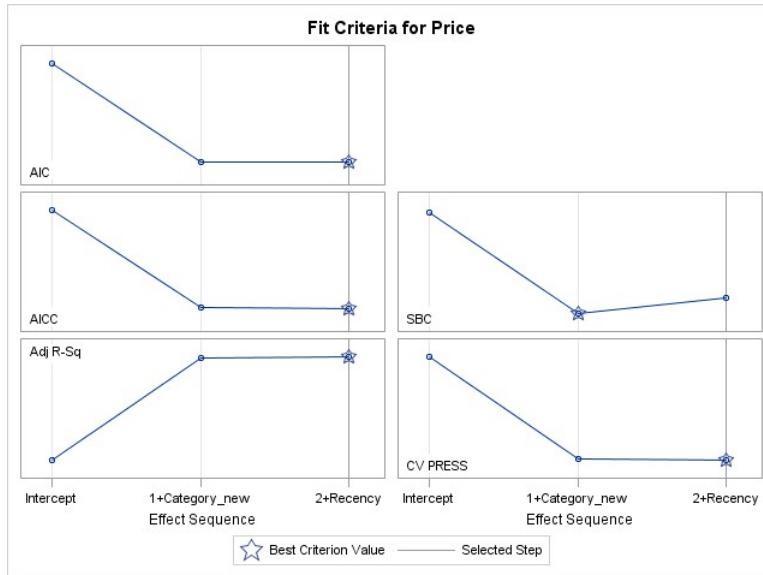
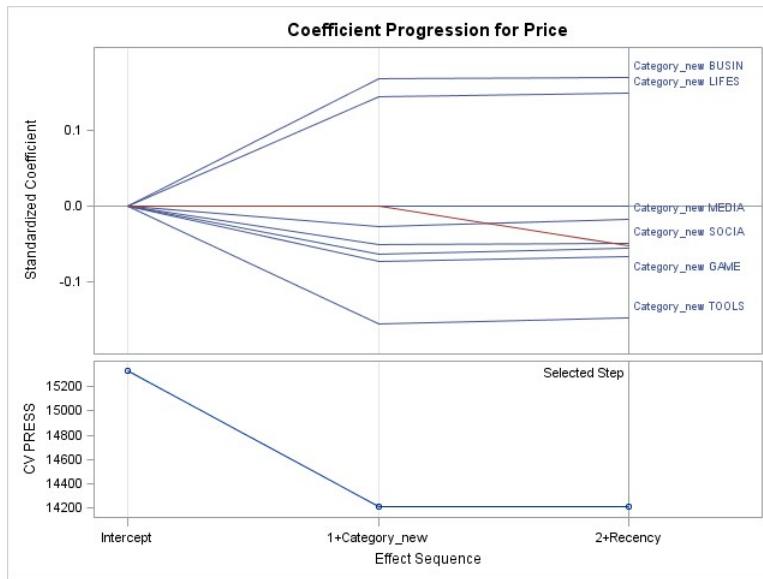
The GLMSELECT Procedure

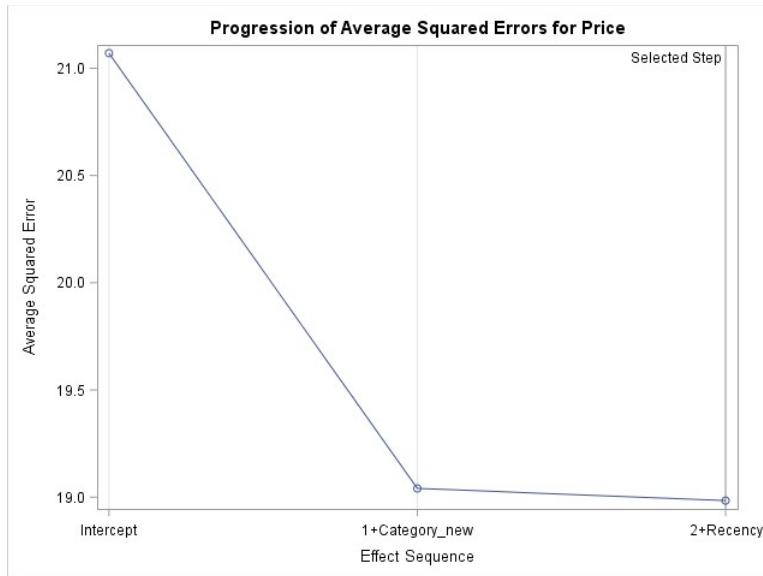
Stepwise Selection Summary					
Step	Effect Entered	Effect Removed	Number Effects In	NumberParms In	CV PRESS
0	Intercept		1	1	15330.6881
1	Category_new		2	8	14213.3855
2	Recency		3	9	14207.8403*

* Optimal Value of Criterion

Selection stopped at a local minimum of the cross validation PRESS.

Stop Details			
Candidate For	Effect	Candidate CV PRESS	Compare CV PRESS
Entry	Rating	14227.7829	> 14207.8403
Removal	Recency	14213.3855	> 14207.8403





stepwise selection with cross validation as criteria with 10-folds**The GLMSELECT Procedure
Selected Model****The selected model is the model at the last step (Step 2).**

Effects:	Intercept Category_new Recency
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	8	1514.79548	189.34943	9.85	<.0001
Error	717	13782	19.22217		
Corrected Total	725	15297			

Root MSE	4.38431
Dependent Mean	4.14933
R-Square	0.0990
Adj R-Sq	0.0890
AIC	2883.04638
AICC	2883.35407
SBC	2196.33433
CV PRESS	14208

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t Value	Pr > t
Intercept	1	4.663711	1.067632	4.37	<.0001
Category_new BUSIN	1	4.621663	1.430670	3.23	0.0013
Category_new FAMIL	1	-0.587406	1.115518	-0.53	0.5987
Category_new GAME	1	-0.970229	1.169861	-0.83	0.4072
Category_new LIFES	1	1.719901	1.126437	1.53	0.1272
Category_new MEDIA	1	-0.381670	1.309059	-0.29	0.7707
Category_new SOCIA	1	-0.977131	1.269747	-0.77	0.4418
Category_new TOOLS	1	-1.475488	1.105710	-1.33	0.1825
Category_new TRANS	0	0	.	.	.
Recency	1	-0.000433	0.000295	-1.47	0.1426

LASSO regression with Cross_Validation as criteria**The GLMSELECT Procedure**

Data Set	WORK.APP_PAID
Dependent Variable	Price
Selection Method	LASSO
Stop Criterion	None
Choose Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	None
Random Number Seed	591584001

Number of Observations Read	726
Number of Observations Used	726

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	0 1 2 3 4 5
Android_Ver	2	0 1
Content_Rating	3	Everyone Mature 1 Teen
update	10	0 1 2 3 4 5 6 7 8 10

Dimensions	
Number of Effects	14
Number of Effects after Splits	61
Number of Parameters	61

LASSO regression with Cross_Validation as criteria

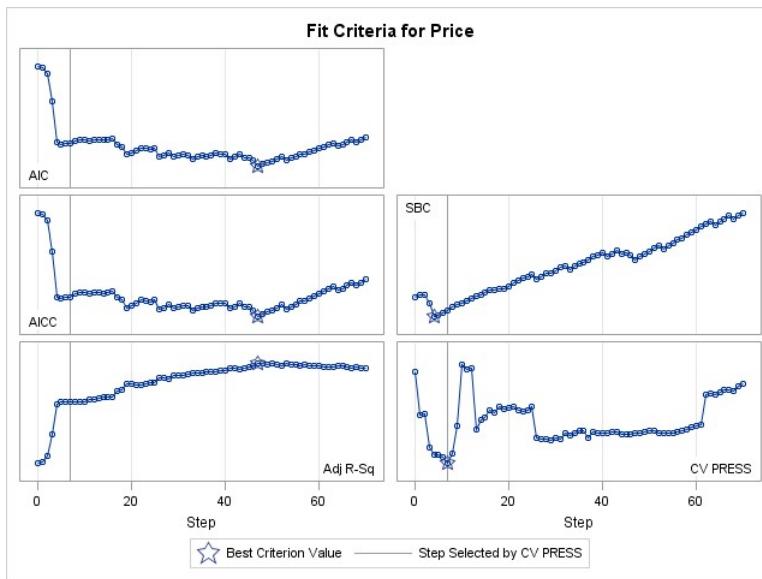
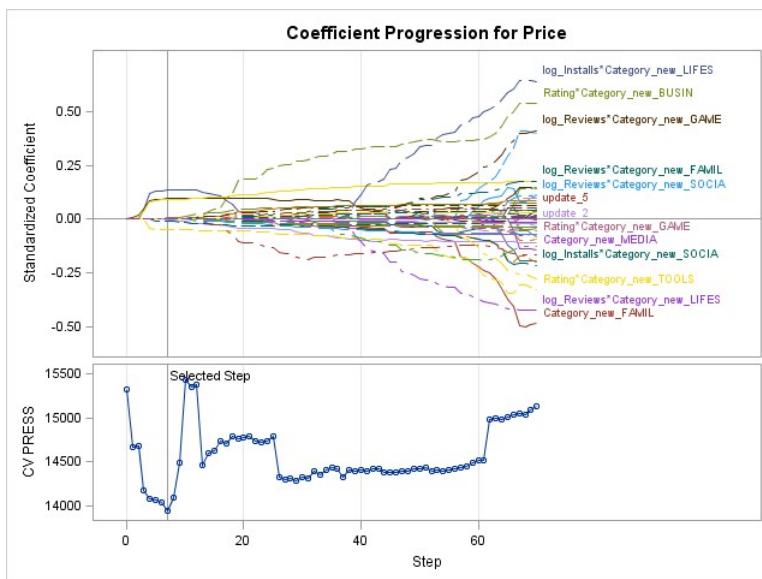
The GLMSELECT Procedure

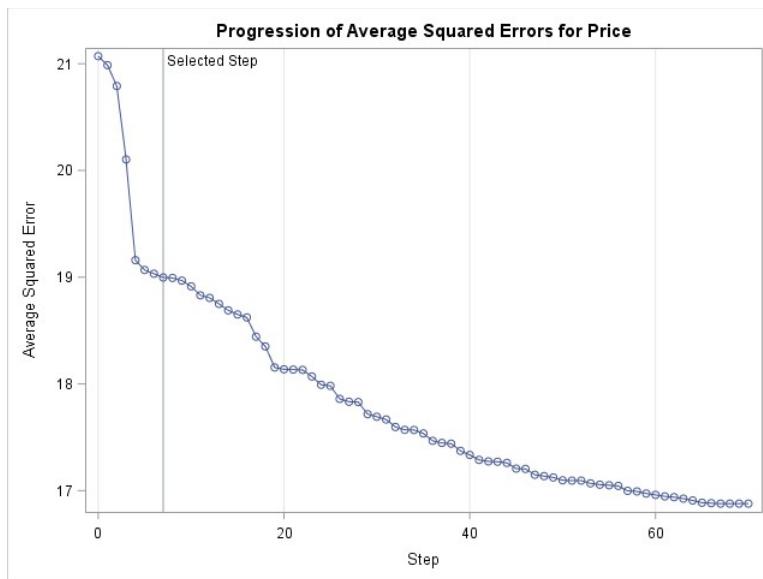
LASSO Selection Summary				
Step	Effect Entered	Effect Removed	Number Effects In	CV PRESS
0	Intercept		1	15324.8742
1	Category_new_LIFES		2	14673.2365
2	Size*Category_new_LIFES		3	14683.7898
3	Category_new_BUSIN		4	14173.5056
4	Rating*Category_new_TOOLS		5	14080.6478
5	Size*Category_new_TOOLS		6	14065.5222
6	Content_Rating_Teen		7	14035.8023
7	Size*Category_new_GAME		8	13944.0777*
8	update_7		9	14088.9788
9	Size*Category_new_BUSIN		10	14497.1259
10	Rating*Category_new_BUSIN		11	15430.7187
11	Recency		12	15355.9421
12	update_1		13	15370.7111
13	log_Reviews*Category_new_BUSIN		14	14459.7143
14	update_5		15	14603.4563
15	log_Reviews*Category_new_FAMILY		16	14625.2267
16	update_3		17	14736.4713
17	update_0		18	14712.2889
18	update_6		19	14785.8506
19	log_Installs*Category_new_SOCIA		20	14760.6425
20	Rating		21	14774.4153
21	log_Reviews*Category_new_TRANS		22	14789.6164
22	Size		23	14734.0905
23	log_Reviews*Category_new_MEDIA		24	14727.2229
24	Content_Rating_Everyone		25	14738.6094
25	log_Reviews		26	14785.6957
26		Category_new_BUSIN	25	14326.1173
27	Size*Category_new_MEDIA		26	14302.7512
28	Size*Category_new_FAMILY		27	14312.6985
29	log_Reviews*Category_new_GAME		28	14283.5734
30	log_Installs		29	14322.9799
31	Category_new_FAMILY		30	14308.2783
32	log_Installs*Category_new_BUSIN		31	14401.3645
33		log_Reviews	30	14359.7315
34	Android_Ver_0		31	14404.3229
35	Rating*Category_new_MEDIA		32	14434.7900
36	log_Reviews*Category_new_LIFES		33	14424.9341
37	log_Installs*Category_new_LIFES		34	14323.8716
38	update_4		35	14408.7478
39	log_Reviews		36	14395.8636
40	update_2		37	14405.0343
41		log_Installs	36	14398.0274
42	log_Reviews*Category_new_SOCIA		37	14423.3849
43	Category_new_GAME		38	14422.4175
44		log_Reviews*Category_new_SOCIA	37	14386.2372
45	Size*Category_new_SOCIA		38	14384.5928
46		Size*Category_new_FAMILY	37	14382.1713
47		Category_new_LIFES	36	14388.7135
48	log_Installs*Category_new_TOOLS		37	14399.4126
49	Rating*Category_new_SOCIA		38	14419.0463
50	update_8		39	14428.4924
51	Size*Category_new_FAMILY		40	14440.3901
52	Rating*Category_new_LIFES		41	14396.3570
53		Size*Category_new_FAMILY	40	14401.9162
54	Size*Category_new_TRANS		41	14396.3570
55	log_Installs*Category_new_GAME		42	14405.9726
56	log_Installs*Category_new_FAMILY		43	14420.4244

57	Rating*Category_new_FAMILY		44	14436.9630
58	Category_new_TOOLS		45	14453.4047
59	log_Installs		46	14486.8623
60	log_Installs*Category_new_MEDIA		47	14511.2505
61	Rating*Category_new_GAME		48	14523.1991
62	Category_new_BUSIN		49	14975.3522
63	log_Reviews*Category_new_SOCIA		50	14996.8070
64		Category_new_GAME	49	14977.8973
65	Category_new_LIFES		50	15012.1035
66	Category_new_MEDIA		51	15039.0330
67	Category_new_SOCIA		52	15049.9957
68		log_Installs*Category_new_MEDIA	51	15029.5511
69	Category_new_GAME		52	15096.0456
70	log_Installs*Category_new_MEDIA		53	15129.2278

* Optimal Value of Criterion

Selection stopped because the change of the maximum absolute correction is tiny.





LASSO regression with Cross_Validation as criteria**The GLMSELECT Procedure
Selected Model**

The selected model, based on Cross Validation, is the model at Step 7.

Effects:	Intercept Category_new_BUSIN Category_new_LIFES Size*Category_new_GAME Size*Category_new_LIFES Size*Category_new_TOOLS Rating*Category_new_TOOLS Content_Rating_Teen
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	1505.35380	215.05054	11.20	<.0001
Error	718	13792	19.20855		
Corrected Total	725	15297			

Root MSE	4.38276
Dependent Mean	4.14933
R-Square	0.0984
Adj R-Sq	0.0896
AIC	2881.54356
AICC	2881.79496
SBC	2190.24396
CV PRESS	13944

Parameter Estimates		
Parameter	DF	Estimate
Intercept	1	3.848979
Category_new_BUSIN	1	3.697650
Category_new_LIFES	1	1.100532
Size*Category_new_GAME	1	-0.001110
Size*Category_new_LIFES	1	0.036663
Size*Category_new_TOOLS	1	-0.005455
Rating*Category_new_TOOLS	1	-0.111001
Content_Rating_Teen	1	0.126568

Elasticnet regression with Cross_Validation as criteria**The GLMSELECT Procedure**

Data Set	WORK.APP_PAID
Dependent Variable	Price
Selection Method	ELASTICNET
Stop Criterion	None
Choose Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	10
Effect Hierarchy Enforced	None
Random Number Seed	595260001

Number of Observations Read	726
Number of Observations Used	726

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL GAME LIFES MEDIA SOCIA TOOLS TRANS
Installs_new	6	0 1 2 3 4 5
Android_Ver	2	0 1
Content_Rating	3	Everyone Mature 1 Teen
update	10	0 1 2 3 4 5 6 7 8 10

Dimensions	
Number of Effects	14
Number of Effects after Splits	61
Number of Parameters	61

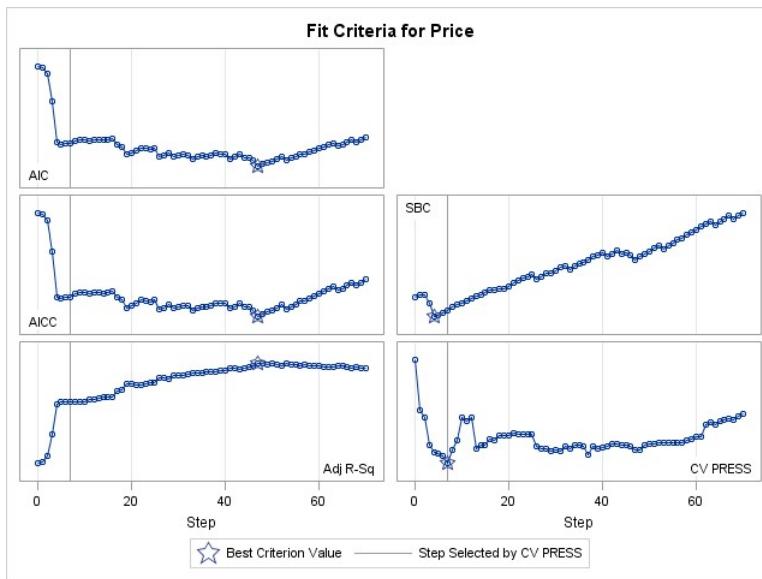
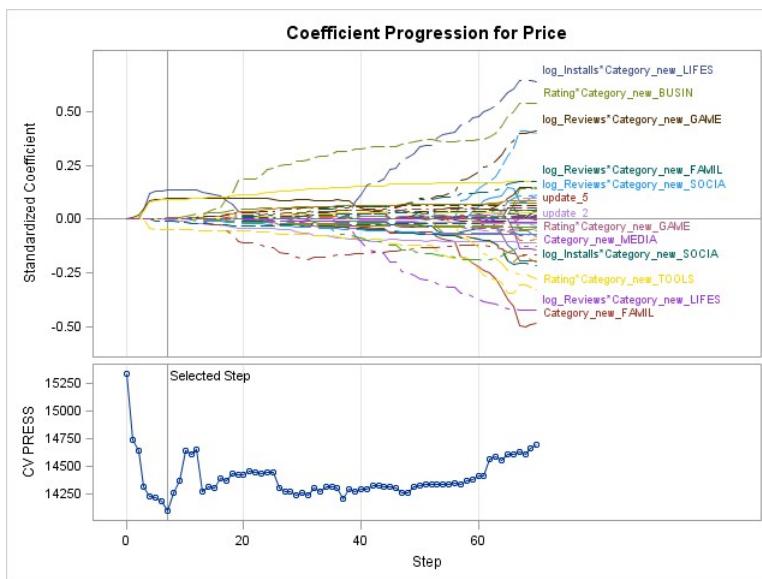
Elasticnet regression with Cross_Validation as criteria**The GLMSELECT Procedure**

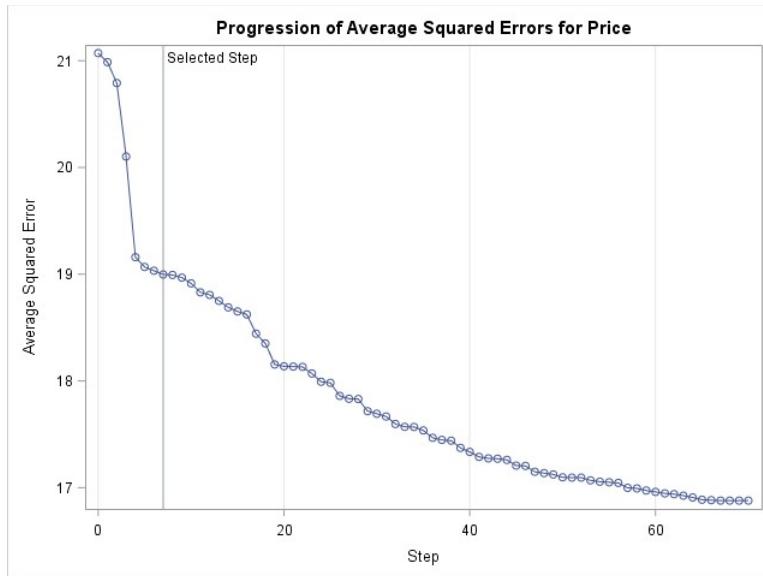
Elastic Net Selection Summary				
Step	Effect Entered	Effect Removed	Number Effects In	CV PRESS
0	Intercept		1	15336.5554
1	Category_new_LIFES		2	14735.9299
2	Size*Category_new_LIFES		3	14642.7032
3	Category_new_BUSIN		4	14310.8968
4	Rating*Category_new_TOOLS		5	14227.7020
5	Size*Category_new_TOOLS		6	14215.6943
6	Content_Rating_Teen		7	14186.9773
7	Size*Category_new_GAME		8	14097.1954*
8	update_7		9	14262.1681
9	Size*Category_new_BUSIN		10	14365.7158
10	Rating*Category_new_BUSIN		11	14639.6376
11	Recency		12	14609.1102
12	update_1		13	14649.1572
13	log_Reviews*Category_new_BUSIN		14	14270.0848
14	update_5		15	14311.5740
15	log_Reviews*Category_new_FAMILY		16	14308.5139
16	update_3		17	14390.4820
17	update_0		18	14370.2077
18	update_6		19	14434.2679
19	log_Installs*Category_new_SOCIA		20	14428.8061
20	Rating		21	14426.2746
21	log_Reviews*Category_new_TRANS		22	14455.4273
22	Size		23	14442.5992
23	log_Reviews*Category_new_MEDIA		24	14438.5843
24	Content_Rating_Everyone		25	14448.7002
25	log_Reviews		26	14449.8445
26		Category_new_BUSIN	25	14303.1325
27	Size*Category_new_MEDIA		26	14268.8052
28	Size*Category_new_FAMILY		27	14274.9701
29	log_Reviews*Category_new_GAME		28	14236.8221
30	log_Installs		29	14256.2134
31	Category_new_FAMILY		30	14240.8661
32	log_Installs*Category_new_BUSIN		31	14299.1610
33		log_Reviews	30	14277.0752
34	Android_Ver_0		31	14313.8860
35	Rating*Category_new_MEDIA		32	14319.8475
36	log_Reviews*Category_new_LIFES		33	14298.9850
37	log_Installs*Category_new_LIFES		34	14204.2805
38	update_4		35	14297.4672
39	log_Reviews		36	14275.2534
40	update_2		37	14289.0279
41		log_Installs	36	14294.6599
42	log_Reviews*Category_new_SOCIA		37	14328.9845
43	Category_new_GAME		38	14328.1566
44		log_Reviews*Category_new_SOCIA	37	14314.7839
45	Size*Category_new_SOCIA		38	14317.8151
46		Size*Category_new_FAMILY	37	14306.5688
47		Category_new_LIFES	36	14260.6668
48	log_Installs*Category_new_TOOLS		37	14259.6208
49	Rating*Category_new_SOCIA		38	14316.5414
50	update_8		39	14325.9923
51	Size*Category_new_FAMILY		40	14334.1801
52	Rating*Category_new_LIFES		41	14337.8339
53		Size*Category_new_FAMILY	40	14336.3797
54	Size*Category_new_TRANS		41	14337.8339
55	log_Installs*Category_new_GAME		42	14338.7276
56	log_Installs*Category_new_FAMILY		43	14343.2111

57	Rating*Category_new_FAMILY		44	14341.9919
58	Category_new_TOOLS		45	14367.3960
59	log_Installs		46	14384.4397
60	log_Installs*Category_new_MEDIA		47	14411.8874
61	Rating*Category_new_GAME		48	14414.6316
62	Category_new_BUSIN		49	14565.9009
63	log_Reviews*Category_new_SOCIA		50	14581.1810
64	Category_new_GAME		49	14558.5648
65	Category_new_LIFES		50	14605.4280
66	Category_new_MEDIA		51	14609.9691
67	Category_new_SOCIA		52	14628.9716
68	log_Installs*Category_new_MEDIA		51	14610.3039
69	Category_new_GAME		52	14666.6152
70	log_Installs*Category_new_MEDIA		53	14692.7045

* Optimal Value of Criterion

Selection stopped because the change of the maximum absolute correction is tiny.





Elasticnet regression with Cross_Validation as criteria**The GLMSELECT Procedure
Selected Model****The selected model, based on Cross Validation, is the model at Step 7.**

Effects:	Intercept Category_new_BUSIN Category_new_LIFES Size*Category_new_GAME Size*Category_new_LIFES Size*Category_new_TOOLS Rating*Category_new_TOOLS Content_Rating_Teen
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Note: The p-values for parameters and effects are not adjusted for the fact that the terms in the model have been selected and so are generally liberal.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	7	1505.35380	215.05054	11.20	<.0001
Error	718	13792	19.20855		
Corrected Total	725	15297			

Root MSE	4.38276
Dependent Mean	4.14933
R-Square	0.0984
Adj R-Sq	0.0896
AIC	2881.54356
AICC	2881.79496
SBC	2190.24396
CV PRESS	14097

Parameter Estimates		
Parameter	DF	Estimate
Intercept	1	3.848979
Category_new_BUSIN	1	3.697650
Category_new_LIFES	1	1.100532
Size*Category_new_GAME	1	-0.001110
Size*Category_new_LIFES	1	0.036663
Size*Category_new_TOOLS	1	-0.005455
Rating*Category_new_TOOLS	1	-0.111001
Content_Rating_Teen	1	0.126568

Elasticnet regression with Cross_Validation as criteria**The GLM Procedure**

Class Level Information		
Class	Levels	Values
Category_new	8	BUSIN FAMIL LIFES MEDIA SOCIA TOOLS TRANS GAME
rate	5	2 3 4 5 1
Content_Rating	3	Mature 1 Teen Everyone
Android_Ver	2	0 1
update	10	0 2 3 4 5 6 7 8 10 1

Number of Observations Read	756
Number of Observations Used	756

Elasticnet regression with Cross_Validation as criteria

The GLM Procedure

Dependent Variable: rate

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	46	30.3682220	0.6601787	2.53	<.0001
Error	709	185.2137885	0.2612324		
Corrected Total	755	215.5820106			

R-Square	Coeff Var	Root MSE	rate Mean
0.140866	13.29657	0.511109	3.843915

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Category_new	7	6.89739418	0.98534203	3.77	0.0005
Size	1	0.64993135	0.64993135	2.49	0.1152
Installs_new	1	0.10168192	0.10168192	0.39	0.5329
Price	1	0.98296527	0.98296527	3.76	0.0528
Android_Ver	1	0.01525032	0.01525032	0.06	0.8091
log_Reviews	1	0.05215193	0.05215193	0.20	0.6551
Recency	1	0.55692155	0.55692155	2.13	0.1447
Content_Rating	2	0.70246814	0.35123407	1.34	0.2613
Size*Category_new	7	3.15538079	0.45076868	1.73	0.0999
Price*Category_new	7	3.78604536	0.54086362	2.07	0.0445
log_Installs	1	10.09310273	10.09310273	38.64	<.0001
log_Insta*Category_n	7	1.78145573	0.25449368	0.97	0.4488
update	9	1.59347275	0.17705253	0.68	0.7295

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Category_new	7	3.60098305	0.51442615	1.97	0.0568
Size	1	0.00646865	0.00646865	0.02	0.8750
Installs_new	1	3.07574162	3.07574162	11.77	0.0006
Price	1	0.17383472	0.17383472	0.67	0.4149
Android_Ver	1	0.00228086	0.00228086	0.01	0.9256
log_Reviews	1	1.51286686	1.51286686	5.79	0.0164
Recency	1	0.05617635	0.05617635	0.22	0.6430
Content_Rating	2	0.78248721	0.39124360	1.50	0.2244
Size*Category_new	7	2.83002243	0.40428892	1.55	0.1481
Price*Category_new	7	4.76640325	0.68091475	2.61	0.0116
log_Installs	1	8.44414806	8.44414806	32.32	<.0001
log_Insta*Category_n	7	1.81166110	0.25880873	0.99	0.4367
update	9	1.59347275	0.17705253	0.68	0.7295

Parameter	Estimate	Standard Error	t Value	Pr > t
Intercept	4.440710932	B	0.18424135	24.10 <.0001
Category_new BUSIN	-0.715733594	B	0.26451976	-2.71 0.0070
Category_new FAMIL	-0.311708959	B	0.18803760	-1.66 0.0978
Category_new LIFES	-0.102046849	B	0.20059467	-0.51 0.6111
Category_new MEDIA	-0.125944534	B	0.34219329	-0.37 0.7129
Category_new SOCIA	-0.635766037	B	0.25990679	-2.45 0.0147
Category_new TOOLS	-0.177954597	B	0.18145494	-0.98 0.3271
Category_new TRANS	-0.362036673	B	0.49518055	-0.73 0.4649
Category_new GAME	0.000000000	B	.	.
Size	-0.001269929	B	0.00247682	-0.51 0.6083
Installs_new	0.190464699	0.05550768	3.43	0.0006
Price	-0.015659836	B	0.01897941	-0.83 0.4096
Android_Ver 0	0.007439567	B	0.07961809	0.09 0.9256
Android_Ver 1	0.000000000	B	.	.
log_Reviews	0.048501516	0.02015434	2.41	0.0164
Recency	-0.000016902	0.00003645	-0.46	0.6430
Content_Rating Mature 1	0.200046799	B	0.12922174	1.55 0.1220
Content_Rating Teen	0.074443959	B	0.08246969	0.90 0.3670
Content_Rating Everyone	0.000000000	B	.	.
Size*Category_new BUSIN	-0.018342224	B	0.00967197	-1.90 0.0583

Size*Category_new FAMIL	0.002622728	B	0.00297782	0.88	0.3787
Size*Category_new LIFES	0.002234090	B	0.00326465	0.68	0.4940
Size*Category_new MEDIA	0.008545149	B	0.00784842	1.09	0.2766
Size*Category_new SOCIA	0.003403790	B	0.00935649	0.36	0.7161
Size*Category_new TOOLS	0.007782651	B	0.00356737	2.18	0.0295
Size*Category_new TRANS	0.001285480	B	0.00619543	0.21	0.8357
Size*Category_new GAME	0.000000000	B	.	.	.
Price*Category_new BUSIN	0.016361320	B	0.01898221	0.86	0.3890
Price*Category_new FAMIL	0.0156665957	B	0.01899124	0.82	0.4097
Price*Category_new LIFES	0.013266473	B	0.01899037	0.70	0.4850
Price*Category_new MEDIA	-0.019742147	B	0.05427045	-0.36	0.7161
Price*Category_new SOCIA	0.016265778	B	0.01976362	0.82	0.4108
Price*Category_new TOOLS	0.011616896	B	0.01926252	0.60	0.5466
Price*Category_new TRANS	0.016694550	B	0.04369393	0.38	0.7025
Price*Category_new GAME	0.000000000	B	.	.	.
log_Installs	-0.129172438	B	0.02591372	-4.98	<.0001
log_Insta*Category_n BUSIN	0.059380933	B	0.03236514	1.83	0.0670
log_Insta*Category_n FAMIL	0.022457344	B	0.02035789	1.10	0.2703
log_Insta*Category_n LIFES	0.000410842	B	0.02275481	0.02	0.9856
log_Insta*Category_n MEDIA	-0.001542215	B	0.03893838	-0.04	0.9684
log_Insta*Category_n SOCIA	0.024611842	B	0.03188092	0.77	0.4404
log_Insta*Category_n TOOLS	-0.001570552	B	0.02024703	-0.08	0.9382
log_Insta*Category_n TRANS	0.002950016	B	0.04623023	0.06	0.9491
log_Insta*Category_n GAME	0.000000000	B	.	.	.
update 0	0.149375722	B	0.15811871	0.94	0.3451
update 2	-0.011925934	B	0.05730477	-0.21	0.8352
update 3	0.036380401	B	0.07632731	0.48	0.6338
update 4	0.120809996	B	0.10553533	1.14	0.2527
update 5	-0.057289230	B	0.15410865	-0.37	0.7102
update 6	0.064852437	B	0.15323986	0.42	0.6723
update 7	0.090599263	B	0.17755123	0.51	0.6100
update 8	0.054180950	B	0.20056072	0.27	0.7871
update 10	0.129778785	B	0.06738992	1.93	0.0545
update 1	0.000000000	B	.	.	.

Note: The X'X matrix has been found to be singular, and a generalized inverse was used to solve the normal equations. Terms whose estimates are followed by the letter 'B' are not uniquely estimable.

Elasticnet regression with Cross_Validation as criteria**The LOGISTIC Procedure**

Model Information	
Data Set	WORK.APP_PAID
Response Variable	rate
Number of Response Levels	5
Model	cumulative probit
Optimization Technique	Fisher's scoring

Number of Observations Read	756
Number of Observations Used	756

Response Profile		
Ordered Value	rate	Total Frequency
1	1	4
2	2	18
3	3	98
4	4	608
5	5	28

Probabilities modeled are cumulated over the lower Ordered Values.

Class Level Information									
Class	Value	Design Variables							
Category_new	BUSIN	1	0	0	0	0	0	0	
	FAMIL	0	1	0	0	0	0	0	
	GAME	-1	-1	-1	-1	-1	-1	-1	
	LIFES	0	0	1	0	0	0	0	
	MEDIA	0	0	0	1	0	0	0	
	SOCIA	0	0	0	0	1	0	0	
	TOOLS	0	0	0	0	0	1	0	
	TRANS	0	0	0	0	0	0	1	
Content_Rating	Everyone	-1	-1						
	Mature 1	1	0						
	Teen	0	1						
Android_Ver	0	1							
	1	-1							
update	0	1	0	0	0	0	0	0	0
	1	-1	-1	-1	-1	-1	-1	-1	-1
	2	0	1	0	0	0	0	0	0
	3	0	0	1	0	0	0	0	0
	4	0	0	0	1	0	0	0	0
	5	0	0	0	0	1	0	0	0
	6	0	0	0	0	0	1	0	0
	7	0	0	0	0	0	0	1	0
	8	0	0	0	0	0	0	0	1
	10	0	0	0	0	0	0	0	1
Installs_new	0	-1	-1	-1	-1	-1			
	1	1	0	0	0	0			
	2	0	1	0	0	0			
	3	0	0	1	0	0			
	4	0	0	0	1	0			
	5	0	0	0	0	1			

Model Convergence Status		
Convergence criterion (GCONV=1E-8) satisfied.		

Score Test for the Equal Slopes Assumption		
Chi-Square	DF	Pr > ChiSq
146.5725	150	0.5639

Model Fit Statistics		

Criterion	Intercept Only	Intercept and Covariates
AIC	1034.425	998.730
SC	1052.937	1248.644
-2 Log L	1026.425	890.730

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	135.6950	50	<.0001
Score	127.6753	50	<.0001
Wald	116.6235	50	<.0001

Joint Tests			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Category_new	7	20.5107	0.0046
Size	1	0.0125	0.9109
Installs_new	5	32.7720	<.0001
Android_Ver	1	0.0050	0.9436
log_Reviews	1	5.6305	0.0177
Recency	1	1.1200	0.2899
Content_Rating	2	2.7740	0.2498
Size*Category_new	7	11.6484	0.1127
Price	1	2.0804	0.1492
Price*Category_new	7	14.5837	0.0417
log_Installs	1	13.6892	0.0002
log_Insta*Category_n	7	9.5597	0.2149
update	9	5.0087	0.8336

Note: Under full-rank parameterizations, Type 3 effect tests are replaced by joint tests. The joint test for an effect is a test that all the parameters associated with that effect are zero. Such joint tests might not be equivalent to Type 3 effect tests under GLM parameterization.

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	1	-4.7504	0.6647	51.0736	<.0001
Intercept	2	1	-4.0216	0.6436	39.0440	<.0001
Intercept	3	1	-2.9801	0.6355	21.9886	<.0001
Intercept	4	1	0.2939	0.6203	0.2245	0.6356
Category_new	BUSIN	1	1.2936	0.5051	6.5578	0.0104
Category_new	FAMIL	1	-0.00661	0.3290	0.0004	0.9840
Category_new	LIFES	1	-0.5708	0.3649	2.4473	0.1177
Category_new	MEDIA	1	-0.7115	0.7476	0.9059	0.3412
Category_new	SOCIA	1	1.2884	0.5118	6.3358	0.0118
Category_new	TOOLS	1	-0.2476	0.3000	0.6811	0.4092
Category_new	TRANS	1	-0.0526	1.0451	0.0025	0.9598
Size		1	0.000598	0.00534	0.0125	0.9109
Installs_new	1	1	0.8915	0.2827	9.9471	0.0016
Installs_new	2	1	0.3222	0.2292	1.9758	0.1598
Installs_new	3	1	-0.2255	0.2508	0.8083	0.3686
Installs_new	4	1	-0.7766	0.3922	3.9209	0.0477
Installs_new	5	1	-0.7125	0.9847	0.5235	0.4694
Android_Ver	0	1	0.00760	0.1076	0.0050	0.9436
log_Reviews		1	-0.1298	0.0547	5.6305	0.0177
Recency		1	0.000103	0.000097	1.1200	0.2899
Content_Rating	Mature 1	1	-0.2956	0.2539	1.3554	0.2443
Content_Rating	Teen	1	0.0430	0.1899	0.0513	0.8208
Size*Category_new	BUSIN	1	0.0355	0.0197	3.2481	0.0715
Size*Category_new	FAMIL	1	-0.00412	0.00669	0.3792	0.5380
Size*Category_new	LIFES	1	-0.00119	0.00725	0.0270	0.8696
Size*Category_new	MEDIA	1	-0.0229	0.0183	1.5608	0.2115
Size*Category_new	SOCIA	1	0.00344	0.0213	0.0261	0.8717
Size*Category_new	TOOLS	1	-0.0202	0.00804	6.3365	0.0118
Size*Category_new	TRANS	1	0.00422	0.0131	0.1044	0.7466
Price		1	0.0328	0.0227	2.0804	0.1492

Price*Category_new	BUSIN	1	-0.0343	0.0228	2.2672	0.1321
Price*Category_new	FAMIL	1	-0.0324	0.0228	2.0262	0.1546
Price*Category_new	LIFES	1	-0.0281	0.0227	1.5296	0.2162
Price*Category_new	MEDIA	1	0.1174	0.1244	0.8906	0.3453
Price*Category_new	SOCIA	1	-0.0384	0.0267	2.0799	0.1493
Price*Category_new	TOOLS	1	-0.0202	0.0237	0.7238	0.3949
Price*Category_new	TRANS	1	0.0206	0.0880	0.0550	0.8146
log_Installs		1	0.2283	0.0617	13.6892	0.0002
log_Insta*Category_n	BUSIN	1	-0.1386	0.0667	4.3249	0.0376
log_Insta*Category_n	FAMIL	1	-0.00226	0.0370	0.0037	0.9514
log_Insta*Category_n	LIFES	1	0.0436	0.0435	1.0052	0.3161
log_Insta*Category_n	MEDIA	1	0.0579	0.0847	0.4670	0.4944
log_Insta*Category_n	SOCIA	1	-0.0830	0.0653	1.6187	0.2033
log_Insta*Category_n	TOOLS	1	0.0427	0.0353	1.4641	0.2263
log_Insta*Category_n	TRANS	1	0.0114	0.1002	0.0130	0.9094
update	0	1	-0.2555	0.4149	0.3792	0.5381
update	2	1	0.1801	0.1627	1.2260	0.2682
update	3	1	0.0783	0.2028	0.1490	0.6995
update	4	1	-0.3024	0.2788	1.1764	0.2781
update	5	1	0.2910	0.3698	0.6193	0.4313
update	6	1	0.1069	0.3706	0.0832	0.7730
update	7	1	0.00837	0.4420	0.0004	0.9849
update	8	1	-0.0199	0.4870	0.0017	0.9674
update	10	1	-0.1708	0.1853	0.8500	0.3566

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	76.2	Somers' D	0.535
Percent Discordant	22.8	Gamma	0.540
Percent Tied	1.0	Tau-a	0.179
Pairs	95572	c	0.767

Elasticnet regression with Cross_Validation as criteria**The LOGISTIC Procedure**

Model Information	
Data Set	WORK.APP_PAID
Response Variable	rate
Number of Response Levels	5
Model	cumulative logit
Optimization Technique	Fisher's scoring

Number of Observations Read	756
Number of Observations Used	756

Response Profile		
Ordered Value	rate	Total Frequency
1	1	4
2	2	18
3	3	98
4	4	608
5	5	28

Probabilities modeled are cumulated over the lower Ordered Values.

Class Level Information									
Class	Value	Design Variables							
Category_new	BUSIN	1	0	0	0	0	0	0	
	FAMIL	0	1	0	0	0	0	0	
	GAME	-1	-1	-1	-1	-1	-1	-1	
	LIFES	0	0	1	0	0	0	0	
	MEDIA	0	0	0	1	0	0	0	
	SOCIA	0	0	0	0	1	0	0	
	TOOLS	0	0	0	0	0	1	0	
	TRANS	0	0	0	0	0	0	1	
Content_Rating	Everyone	-1	-1						
	Mature 1	1	0						
	Teen	0	1						
Android_Ver	0	1							
	1	-1							
update	0	1	0	0	0	0	0	0	0
	1	-1	-1	-1	-1	-1	-1	-1	-1
	2	0	1	0	0	0	0	0	0
	3	0	0	1	0	0	0	0	0
	4	0	0	0	1	0	0	0	0
	5	0	0	0	0	1	0	0	0
	6	0	0	0	0	0	1	0	0
	7	0	0	0	0	0	0	1	0
	8	0	0	0	0	0	0	0	1
	10	0	0	0	0	0	0	0	1
Installs_new	0	-1	-1	-1	-1	-1			
	1	1	0	0	0	0			
	2	0	1	0	0	0			
	3	0	0	1	0	0			
	4	0	0	0	1	0			
	5	0	0	0	0	1			

Model Convergence Status		
Convergence criterion (GCONV=1E-8) satisfied.		

Score Test for the Proportional Odds Assumption		
Chi-Square	DF	Pr > ChiSq
1957.4091	150	<.0001

Model Fit Statistics		

Criterion	Intercept Only	Intercept and Covariates
AIC	1034.425	992.272
SC	1052.937	1242.186
-2 Log L	1026.425	884.272

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	142.1535	50	<.0001
Score	129.6761	50	<.0001
Wald	119.9556	50	<.0001

Joint Tests			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Category_new	7	22.6183	0.0020
Size	1	0.0004	0.9845
Installs_new	5	33.3004	<.0001
Android_Ver	1	0.0027	0.9585
log_Reviews	1	8.6168	0.0033
Recency	1	0.7073	0.4003
Content_Rating	2	1.9181	0.3833
Size*Category_new	7	13.3334	0.0644
Price	1	2.3843	0.1226
Price*Category_new	7	15.1911	0.0336
log_Installs	1	14.7675	0.0001
log_Insta*Category_n	7	9.6181	0.2113
update	9	5.0051	0.8339

Note: Under full-rank parameterizations, Type 3 effect tests are replaced by joint tests. The joint test for an effect is a test that all the parameters associated with that effect are zero. Such joint tests might not be equivalent to Type 3 effect tests under GLM parameterization.

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	1	-9.2089	1.3377	47.3939	<.0001
Intercept	2	1	-7.4083	1.2540	34.9018	<.0001
Intercept	3	1	-5.3307	1.2331	18.6892	<.0001
Intercept	4	1	0.7014	1.1955	0.3442	0.5574
Category_new	BUSIN	1	2.6079	0.9163	8.1007	0.0044
Category_new	FAMIL	1	-0.3970	0.6472	0.3764	0.5395
Category_new	LIFES	1	-0.9572	0.7129	1.8027	0.1794
Category_new	MEDIA	1	-1.2608	1.4545	0.7514	0.3860
Category_new	SOCIA	1	2.6278	0.9617	7.4663	0.0063
Category_new	TOOLS	1	-0.3709	0.5801	0.4089	0.5225
Category_new	TRANS	1	-0.2855	1.9216	0.0221	0.8819
Size		1	0.000194	0.00999	0.0004	0.9845
Installs_new	1	1	1.6822	0.5801	8.4092	0.0037
Installs_new	2	1	0.6959	0.4941	1.9836	0.1590
Installs_new	3	1	-0.3810	0.5395	0.4988	0.4800
Installs_new	4	1	-1.4164	0.8162	3.0120	0.0826
Installs_new	5	1	-1.3015	2.1633	0.3620	0.5474
Android_Ver	0	1	-0.0107	0.2058	0.0027	0.9585
log_Reviews		1	-0.3072	0.1047	8.6168	0.0033
Recency		1	0.000157	0.000187	0.7073	0.4003
Content_Rating	Mature 1	1	-0.5517	0.5161	1.1428	0.2851
Content_Rating	Teen	1	0.1300	0.3836	0.1149	0.7347
Size*Category_new	BUSIN	1	0.0654	0.0353	3.4183	0.0645
Size*Category_new	FAMIL	1	-0.00624	0.0128	0.2369	0.6264
Size*Category_new	LIFES	1	-0.00527	0.0138	0.1455	0.7029
Size*Category_new	MEDIA	1	-0.0422	0.0350	1.4483	0.2288
Size*Category_new	SOCIA	1	0.00421	0.0408	0.0107	0.9177
Size*Category_new	TOOLS	1	-0.0412	0.0152	7.3889	0.0066
Size*Category_new	TRANS	1	0.0121	0.0234	0.2689	0.6041
Price		1	0.0682	0.0442	2.3843	0.1226

Price*Category_new	BUSIN	1	-0.0712	0.0443	2.5824	0.1081
Price*Category_new	FAMIL	1	-0.0671	0.0443	2.2949	0.1298
Price*Category_new	LIFES	1	-0.0597	0.0442	1.8247	0.1768
Price*Category_new	MEDIA	1	0.2069	0.2512	0.6783	0.4102
Price*Category_new	SOCIA	1	-0.0813	0.0534	2.3240	0.1274
Price*Category_new	TOOLS	1	-0.0441	0.0457	0.9312	0.3345
Price*Category_new	TRANS	1	0.0922	0.1572	0.3435	0.5578
log_Installs		1	0.4598	0.1196	14.7675	0.0001
log_Insta*Category_n	BUSIN	1	-0.2692	0.1251	4.6277	0.0315
log_Insta*Category_n	FAMIL	1	0.0316	0.0737	0.1839	0.6681
log_Insta*Category_n	LIFES	1	0.0801	0.0860	0.8681	0.3515
log_Insta*Category_n	MEDIA	1	0.1144	0.1623	0.4965	0.4810
log_Insta*Category_n	SOCIA	1	-0.1676	0.1221	1.8834	0.1700
log_Insta*Category_n	TOOLS	1	0.0791	0.0687	1.3233	0.2500
log_Insta*Category_n	TRANS	1	-0.00356	0.1892	0.0004	0.9850
update	0	1	-0.3365	0.8385	0.1610	0.6882
update	2	1	0.4021	0.3083	1.7013	0.1921
update	3	1	0.0518	0.3957	0.0171	0.8958
update	4	1	-0.5997	0.5627	1.1361	0.2865
update	5	1	0.3814	0.7007	0.2963	0.5862
update	6	1	0.2031	0.7026	0.0836	0.7725
update	7	1	0.0511	0.8665	0.0035	0.9530
update	8	1	-0.00724	0.9291	0.0001	0.9938
update	10	1	-0.3372	0.3712	0.8252	0.3637

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
Installs_new 1 vs 0	2.615	1.010	6.767
Installs_new 2 vs 0	0.975	0.240	3.960
Installs_new 3 vs 0	0.332	0.050	2.218
Installs_new 4 vs 0	0.118	0.009	1.576
Installs_new 5 vs 0	0.132	<0.001	33.661
Android_Ver 0 vs 1	0.979	0.437	2.193
log_Reviews	0.735	0.599	0.903
Recency	1.000	1.000	1.001
Content_Rating Mature 1 vs Everyone	0.378	0.085	1.670
Content_Rating Teen vs Everyone	0.747	0.300	1.862
update 0 vs 1	0.590	0.099	3.525
update 2 vs 1	1.235	0.711	2.145
update 3 vs 1	0.870	0.399	1.897
update 4 vs 1	0.453	0.139	1.475
update 5 vs 1	1.210	0.275	5.327
update 6 vs 1	1.012	0.224	4.569
update 7 vs 1	0.869	0.133	5.682
update 8 vs 1	0.820	0.110	6.132
update 10 vs 1	0.590	0.284	1.223

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	76.5	Somers' D	0.539
Percent Discordant	22.6	Gamma	0.545
Percent Tied	1.0	Tau-a	0.181
Pairs	95572	c	0.770

Elasticnet regression with Cross_Validation as criteria**The LOGISTIC Procedure**

Model Information	
Data Set	WORK.APP_FREE
Response Variable	rate
Number of Response Levels	5
Model	cumulative probit
Optimization Technique	Fisher's scoring

Number of Observations Read	8904
Number of Observations Used	8904

Response Profile		
Ordered Value	rate	Total Frequency
1	1	51
2	2	207
3	3	1570
4	4	6833
5	5	243

Probabilities modeled are cumulated over the lower Ordered Values.

Class Level Information									
Class	Value	Design Variables							
Category_new	BUSIN	1	0	0	0	0	0	0	
	FAMIL	0	1	0	0	0	0	0	
	GAME	-1	-1	-1	-1	-1	-1	-1	
	LIFES	0	0	1	0	0	0	0	
	MEDIA	0	0	0	1	0	0	0	
	SOCIA	0	0	0	0	1	0	0	
	TOOLS	0	0	0	0	0	1	0	
	TRANS	0	0	0	0	0	0	1	
Content_Rating	Adults o	1	0	0	0				
	Everyone	-1	-1	-1	-1				
	Mature 1	0	1	0	0				
	Teen	0	0	1	0				
	Unrated	0	0	0	1				
Android_Ver	0	1							
	1	-1							
update	0	1	0	0	0	0	0	0	0
	1	-1	-1	-1	-1	-1	-1	-1	-1
	2	0	1	0	0	0	0	0	0
	3	0	0	1	0	0	0	0	0
	4	0	0	0	1	0	0	0	0
	5	0	0	0	0	1	0	0	0
	6	0	0	0	0	0	1	0	0
	7	0	0	0	0	0	0	1	0
	8	0	0	0	0	0	0	0	1
	9	0	0	0	0	0	0	0	1
	10	0	0	0	0	0	0	0	0
Installs_new	0	-1	-1	-1	-1				
	1	1	0	0	0				
	2	0	1	0	0				
	3	0	0	1	0				
	4	0	0	0	1				
	5	0	0	0	0	1			

Model Convergence Status			
Convergence criterion (GCONV=1E-8) satisfied.			

Score Test for the Equal Slopes Assumption		
Chi-Square	DF	Pr > ChiSq

819.9595	135	<.0001
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Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	12909.152	11761.534
SC	12937.529	12109.153
-2 Log L	12901.152	11663.534

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	1237.6180	45	<.0001
Score	1118.2979	45	<.0001
Wald	1070.7805	45	<.0001

Joint Tests			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Category_new	7	43.8236	<.0001
Size	1	12.6835	0.0004
Installs_new	5	408.6747	<.0001
Android_Ver	1	3.7416	0.0531
log_Reviews	1	239.1652	<.0001
Recency	1	41.8373	<.0001
Content_Rating	4	17.1155	0.0018
Size*Category_new	7	16.9784	0.0175
log_Installs	1	56.3343	<.0001
log_Insta*Category_n	7	42.8414	<.0001
update	10	27.2626	0.0024

Note: Under full-rank parameterizations, Type 3 effect tests are replaced by joint tests. The joint test for an effect is a test that all the parameters associated with that effect are zero. Such joint tests might not be equivalent to Type 3 effect tests under GLM parameterization.

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	1	-2.9849	0.3109	92.1781	<.0001
Intercept	2	1	-2.3409	0.3082	57.6965	<.0001
Intercept	3	1	-1.1701	0.3072	14.5056	0.0001
Intercept	4	1	1.9640	0.3080	40.6709	<.0001
Category_new	BUSIN	1	-0.0396	0.1172	0.1142	0.7354
Category_new	FAMIL	1	-0.5017	0.0971	26.7061	<.0001
Category_new	LIFES	1	-0.1373	0.0921	2.2221	0.1360
Category_new	MEDIA	1	-0.2755	0.1412	3.8074	0.0510
Category_new	SOCIA	1	0.3049	0.1106	7.6033	0.0058
Category_new	TOOLS	1	0.1511	0.0923	2.6787	0.1017
Category_new	TRANS	1	0.3808	0.1939	3.8583	0.0495
Size		1	0.00370	0.00104	12.6835	0.0004
Installs_new	1	1	-0.0699	0.0644	1.1750	0.2784
Installs_new	2	1	0.4048	0.0356	129.2301	<.0001
Installs_new	3	1	0.3622	0.0384	88.9065	<.0001
Installs_new	4	1	0.2390	0.0661	13.0801	0.0003
Installs_new	5	1	0.1696	0.1054	2.5872	0.1077
Android_Ver	0	1	-0.0542	0.0280	3.7416	0.0531
log_Reviews		1	-0.2101	0.0136	239.1652	<.0001
Recency		1	0.000248	0.000038	41.8373	<.0001
Content_Rating	Adults o	1	0.5520	0.6150	0.8058	0.3694
Content_Rating	Mature 1	1	0.4142	0.2584	2.5687	0.1090
Content_Rating	Teen	1	0.1678	0.2550	0.4332	0.5104
Content_Rating	Unrated	1	-1.2710	0.8400	2.2895	0.1303
Size*Category_new	BUSIN	1	-7.27E-6	0.00288	0.0000	0.9980
Size*Category_new	FAMIL	1	-0.00447	0.00160	7.7563	0.0054
Size*Category_new	LIFES	1	-0.00123	0.00187	0.4379	0.5082
Size*Category_new	MEDIA	1	0.00789	0.00342	5.3248	0.0210
Size*Category_new	SOCIA	1	-0.00139	0.00278	0.2515	0.6160

Size*Category_new	TOOLS	1	-0.00254	0.00241	1.1035	0.2935
Size*Category_new	TRANS	1	0.00661	0.00371	3.1708	0.0750
log_Installs		1	0.1359	0.0181	56.3343	<.0001
log_Insta*Category_n	BUSIN	1	0.00327	0.0115	0.0813	0.7755
log_Insta*Category_n	FAMIL	1	0.0508	0.00916	30.6938	<.0001
log_Insta*Category_n	LIFES	1	0.00435	0.00821	0.2804	0.5964
log_Insta*Category_n	MEDIA	1	0.0148	0.0121	1.4849	0.2230
log_Insta*Category_n	SOCIA	1	-0.0233	0.00928	6.3279	0.0119
log_Insta*Category_n	TOOLS	1	-0.0130	0.00762	2.8938	0.0889
log_Insta*Category_n	TRANS	1	-0.0357	0.0164	4.7297	0.0296
update	0	1	-0.3018	0.1035	8.5050	0.0035
update	2	1	-0.0606	0.0424	2.0431	0.1529
update	3	1	0.0547	0.0493	1.2316	0.2671
update	4	1	0.0489	0.0586	0.6963	0.4040
update	5	1	0.0718	0.0691	1.0801	0.2987
update	6	1	0.0947	0.0822	1.3275	0.2492
update	7	1	0.00525	0.1053	0.0025	0.9602
update	8	1	-0.0731	0.1159	0.3986	0.5278
update	9	1	0.1735	0.1522	1.2992	0.2544
update	10	1	0.0752	0.0471	2.5519	0.1102

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	73.2	Somers' D	0.474
Percent Discordant	25.8	Gamma	0.479
Percent Tied	1.1	Tau-a	0.180
Pairs	15010964	c	0.737

Elasticnet regression with Cross_Validation as criteria**The LOGISTIC Procedure**

Model Information	
Data Set	WORK.APP_FREE
Response Variable	rate
Number of Response Levels	5
Model	cumulative logit
Optimization Technique	Fisher's scoring

Number of Observations Read	8904
Number of Observations Used	8904

Response Profile		
Ordered Value	rate	Total Frequency
1	1	51
2	2	207
3	3	1570
4	4	6833
5	5	243

Probabilities modeled are cumulated over the lower Ordered Values.

Class Level Information									
Class	Value	Design Variables							
Category_new	BUSIN	1	0	0	0	0	0	0	
	FAMIL	0	1	0	0	0	0	0	
	GAME	-1	-1	-1	-1	-1	-1	-1	
	LIFES	0	0	1	0	0	0	0	
	MEDIA	0	0	0	1	0	0	0	
	SOCIA	0	0	0	0	1	0	0	
	TOOLS	0	0	0	0	0	1	0	
	TRANS	0	0	0	0	0	0	1	
Content_Rating	Adults o	1	0	0	0				
	Everyone	-1	-1	-1	-1				
	Mature 1	0	1	0	0				
	Teen	0	0	1	0				
	Unrated	0	0	0	1				
Android_Ver	0	1							
	1	-1							
update	0	1	0	0	0	0	0	0	0
	1	-1	-1	-1	-1	-1	-1	-1	-1
	2	0	1	0	0	0	0	0	0
	3	0	0	1	0	0	0	0	0
	4	0	0	0	1	0	0	0	0
	5	0	0	0	0	1	0	0	0
	6	0	0	0	0	0	1	0	0
	7	0	0	0	0	0	0	1	0
	8	0	0	0	0	0	0	0	1
	9	0	0	0	0	0	0	0	1
	10	0	0	0	0	0	0	0	0
Installs_new	0	-1	-1	-1	-1				
	1	1	0	0	0				
	2	0	1	0	0				
	3	0	0	1	0				
	4	0	0	0	1				
	5	0	0	0	0	1			

Model Convergence Status		
Convergence criterion (GCONV=1E-8) satisfied.		

Score Test for the Proportional Odds Assumption		
Chi-Square	DF	Pr > ChiSq

865.9268	135	<.0001
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Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	12909.152	11680.105
SC	12937.529	12027.723
-2 Log L	12901.152	11582.105

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	1319.0477	45	<.0001
Score	1135.1824	45	<.0001
Wald	1098.8002	45	<.0001

Joint Tests			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Category_new	7	41.3608	<.0001
Size	1	15.4423	<.0001
Installs_new	5	424.2305	<.0001
Android_Ver	1	3.3549	0.0670
log_Reviews	1	279.4914	<.0001
Recency	1	49.0155	<.0001
Content_Rating	4	19.2459	0.0007
Size*Category_new	7	21.4768	0.0031
log_Installs	1	54.7127	<.0001
log_Insta*Category_n	7	41.2743	<.0001
update	10	31.5739	0.0005

Note: Under full-rank parameterizations, Type 3 effect tests are replaced by joint tests. The joint test for an effect is a test that all the parameters associated with that effect are zero. Such joint tests might not be equivalent to Type 3 effect tests under GLM parameterization.

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	1	-5.8675	0.6382	84.5175	<.0001
Intercept	2	1	-4.2090	0.6261	45.1992	<.0001
Intercept	3	1	-1.9177	0.6234	9.4624	0.0021
Intercept	4	1	3.9376	0.6263	39.5301	<.0001
Category_new	BUSIN	1	-0.0882	0.2286	0.1489	0.6996
Category_new	FAMIL	1	-0.9020	0.1812	24.7783	<.0001
Category_new	LIFES	1	-0.3701	0.1776	4.3429	0.0372
Category_new	MEDIA	1	-0.4877	0.2658	3.3680	0.0665
Category_new	SOCIA	1	0.5716	0.2167	6.9571	0.0083
Category_new	TOOLS	1	0.2146	0.1790	1.4374	0.2306
Category_new	TRANS	1	0.8045	0.3685	4.7664	0.0290
Size		1	0.00742	0.00189	15.4423	<.0001
Installs_new	1	1	-0.1485	0.1204	1.5210	0.2175
Installs_new	2	1	0.7464	0.0643	134.6264	<.0001
Installs_new	3	1	0.7864	0.0714	121.2930	<.0001
Installs_new	4	1	0.6300	0.1252	25.3174	<.0001
Installs_new	5	1	0.5075	0.1999	6.4438	0.0111
Android_Ver	0	1	-0.0935	0.0511	3.3549	0.0670
log_Reviews		1	-0.4201	0.0251	279.4914	<.0001
Recency		1	0.000479	0.000068	49.0155	<.0001
Content_Rating	Adults o	1	1.1525	1.1068	1.0843	0.2977
Content_Rating	Mature 1	1	0.7957	0.5380	2.1871	0.1392
Content_Rating	Teen	1	0.3686	0.5330	0.4784	0.4892
Content_Rating	Unrated	1	-2.5786	1.8785	1.8842	0.1699
Size*Category_new	BUSIN	1	0.00144	0.00533	0.0733	0.7866
Size*Category_new	FAMIL	1	-0.00926	0.00294	9.9023	0.0017
Size*Category_new	LIFES	1	-0.00274	0.00343	0.6398	0.4238
Size*Category_new	MEDIA	1	0.0160	0.00604	7.0070	0.0081
Size*Category_new	SOCIA	1	-0.00098	0.00508	0.0371	0.8473

Size*Category_new	TOOLS	1	-0.00578	0.00449	1.6555	0.1982
Size*Category_new	TRANS	1	0.0114	0.00657	3.0000	0.0833
log_Installs		1	0.2529	0.0342	54.7127	<.0001
log_Insta*Category_n	BUSIN	1	0.00400	0.0225	0.0317	0.8588
log_Insta*Category_n	FAMIL	1	0.0948	0.0171	30.6660	<.0001
log_Insta*Category_n	LIFES	1	0.0152	0.0160	0.8958	0.3439
log_Insta*Category_n	MEDIA	1	0.0253	0.0232	1.1853	0.2763
log_Insta*Category_n	SOCIA	1	-0.0453	0.0186	5.9275	0.0149
log_Insta*Category_n	TOOLS	1	-0.0191	0.0151	1.5980	0.2062
log_Insta*Category_n	TRANS	1	-0.0717	0.0321	5.0063	0.0253
update	0	1	-0.5509	0.1965	7.8593	0.0051
update	2	1	-0.1094	0.0785	1.9407	0.1636
update	3	1	0.0908	0.0909	0.9972	0.3180
update	4	1	0.0776	0.1088	0.5090	0.4756
update	5	1	0.1800	0.1272	2.0022	0.1571
update	6	1	0.1488	0.1500	0.9849	0.3210
update	7	1	-0.0125	0.1997	0.0039	0.9501
update	8	1	-0.1669	0.2163	0.5959	0.4401
update	9	1	0.3634	0.2779	1.7099	0.1910
update	10	1	0.1670	0.0885	3.5620	0.0591

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
Installs_new 1 vs 0	10.733	7.750	14.865
Installs_new 2 vs 0	26.266	16.988	40.610
Installs_new 3 vs 0	27.338	15.732	47.507
Installs_new 4 vs 0	23.378	11.912	45.883
Installs_new 5 vs 0	20.684	9.155	46.732
Android_Ver 0 vs 1	0.829	0.679	1.013
log_Reviews	0.657	0.625	0.690
Recency	1.000	1.000	1.001
Content_Rating Adults o vs Everyone	2.437	0.208	28.492
Content_Rating Mature 1 vs Everyone	1.706	1.324	2.198
Content_Rating Teen vs Everyone	1.113	0.932	1.329
Content_Rating Unrated vs Everyone	0.058	<0.001	5.580
update 0 vs 1	0.696	0.459	1.054
update 2 vs 1	1.082	0.930	1.259
update 3 vs 1	1.322	1.100	1.587
update 4 vs 1	1.304	1.038	1.638
update 5 vs 1	1.445	1.104	1.891
update 6 vs 1	1.400	1.017	1.928
update 7 vs 1	1.192	0.777	1.829
update 8 vs 1	1.021	0.642	1.624
update 9 vs 1	1.736	0.952	3.164
update 10 vs 1	1.426	1.185	1.717

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	73.3	Somers' D	0.476
Percent Discordant	25.7	Gamma	0.481
Percent Tied	1.0	Tau-a	0.180
Pairs	15010964	c	0.738