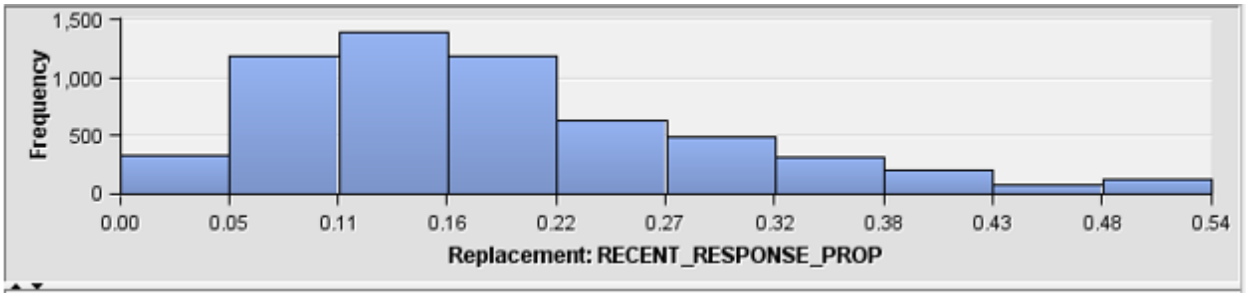
1. In this exercise, we determine which combinations of certain variables increase the average and total profit for TARGET_B at each iteration. Certain variables such as FREQUENCY_STATUS_97NK, and DONOR_AGE were used to determine our decision tree model.

Iteration 1:

S1



S2

Source	Method	Variable Name	Formula	Number of Levels
Input	Original	REP_REC...		.
Output	Computed	OPT_REP_...	Optimal Bin...	2

S3

S4

Odds Ratio Estimates

Effect		Point Estimate
IMP_REP_SES	1 vs 4	1.662
IMP_REP_SES	2 vs 4	1.444
IMP_REP_SES	3 vs 4	1.216
REP_FREQUENCY_STATUS_97NK		1.359

Q1. Two total variables are considered at this iteration.

Q2. These two variables are IMP_REP_SES and REP_FREQUENCY_STATUS_97K.

Q3. Both varialbes are from the newly introduced data segment.

Q4.

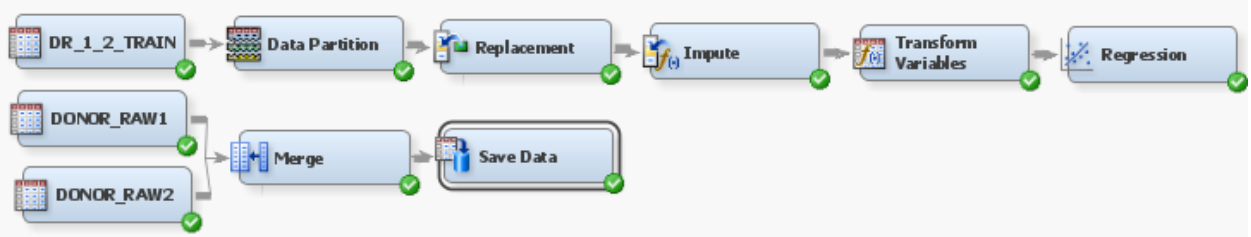
TARGET_B	TARGET_B	_PROF_	Total Profit f...	1989.996	1476.009	1465.233
TARGET_B	TARGET_B	_APROF_	Average Pr...	0.256807	0.254003	0.252105

Iteration 2:

S1. No newly inserted variables with a skewed distribution.

S2. No skewed distributions on newly inserted variables, so no transformations needed.

S3.



S4.

Odds Ratio Estimates

Effect		Point Estimate
IMP_REP_SES	1 vs 4	1.653
IMP_REP_SES	2 vs 4	1.420
IMP_REP_SES	3 vs 4	1.207
PEP_STAR	0 vs 1	0.847
REP_FREQUENCY_STATUS_97NK		1.269
REP_MONTHS_SINCE_ORIGIN		1.003
REP_RECENT_CARD_RESPONSE_PROP		1.601

Q1. 5 variables are considered at this iteration.

Q2. The variables considered at this iteration are IMP_REP_SES, PEP_STAR, REP_FREQUENCY_STATUS_97NK, REP_MONTHS_SINCE_ORIGIN , and REP_RECENT_CARD_RESPONSE_PROP.

Q3. The newly introduced variables are PEP_STAR, REP_MONTHS_SINCE_ORIGIN , and REP_RECENT_CARD_RESPONSE_PRO. Variables included from last iteration are IMP_REP_SES and REP_FREQUENCY_STATUS_97K.

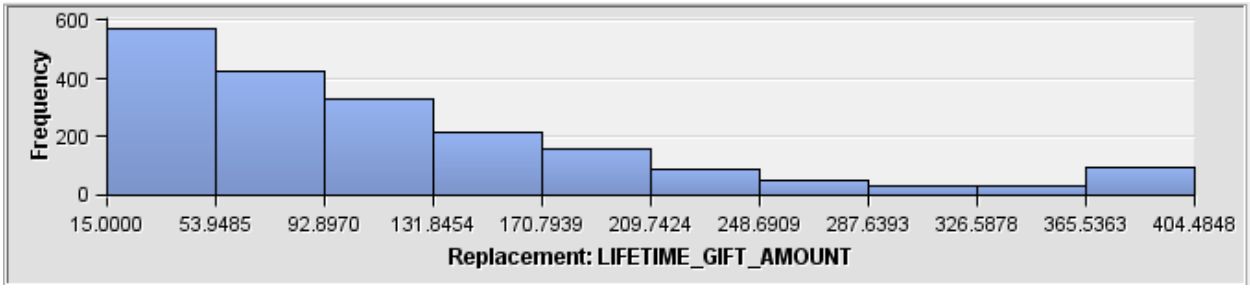
Q4.

TARGET_B	TARGET_B	_PROF_	Total Profit f...	2028.167	1531.739	1491.867
TARGET_B	TARGET_B	_APROF_	Average Pr...	0.261733	0.263593	0.256687

There is an improvement over the previous iteration with both total and average profit.

Iteration 3:

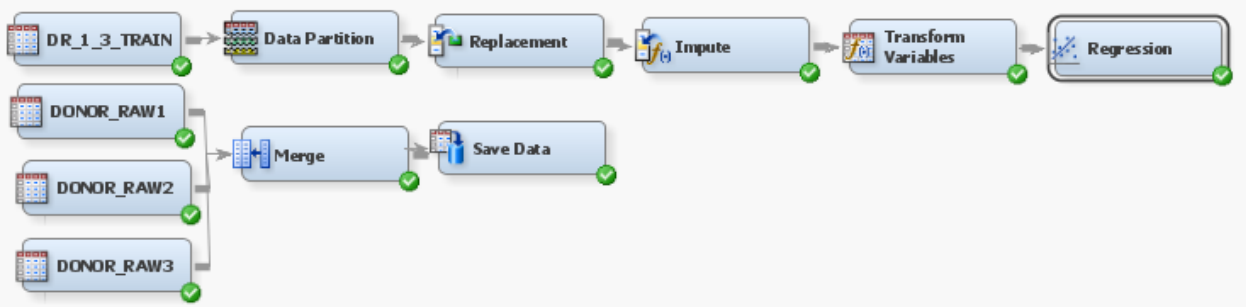
S1.



S2.

Input	Original	REP_LIFETIME_GIFT_AMOUNT		.
Input	Original	REP_RECENT_RESPONSE_PROP		.
Output	Computed	LG10_REP_LIFETIME_GIFT_AMOUNT	log10(REP_LIF...	.
Output	Computed	OPT_REP_RECENT_RESPONSE_PROP	Optimal Binnin...	2

S3.



S4.

Odds Ratio Estimates

Effect		Point Estimate
IMP_REP_SES	1 vs 4	1.661
IMP_REP_SES	2 vs 4	1.404
IMP_REP_SES	3 vs 4	1.198
REP_FREQUENCY_STATUS_97NK		1.352
REP_MONTHS_SINCE_ORIGIN		1.004

Q1. Three variables are considered in this iteration.

Q2. IMP_REP_SES, REP_FREQUENCY_STATUS_97NK, REP_MONTHS_SINCE_ORIGIN

Q3. There are no newly introduced variables in this iteration.

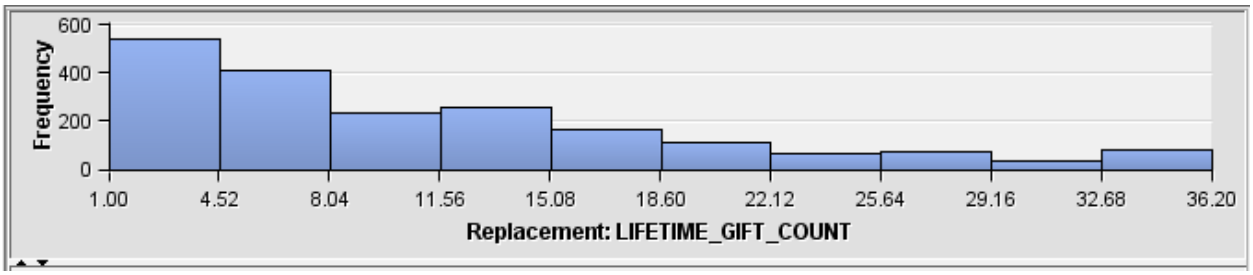
Q4.

Total Profit for TARGET_B	2063.146	1458.901	1490.867
Average Profit for TARGET_B	0.266247	0.251059	0.256515

Model did not improve over iteration 2.

ITERATION 4.

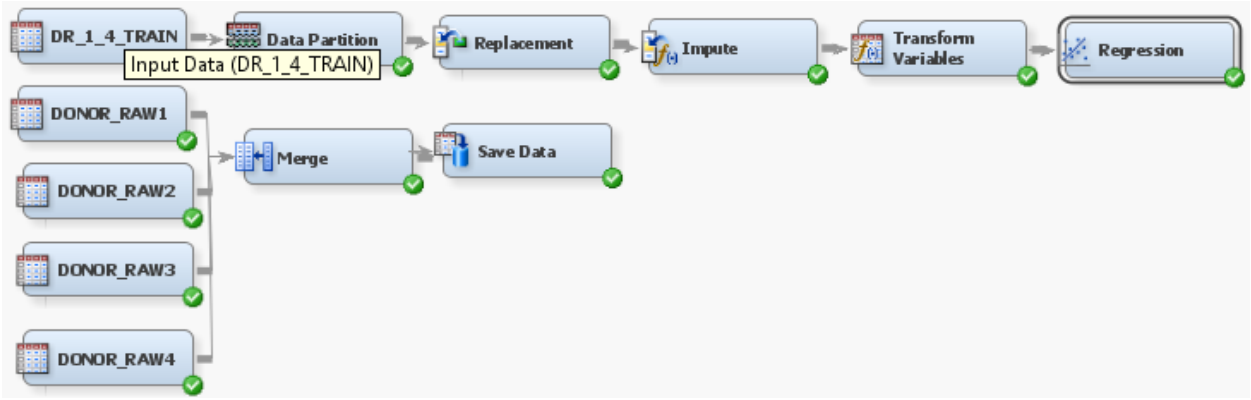
S1.



S2.

Input	Original	REP_LIFETIME_GIFT_AMOUNT		.
Input	Original	REP_LIFETIME_GIFT_COUNT		.
Input	Original	REP_RECENT_RESPONSE_PROP		.
Output	Computed	LG10_REP_LIFETIME_GIFT_AMOUNT	log10(REP_LI...	.
Output	Computed	OPT_REP_LIFETIME_GIFT_COUNT	Optimal Binnin...	4
Output	Computed	OPT_REP_RECENT_RESPONSE_PROP	Optimal Binnin...	2

S3.



S4.

Odds Ratio Estimates

Effect		Point Estimate
IMP_REP_SES	1 vs 4	1.643
IMP_REP_SES	2 vs 4	1.385
IMP_REP_SES	3 vs 4	1.190
OPT_REP_LIFETIME_GIFT_COUNT	01:low-1.5 vs 04:14.5-high	0.463
OPT_REP_LIFETIME_GIFT_COUNT	02:1.5-4.5 vs 04:14.5-high	0.680
OPT_REP_LIFETIME_GIFT_COUNT	03:4.5-14.5, MISSING vs 04:14.5-high	0.893
REP_FREQUENCY_STATUS_97NK		1.123
REP_MONTHS_SINCE_LAST_GIFT		0.969
REP_RECENT_AVG_GIFT_AMT		0.988
REP_RECENT_CARD_RESPONSE_PROP		1.805

Q1. 6 variables are considered at this iteration.

Q2. **IMP_REP_SES**, OPT_REP_LIFETIME_GIFT_COUNT, **REP_FREQUENCY_STATUS_97NK**, REP_MONTHS_SINCE_LAST_GIFT, REP_RECENT_AVG_GIFT_AMT, **REP_RECENT_CARD_RESPONSE_PROP**

Q3. The newly introduced variables in this iteration are OPT_REP_LIFETIME_GIFT_COUNT, REP_MONTHS_SINCE_LAST_GIFT and REP_RECENT_AVG_GIFT_AMT.

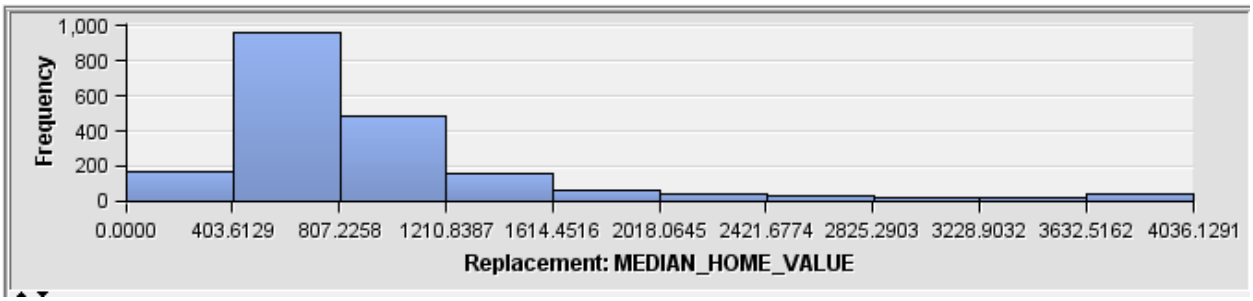
Q4.

Total Profit for TARGET_B	2100.088	1503.826	1461.667
Average Profit for TARGET_B	0.271014	0.25879	0.251491

Model did not improve over iteration 3.

ITERATION 5:

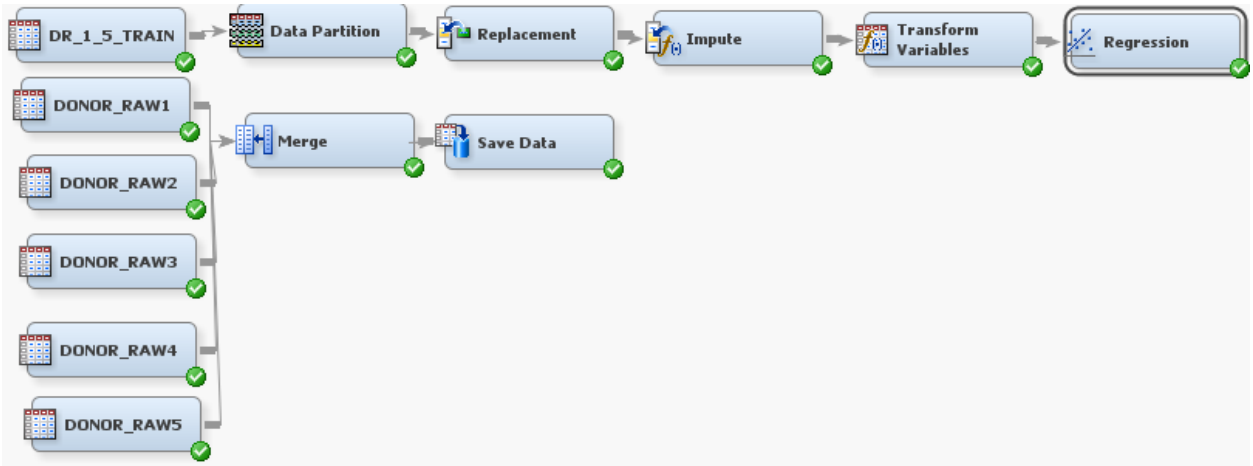
S1.



S2.

Input	Original	REP_LIFETIME_GIFT_AMOUNT		.
Input	Original	REP_LIFETIME_GIFT_COUNT		.
Input	Original	REP_MEDIAN_HOME_VALUE		.
Input	Original	REP_RECENT_RESPONSE_PROP		.
Output	Computed	LG10_REP_LIFETIME_GIFT_AMOUNT	log10(REP_LI...	.
Output	Computed	OPT_REP_LIFETIME_GIFT_COUNT	Optimal Binnin...	4
Output	Computed	OPT_REP_MEDIAN_HOME_VALUE	Optimal Binnin...	2
Output	Computed	OPT_REP_RECENT_RESPONSE_PROP	Optimal Binnin...	2

S3



S4.

Odds Ratio Estimates

Effect		Point Estimate
IMP_REP_INCOME_GROUP		1.090
IN_HOUSE	0 vs 1	0.787
OPT_REP_LIFETIME_GIFT_COUNT	01:low-1.5 vs 04:14.5-high	0.463
OPT_REP_LIFETIME_GIFT_COUNT	02:1.5-4.5 vs 04:14.5-high	0.686
OPT_REP_LIFETIME_GIFT_COUNT	03:4.5-14.5, MISSING vs 04:14.5-high	0.894
OPT_REP_MEDIAN_HOME_VALUE	01:low-1321.5, MISSING vs 02:1321.5-high	0.778
REP_FREQUENCY_STATUS_97NK		1.136
REP_MONTHS_SINCE_LAST_GIFT		0.975
REP_RECENT_AVG_GIFT_AMT		0.986
REP_RECENT_CARD_RESPONSE_PROP		1.798

Q1. There are eight variables included in this iteration.

Q2. IMP_REP_INCOME_GROUP, IN_HOUSE, OPT_REP_LIFETIME_GIFT_COUNT, OPT_REP_MEDIAN_HOME_VALUE, REP_FREQUENCY_STATUS_97NK, REP_MONTHS_SINCE_LAST_GIFT, REP_RECENT_AVG_GIFT_AMT, and REP_RECENT_CARD_RESPONSE_PROP

Q3. IMP_REP_INCOME_GROUP, IN_HOUSE, and OPT_REP_MEDIAN_HOME_VALUE are the newly introduced variables in this iteration.

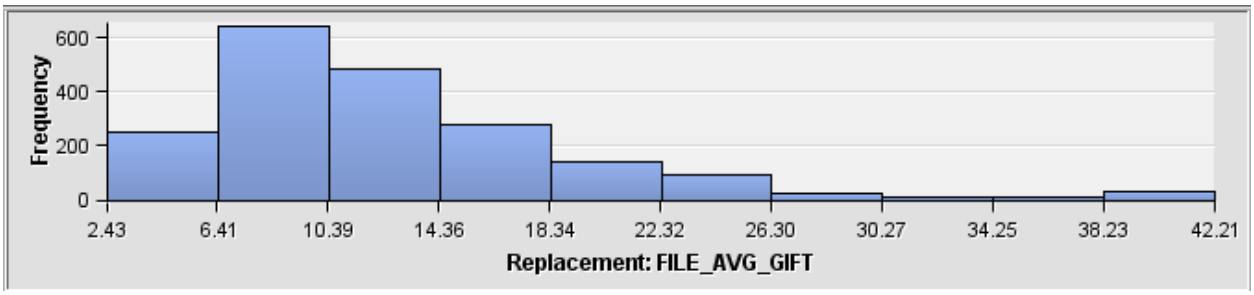
Q4

Total Profit for TARGET_B	2144.612	1514.803	1476.233
Average Profit for TARGET_B	0.27676	0.260679	0.253997

Model has approved over iteration 4, but not over iteration 2.

ITERATION 6:

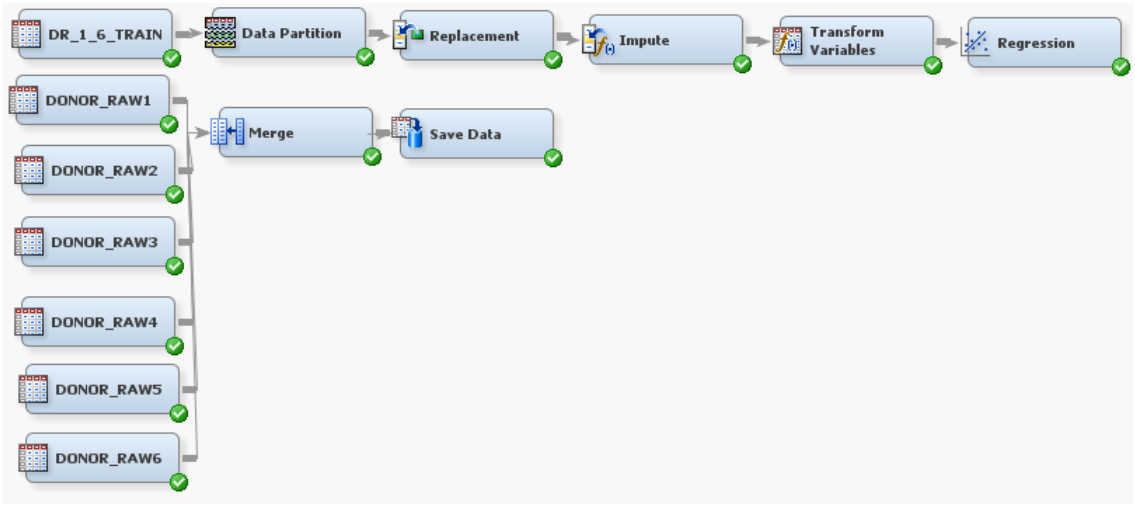
S1.



S2.

Input	Original	REP_FILE_AVG_GIFT		.
Input	Original	REP_LIFETIME_GIFT_AMOUNT		.
Input	Original	REP_LIFETIME_GIFT_COUNT		.
Input	Original	REP_MEDIAN_HOME_VALUE		.
Input	Original	REP_RECENT_RESPONSE_PROP		.
Output	Computed	LG10_REP_FILE_AVG_GIFT	log10(REP_FI...	.
Output	Computed	LG10_REP_LIFETIME_GIFT_AMOUNT	log10(REP_LI...	.
Output	Computed	OPT_REP_LIFETIME_GIFT_COUNT	Optimal Binni...	4
Output	Computed	OPT_REP_MEDIAN_HOME_VALUE	Optimal Binni...	2
Output	Computed	OPT_REP_RECENT_RESPONSE_PROP	Optimal Binni...	2

S3.



S4.

Odds Ratio Estimates

Effect		Point Estimate
CARD_PROM_12	0 vs 14	999.000
CARD_PROM_12	1 vs 14	498.423
CARD_PROM_12	2 vs 14	394.635
CARD_PROM_12	3 vs 14	474.375
CARD_PROM_12	4 vs 14	388.348
CARD_PROM_12	5 vs 14	309.652
CARD_PROM_12	6 vs 14	271.849
CARD_PROM_12	7 vs 14	390.356
CARD_PROM_12	8 vs 14	322.891
CARD_PROM_12	9 vs 14	424.346
CARD_PROM_12	10 vs 14	405.388
CARD_PROM_12	11 vs 14	681.851
CARD_PROM_12	12 vs 14	456.981
CARD_PROM_12	13 vs 14	999.000
IMP_REP_INCOME_GROUP		1.090
OPT_REP_LIFETIME_GIFT_COUNT	01:low-1.5 vs 04:14.5-high	0.402
OPT_REP_LIFETIME_GIFT_COUNT	02:1.5-4.5 vs 04:14.5-high	0.668
OPT_REP_LIFETIME_GIFT_COUNT	03:4.5-14.5, MISSING vs 04:14.5-high	0.877
OPT_REP_MEDIAN_HOME_VALUE	01:low-1321.5, MISSING vs 02:1321.5-high	0.783
REP_FREQUENCY_STATUS_97NK		1.288
REP_MONTHS_SINCE_LAST_GIFT		0.977

Q1. There are six variables included in this iteration.

Q2. CARD_PROM_12, IMP_REP_INCOME_GROUP, OPT_REP_LIFETIME_GIFT_COUNT, OPT_REP_MEDIAN_HOME_VALUE, REP_FREQUENCY_STATUS_97NK, and REP_MONTHS_SINCE_LAST_GIFT

Q3. CARD_PROM_12 is the newly introduced variables in this iteration.

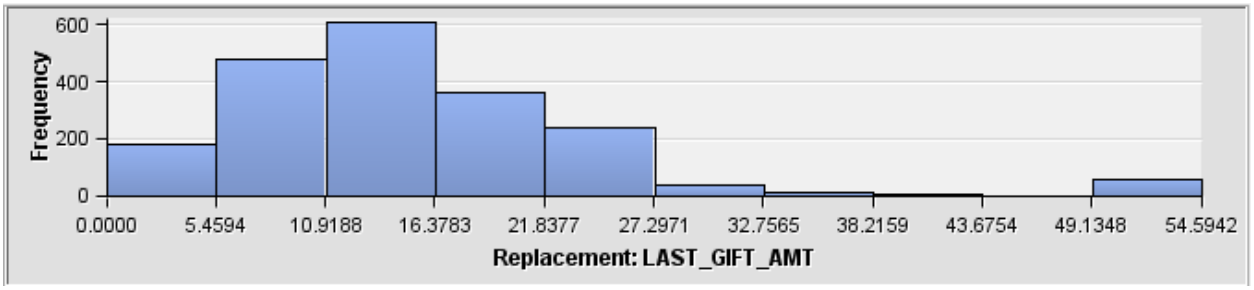
Q4.

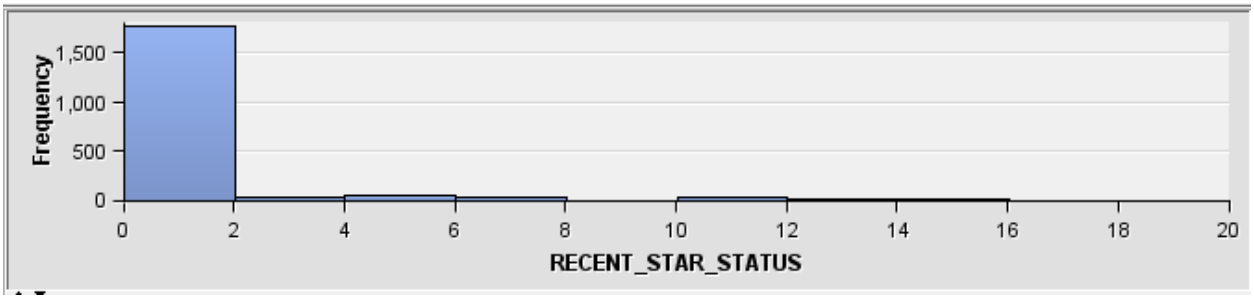
Total Profit for TARGET_B	2116.242	1520.195	1475.033
Average Profit for TARGET_B	0.273099	0.261606	0.253791

Model did not improve over iteration 5.

ITERATION 7

S1.

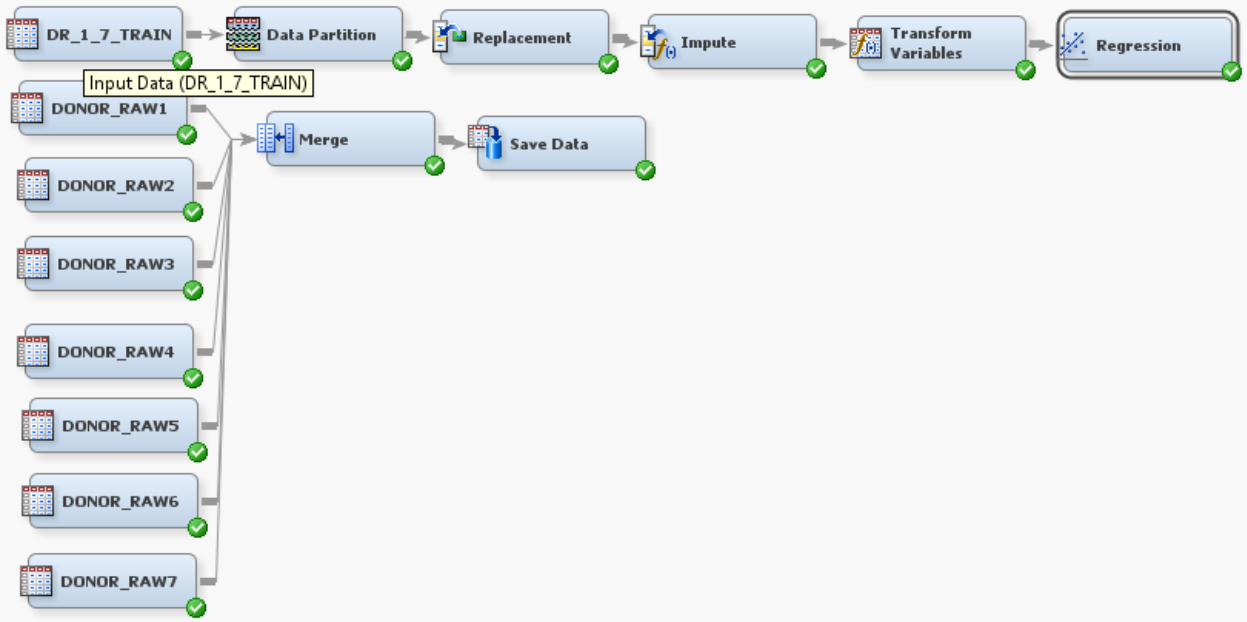




S2.

Input	Original	REP_FILE_AVG_GIFT		.
Input	Original	REP_LAST_GIFT_AMT		.
Input	Original	REP_LIFETIME_GIFT_AMOUNT		.
Input	Original	REP_LIFETIME_GIFT_COUNT		.
Input	Original	REP_MEDIAN_HOME_VALUE		.
Input	Original	REP_RECENT_RESPONSE_PROP		.
Input	Original	REP_RECENT_STAR_STATUS		.
Output	Computed	LG10_REP_FILE_AVG_GIFT	log10(REP_FI...	.
Output	Computed	LG10_REP_LAST_GIFT_AMT	log10(REP_LA...	.
Output	Computed	LG10_REP_LIFETIME_GIFT_AMOUNT	log10(REP_LI...	.
Output	Computed	OPT_REP_LIFETIME_GIFT_COUNT	Optimal Binnin...	4
Output	Computed	OPT_REP_MEDIAN_HOME_VALUE	Optimal Binnin...	2
Output	Computed	OPT_REP_RECENT_RESPONSE_PROP	Optimal Binnin...	2
Output	Computed	OPT_REP_RECENT_STAR_STATUS	Optimal Binnin...	3

S3.



S4.

1234		Odds Ratio Estimates	
1235			
1236			Point
1237			Estimate
1238			
1239		0 vs 14	999.000
1240		1 vs 14	517.648
1241		2 vs 14	402.254
1242		3 vs 14	472.115
1243		4 vs 14	385.999
1244		5 vs 14	307.048
1245		6 vs 14	279.153
1246		7 vs 14	398.266
1247		8 vs 14	334.633
1248		9 vs 14	423.584
1249		10 vs 14	382.471
1250		11 vs 14	670.131
1251		12 vs 14	417.302
1252		13 vs 14	999.000
1253			1.090
1254			0.652
1255	COUNT	01:low-1.5 vs 04:14.5-high	0.449
1256	COUNT	02:1.5-4.5 vs 04:14.5-high	0.744
1257	COUNT	03:4.5-14.5, MISSING vs 04:14.5-high	0.953
1258	LUE	01:low-1321.5, MISSING vs 02:1321.5-high	0.778
1259	7NK		1.159
1260	GIFT		0.977
1261	SE_COUNT		1.075

Q1. There are eight variables included in this iteration.

Q2. CARD_PROM_12, IMP_REP_INCOME_GROUP, LG10_REP_LAST_GIFT_AMT , OPT_REP_LIFETIME_GIFT_COUNT, OPT_REP_MEDIAN_HOME_VALUE, REP_FREQUENCY_STATUS_97NK, REP_MONTHS_SINCE_LAST_GIFT, REP_RECENT_CARD_RESPONSE_COUNT

Q3. LG10_REP_LAST_GIFT_AMT and REP_RECENT_CARD_RESPONSE_COUNT are the newly introduced variables in this iteration.

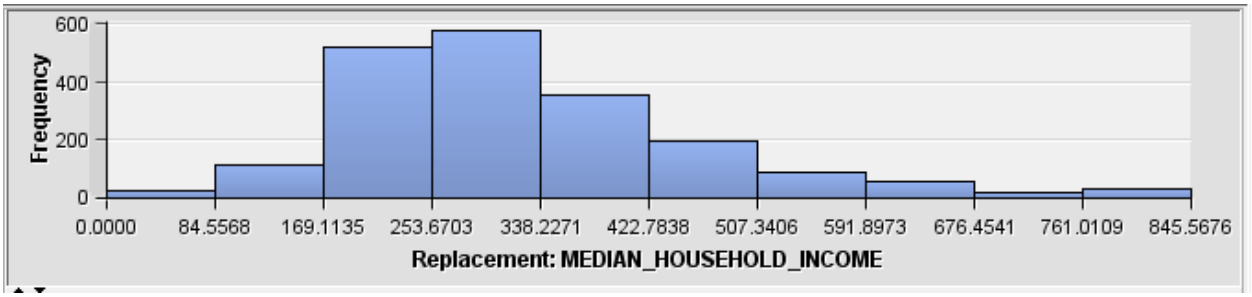
Q4.

Total Profit for TARGET_B	2146.806	1521.7	1499.367
Average Profit for TARGET_B	0.277043	0.261865	0.257978

Model has approved over both iteration 2 and 6.

ITERATION 8

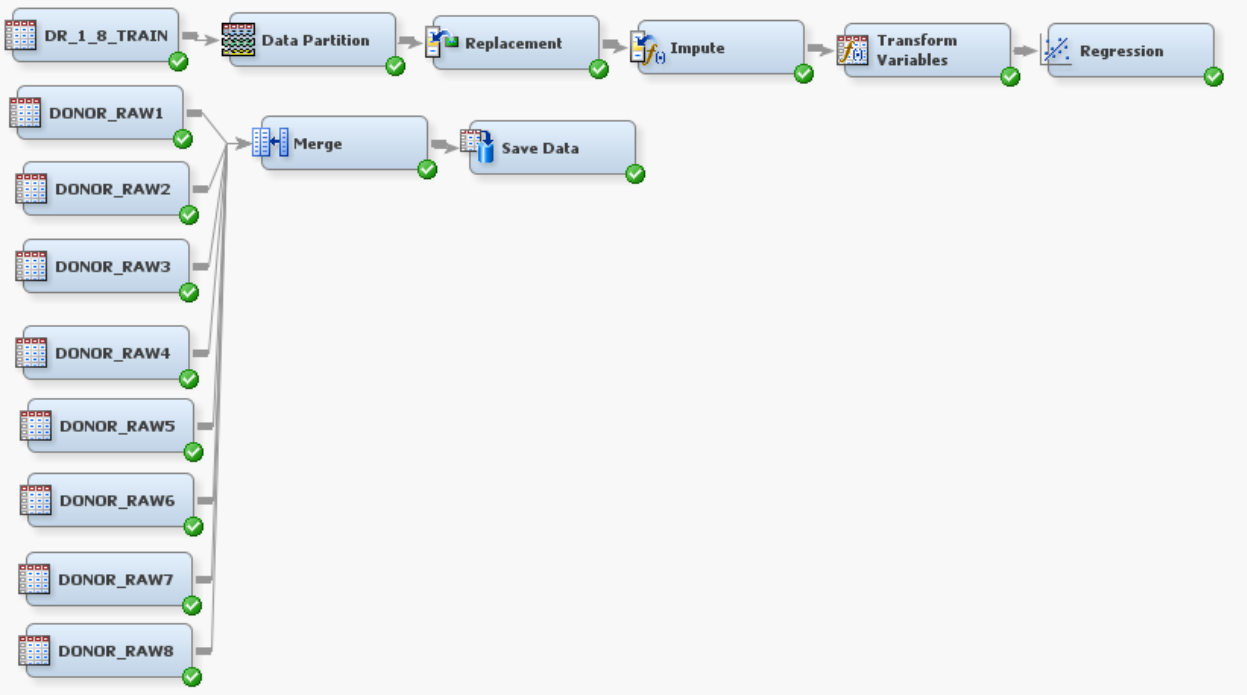
S1.



S2.

Input	Original	REP_FILE_AVG...		.
Input	Original	REP_LAST_GIF...		.
Input	Original	REP_LIFETIME...		.
Input	Original	REP_LIFETIME...		.
Input	Original	REP_MEDIAN_...		.
Input	Original	REP_MEDIAN_...		.
Input	Original	REP_RECENT_...		.
Input	Original	REP_RECENT_...		.
Output	Computed	LG10_REP_FIL...	log10(REP_FIL...	.
Output	Computed	LG10_REP_LA...	log10(REP_LAS...	.
Output	Computed	LG10_REP_LIF...	log10(REP_LIF...	.
Output	Computed	OPT_REP_LIFE...	Optimal Binning...	4
Output	Computed	OPT_REP_MED...	Optimal Binning...	2
Output	Computed	OPT_REP_MED...	Optimal Binning...	2
Output	Computed	OPT_REP_REC...	Optimal Binning...	2
Output	Computed	OPT_REP_REC...	Optimal Binning...	3

S3.



S4.

Odds Ratio Estimates

Effect		Point Estimate
CARD_PROM_12	0 vs 14	999.000
CARD_PROM_12	1 vs 14	517.648
CARD_PROM_12	2 vs 14	402.254
CARD_PROM_12	3 vs 14	472.115
CARD_PROM_12	4 vs 14	385.999
CARD_PROM_12	5 vs 14	307.048
CARD_PROM_12	6 vs 14	279.153
CARD_PROM_12	7 vs 14	398.266
CARD_PROM_12	8 vs 14	334.633
CARD_PROM_12	9 vs 14	423.584
CARD_PROM_12	10 vs 14	382.471
CARD_PROM_12	11 vs 14	670.131
CARD_PROM_12	12 vs 14	417.302
CARD_PROM_12	13 vs 14	999.000
IMP_REP_INCOME_GROUP		1.090
LG10_REP_LAST_GIFT_AMT		0.652
OPT_REP_LIFETIME_GIFT_COUNT	01:low-1.5 vs 04:14.5-high	0.449
OPT_REP_LIFETIME_GIFT_COUNT	02:1.5-4.5 vs 04:14.5-high	0.744
OPT_REP_LIFETIME_GIFT_COUNT	03:4.5-14.5, MISSING vs 04:14.5-high	0.953
OPT_REP_MEDIAN_HOME_VALUE	01:low-1321.5, MISSING vs 02:1321.5-high	0.778
REP_FREQUENCY_STATUS_97NK		1.159
REP_MONTHS_SINCE_LAST_GIFT		0.977
REP_RECENT_CARD_RESPONSE_COUNT		1.075

Q1. There are eight variables included in this iteration.

Q2. CARD_PROM_12 , IMP_REP_INCOME_GROUP, LG10_REP_LAST_GIFT_AMT, OPT_REP_LIFETIME_GIFT_COUNT, OPT_REP_MEDIAN_HOME_VALUE, REP_FREQUENCY_STATUS_97NK, REP_MONTHS_SINCE_LAST_GIFT, and REP_RECENT_CARD_RESPONSE_COUNT

Q3. No variables from the newly inserted data segment included in this current model.

Q4.

Total Profit for TARGET_B	2146.806	1521.7	1499.367
Average Profit for TARGET_B	0.277043	0.261865	0.257978

Total/Average profit have stayed the same compared to iteration 7.

Q5. The tree model was a lot faster to build in comparison to the regression model,

Q6. The regression model performed substantially better, ending with a total profit of $1,499 compared to the tree model which ended up being $1,444 for total profit. Average profit for our regression model also was higher compared to the tree model's average profit.