Project On

Bank Customer data for Term Deposit

Objectives

Term deposits are one of the important instruments, bank uses to collect money from the customers in return for higher compensation for a short period of time. Bank then uses this money to invest/lend to bigger financial products to earn more profits.

The goal of the project is to analyze the customers financial status and predict which of them can be interested in investing on term deposit. Also, to highlight the main reasons which restricts customers to invest in term deposits.

A bank has thousands of customers with different financial status, it required a lot of effort and time to talk and convince every customer to invest in term deposits. The objective is to build a model which can predict the customers who are more likely to invest in term deposits.

This will help bank to design campaign around the selected customers, which increase the likelihood of its success. This will help in reducing the cost incurred to contact customers and reduce the efforts as well.

Pre-Processing Data

Before starting the real job, It's important to check the data in csv file. The dataset has 42k observations and 17 columns. The column details are as below:

Data point(Variables)	Description	Data type
Term_deposit	client subscribed a term deposit (yes/no)	Binary
Age	Customers age	Continuous
Job	Customers job type	Categorical
Marital	Marital status	Categorical
Education	Customers education	Categorical
Default	has credit in default?	Binary
Balance	Balance in the account	Continuous
Housing	has housing loan?	Binary
Loan	has personal loan?	Binary
Contact	contact communication type	Categorical
Day	last contact day of the week	Categorical
Month	last contact month of year	Categorical
Duration	last contact duration, in seconds	Continuous
Campaign	number of contacts performed during this campaign and for this client	Continuous
Pdays	number of days that passed by	Continuous

	after the client was last contacted from a previous campaign	
Previous	number of contacts performed before this campaign and for this client	Continuous
poutcome	outcome of the previous marketing campaign	Categorical

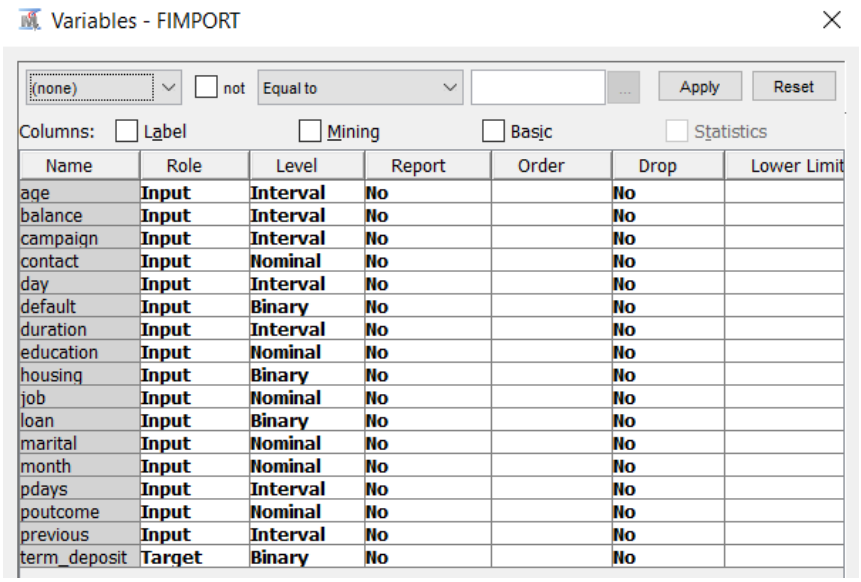
Its important to keep the binary column in the form of '0' and '1', so the data value 'yes' is replaced by 1 and data value '0' is replaced by 1.

Random 220 observations are taken out in separate csv file for scoring purpose.

Exploratory Data Analysis

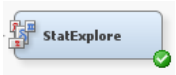
Data is imported to SAS e-miner using file import node 

and defined term_deposit as the target variable



Name	Role	Level	Report	Order	Drop	Lower Limit
age	Input	Interval	No		No	
balance	Input	Interval	No		No	
campaign	Input	Interval	No		No	
contact	Input	Nominal	No		No	
day	Input	Interval	No		No	
default	Input	Binary	No		No	
duration	Input	Interval	No		No	
education	Input	Nominal	No		No	
housing	Input	Binary	No		No	
job	Input	Nominal	No		No	
loan	Input	Binary	No		No	
marital	Input	Nominal	No		No	
month	Input	Nominal	No		No	
pdays	Input	Interval	No		No	
poutcome	Input	Nominal	No		No	
previous	Input	Interval	No		No	
term_deposit	Target	Binary	No		No	

All the input variables explored in detail and found that Variables balance, campaign, duration, pdays and previous are skewed.

Using stat explorer node 

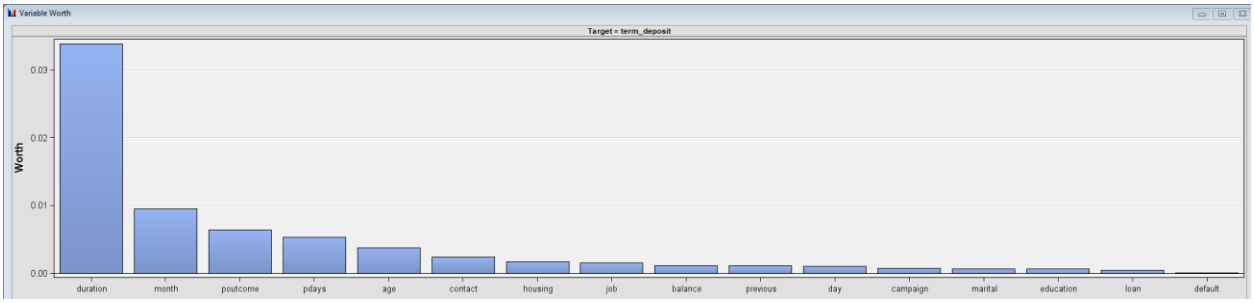
basic statistical analysis performed on the data variables. Major finds where that there are no missing values and Variables **balance**, **campaign**, **duration**, **pdays** and **previous** has high skewness value.

The kurtosis values are also very high for **balance, campaign, duration** and **pdays** which implies few of the observations has outliers.

Variable	Role	Mean	Standard Deviation	Non Missing	Missing	Minimum	Median	Maximum	Skewness	Kurtosis
age	INPUT	40.82062	10.16159	42419	0	18	39	95	0.587978	0.026631
balance	INPUT	1332.847	3015.304	42419	0	-8019	429	102127	8.330425	140.6219
campaign	INPUT	2.819161	3.166977	42419	0	1	2	63	4.824073	37.83503
day	INPUT	15.85219	8.28983	42419	0	1	16	31	0.092067	-1.04996
duration	INPUT	255.8154	258.4897	42419	0	0	176	4918	3.157149	17.98294
pdays	INPUT	34.21856	92.13923	42419	0	-1	-1	536	2.596911	5.505176
previous	INPUT	0.465947	2.170725	42419	0	0	0	275	52.06205	6083.774

Data Role	Variable Name	Role	Number of Levels	Missing	Mode	Mode Percentage	Mode2	Mode2 Percentage
TRAIN	contact	INPUT	3	0	cellular	63.94	unknown	29.87
TRAIN	default	INPUT	2	0	0	98.10	1	1.90
TRAIN	education	INPUT	4	0	secondary	51.73	tertiary	28.87
TRAIN	housing	INPUT	2	0	1	57.65	0	42.35
TRAIN	job	INPUT	12	0	blue-collar	22.36	management	20.79
TRAIN	loan	INPUT	2	0	0	83.36	1	16.64
TRAIN	marital	INPUT	3	0	married	60.75	single	27.57
TRAIN	month	INPUT	12	0	may	31.64	jul	15.50
TRAIN	poutcome	INPUT	4	0	unknown	84.62	failure	10.04
TRAIN	term_deposit	TARGET	2	0	0	90.75	1	9.25

The variable worth chart shows Duration, Month, poutcome are the impacting the decision. This can lead to a hypothesis that more/less time spend on convincing the customers can be a impoartant factor in making decision to go for term deposit or not.



Distribution of target variable shows 91% of observations led to no term deposit, hence it is very important to come up with the model to predict customers who are more likely to take term deposit

Distribution of Class Target and Segment Variables
(maximum 500 observations printed)

Data Role=TRAIN

Data Role	Variable Name	Role	Level	Frequency Count	Percent
TRAIN	term_deposit	TARGET	0	38495	90.7494
TRAIN	term_deposit	TARGET	1	3924	9.2506

Data Prep

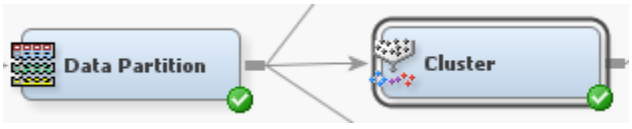
First step for data perp is partitioning the data into 2, one for training the model and one for validating the model. Using Data partition node 

the data is divided into 75:25 for training and validation.

It has been noticed that there are certain skewness and outliers in few data variables so to understand the nature of outliers. Clustering and Decision tree are built on the dataset.

Cluster Analysis

To build cluster, a cluster node from Explore tab is linked to data partitioned node. Executed the cluster node by keeping the default property setting.



Four clusters formed based on variable segmentations. Pday(Number of days past the customer last contacted) is the important variable based on which the segmentation is done. Cluster-1 has only one observation, the pday was 262 days. Cluster-2 has 2956 customers who were last contacted 7 days ago.

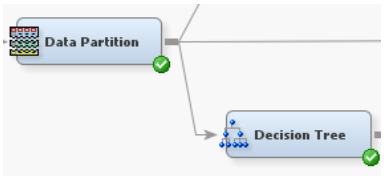
Cluster-3 has 4533 customers who were last contacted 237 days ago. And Cluster-4 has 24322 customers who were recently contacted. **Click here for details**.

Variable Importance

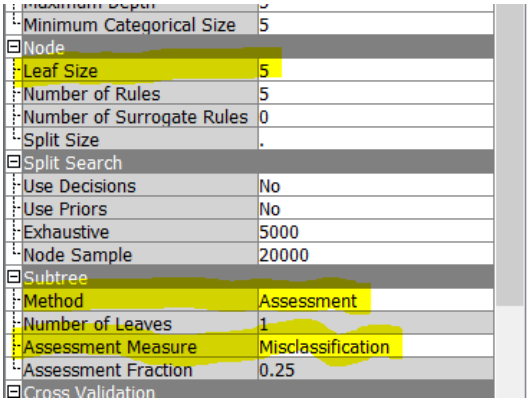
Variable Name	Label	Number of Splitting Rules	Number of Surrogate Rules	Importance
pdays		4	1	1.00000
previous		1	2	0.99438
poutcome		0	2	0.99299
month		0	9	0.96777
balance		7	7	0.63313
duration		0	8	0.56914
campaign		0	6	0.53094
age		6	4	0.47445
contact		0	5	0.29461
job		0	6	0.28007
day		0	4	0.24666
housing		4	1	0.23259
education		0	4	0.23108
marital		0	3	0.22516

Decision Tree

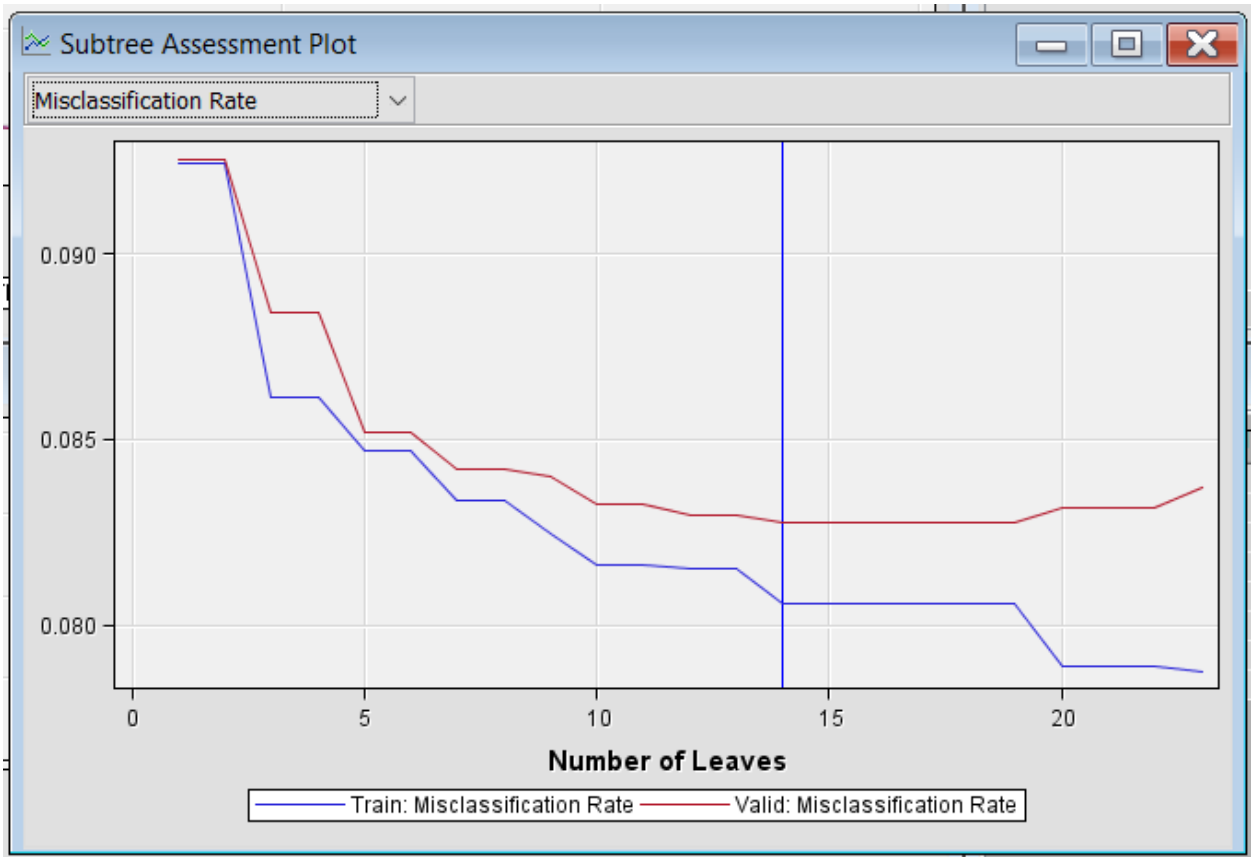
To build a decision tree, used decision tree nodes from Model tab and linked to data partitioned node.



A pruned decision tree reduces the complexity and improves the predictive accuracy, hence decided to set the subtree method as ASSESSMENT and Assessment measure as Misclassification in the decision tree property panel. The size of leaf is set to 5.



The decision tree assessment plot shows that the number of leave 5 gives acceptable misclassification rate.



The misclasification rate is 8%. The decision tree splits the branches based on contact duration. The confusion matrix tell us the the false negative percent is 6.29 and false possitive percent is 1.7. To predict the customers that are likely to take term deposits, the model should have low false negatives. As Bank don't want to loose the perspective customer because of model predicted it false. Hence the sensetivity is important to be low, the decision tree gave a sensitivity of 0.31, The accuracy calculated out of confusion matrix is 92%. Click here for Details.

Event Classification Table

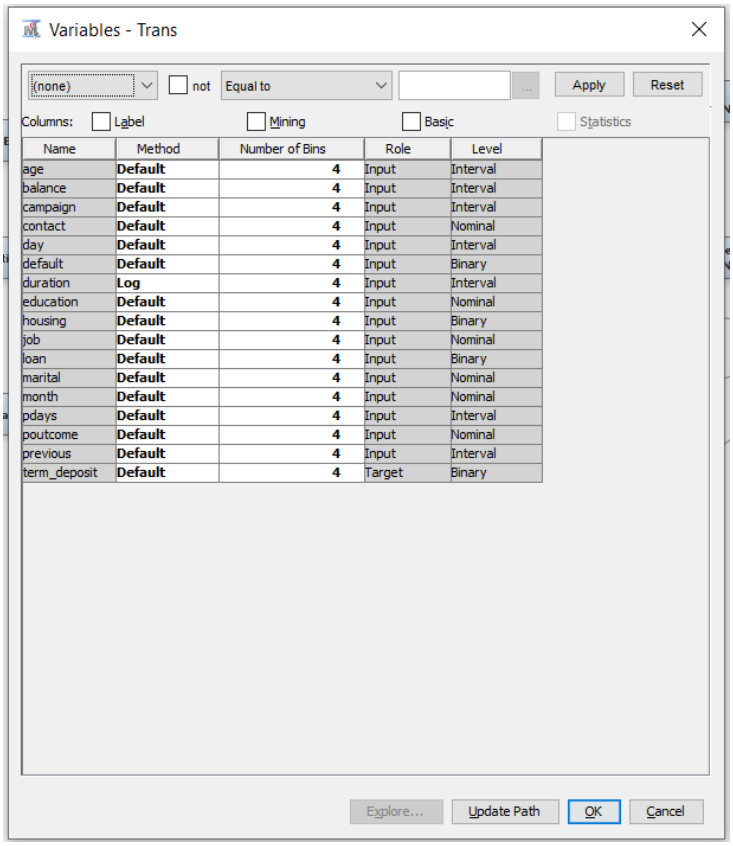
Data Role=TRAIN Target=term_deposit Target Label=' '

False Negative	True Negative	False Positive	True Positive
2001	28307	563	941

Data Transformation

As data variable **duration** is skewed and it is important to normalizing the skewness using log transformation. Joining the transformation node with data partitioned node.

To run transformation, first the variables need to be edited. Variable **duration** method set to log.



Name	Method	Number of Bins	Role	Level
age	**Default**	**4**	Input	Interval
balance	**Default**	**4**	Input	Interval
campaign	**Default**	**4**	Input	Interval
contact	**Default**	**4**	Input	Nominal
day	**Default**	**4**	Input	Interval
default	**Default**	**4**	Input	Binary
duration	**Log**	**4**	Input	Interval
education	**Default**	**4**	Input	Nominal
housing	**Default**	**4**	Input	Binary
job	**Default**	**4**	Input	Nominal
loan	**Default**	**4**	Input	Binary
marital	**Default**	**4**	Input	Nominal
month	**Default**	**4**	Input	Nominal
pdays	**Default**	**4**	Input	Interval
poutcome	**Default**	**4**	Input	Nominal
previous	**Default**	**4**	Input	Interval
term_deposit	**Default**	**4**	Target	Binary

Models

Below models are build on the dataset to predict the customers likely to take term deposit.

1. Regression Model
2. Stepwise Regression
3. Regression with Clusters
4. Neural network model on Regression
5. Neural network model on Stepwise Regression

Regression Model

Linking transformation note with regression model node. The regression executed with default settings and misclassification rate is 0.080, which is low.

The odd estimates show that the log of duration has very much impact on predicting the term deposit, a point change in log duration can increase the probability of customer taking term deposit by 687.5%. Click here for more details.

Stepwise Regression

Using second regression node, linked it with transformation node.

In property panel, the selection model property is updated to stepwise and selection criteria is set as validation misclassification.

Model Selection	
Selection Model	Stepwise
Selection Criterion	Validation Misclassification
Use Selection Defaults	No
Selection Options	

The results show that the model has a misclassification rate of 0.081, which is also impressive. The odd estimates of log duration is 7.798, which implies one point change in log duration can increase the probability of a customer to take term deposit by 678%. Click here for detail results.

Regression with Clusters

A regression node is linked with the cluster node. Renamed the regression node to Cluster_Regression for identification.

The selection model for the regression is set to stepwise and selection criteria is set as validation misclassification. The results show that the misclassification rate for this model is 0.08. The accuracy for this model is 91.76% and sensitivity is 0.29. Also, the odds ratio estimates for campaign (number of contacts made to customer) is 0.946, which implies one point increase in campaign can decrease the probability of customer taking term deposit by 5.4%. The odd ratio for the duration is 1.004, which implies that one point increase in the duration increase the probability of customer taking term deposit by 0.4%. More details here.

Neural network model on regression model

A neural network node is linked to regression model. Renamed the model to Reg_NeuralNetwork. The model selection settings for Neural network was kept Missclassification.

Property	Value
General	
Node ID	Neural2
Imported Data	
Exported Data	
Notes	
Train	
Variables	
Continue Training	No
Network	
Optimization	
Initialization Seed	12345
Model Selection Criterion	Misclassification
Suppress Output	No
Score	
Hidden Units	No
Residuals	Yes
Standardization	No

The number of networks for this model was kept 6 and the maximum number of iteration was kept 100. The misclassification rate of the model is 0.075. The sensitivity out of Confusion matrix is 0.411 and accuracy is 92%. The details are here.

Event Classification Table

Data Role=TRAIN Target=term_deposit Target Label=' '

False Negative	True Negative	False Positive	True Positive
1730	28206	664	1212

Neural network model on stepwise regression model

Another neural network node is linked to stepwise regression model. Renamed the model to Reg_Step_NeuralNetwork. 

. The settings kept same as above. The misclassification rate for this model is 0.080. The iteration plot shows iteration number 5 gave the acceptable misclassification rate.

The sensitivity of this model is 0.33 and accuracy of the model is 91.9%. The details are here.

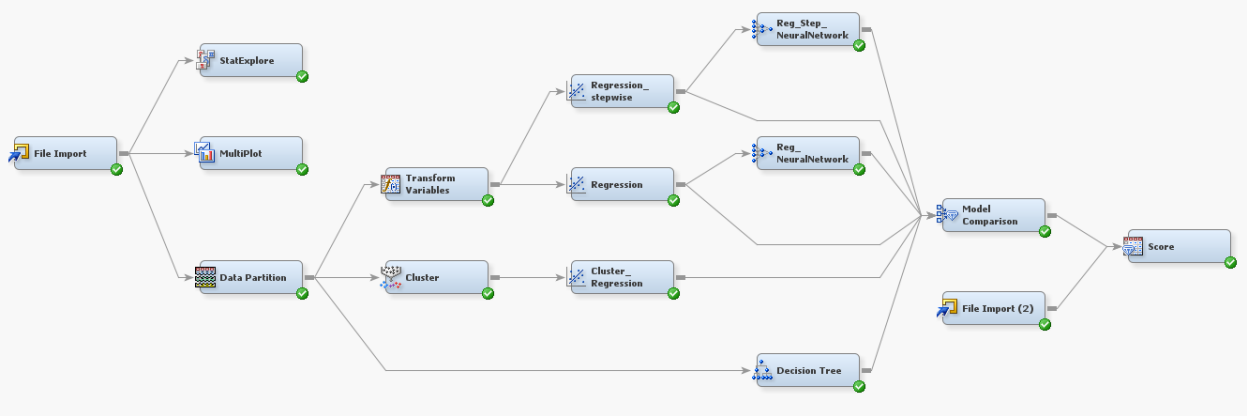
Event Classification Table

Data Role=TRAIN Target=term_deposit Target Label=' '

False Negative	True Negative	False Positive	True Positive
1967	28279	591	975

Model Assessment

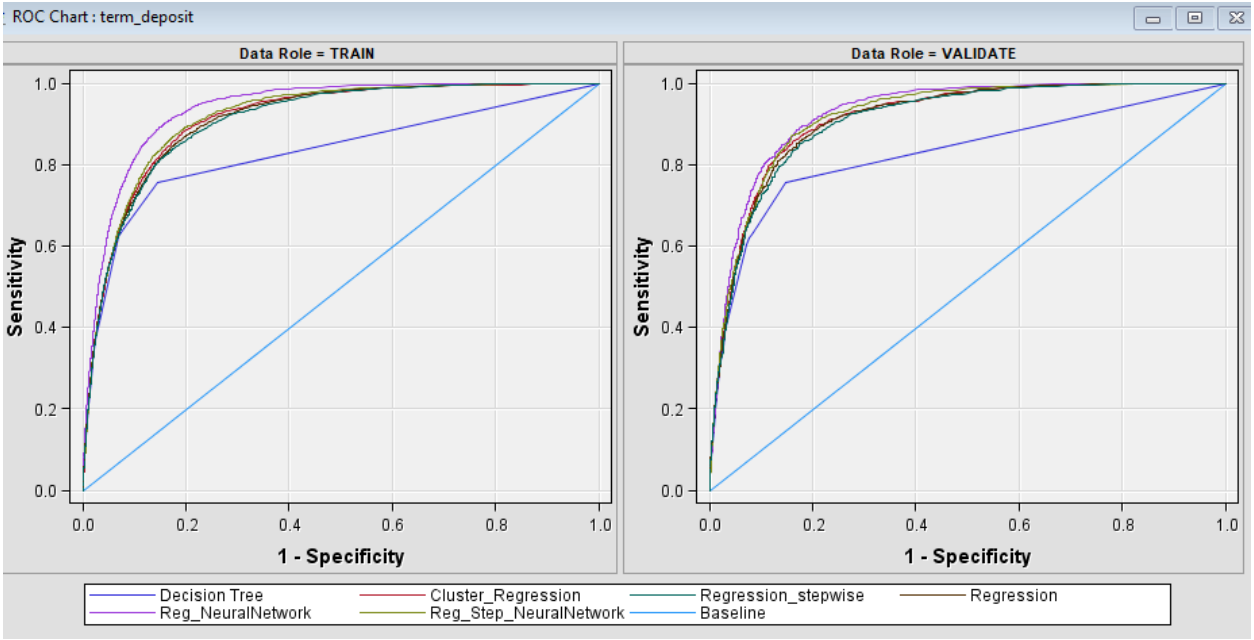
The final model is as below:



To compare these 6 models, we use Model comparison node. Connecting each model to the model comparison to find the best model based on the misclassification rate.

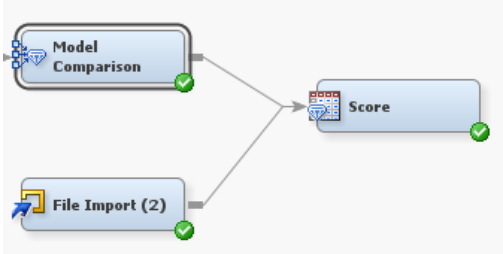
Out of 5 models, Reg_NeuralNetwork model is the best.

Model Name	Training Misclassification rate	Validation Misclassification rate
Reg_NeuralNetwork	0.075255	0.079099
Reg_Step_NeuralNetwork	0.08041	0.079853
Regression_stepwise	0.081416	0.082398
Cluster_Regression	0.081479	0.082776
Decision Tree	0.080599	0.082776
Regression	0.08019	0.082964



Scoring

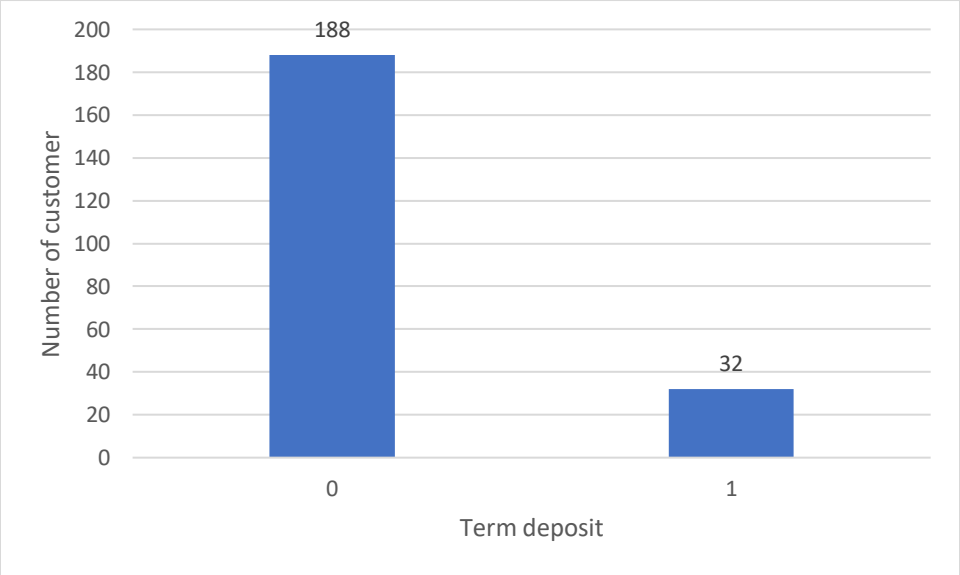
We have found the best model for Bank that helps to predict the customers who are likely to take term deposits. We have a sample customer data and we feed this to the model using file import node and check which all customers have probability to take term deposit. For scoring the sample customer data, a score node is linked to model comparison node.



The scoring data has 220 observations out of which 32 are predicted as more likely to take the term deposits. Details of the customers are in the excel file attached

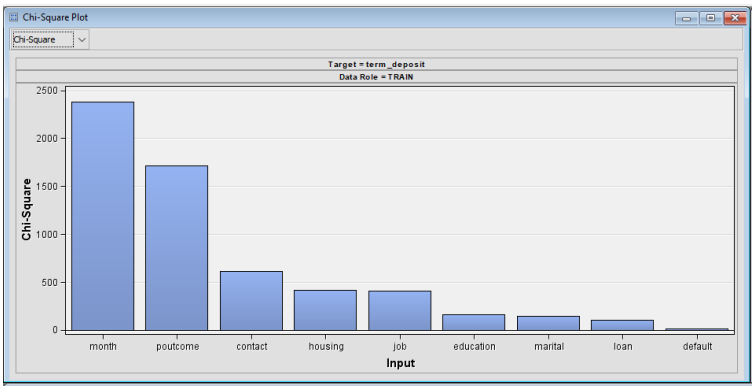

Scored data.xls.txt

Below graphs shows the distribution of the customers based on the likelihood of taking term deposit.



Appendix

[a] Stats



Results - Node: StatExplore Diagram: Project Final

File Edit View Window

Output

Class Variable Summary Statistics by Class Target
(maximum 500 observations printed)

Data Role=TRAIN Variable Name=contact

Target	Target Level	Number of Levels	Missing	Mode	Mode Percentage	Mode2	Mode2 Percentage
OVERALL		3	0	cellular	63.94	unknown	29.87
term_deposit	0	3	0	cellular	62.26	unknown	31.61
term_deposit	1	3	0	cellular	80.40	unknown	12.74

Data Role=TRAIN Variable Name=default

Target	Target Level	Number of Levels	Missing	Mode	Mode Percentage	Mode2	Mode2 Percentage
OVERALL		2	0	0	98.10	1	1.90
term_deposit	0	2	0	0	98.04	1	1.96
term_deposit	1	2	0	0	98.70	1	1.30

Data Role=TRAIN Variable Name=education

Target	Target Level	Number of Levels	Missing	Mode	Mode Percentage	Mode2	Mode2 Percentage
OVERALL		4	0	secondary	51.73	tertiary	28.87
term_deposit	0	4	0	secondary	52.23	tertiary	28.03
term_deposit	1	4	0	secondary	46.87	tertiary	37.16

Data Role=TRAIN Variable Name=housing

Target	Target Level	Number of Levels	Missing	Mode	Mode Percentage	Mode2	Mode2 Percentage
OVERALL		2	0	1	57.65	0	42.35
term_deposit	0	2	0	1	59.21	0	40.79
term_deposit	1	2	0	0	57.67	1	42.33

Output

Data Role=TRAIN Variable Name=job

Target	Target Level	Number of Levels	Missing	Mode	Mode Percentage	Mode2	Mode2 Percentage
OVERALL		12	0	blue-collar	22.36	management	20.79
term_deposit	0	12	0	blue-collar	23.07	management	20.40
term_deposit	1	12	0	management	24.54	technician	16.34

Data Role=TRAIN Variable Name=loan

Target	Target Level	Number of Levels	Missing	Mode	Mode Percentage	Mode2	Mode2 Percentage
OVERALL		2	0	0	83.36	1	16.64
term_deposit	0	2	0	0	82.77	1	17.23
term_deposit	1	2	0	0	89.19	1	10.81

Data Role=TRAIN Variable Name=marital

Target	Target Level	Number of Levels	Missing	Mode	Mode Percentage	Mode2	Mode2 Percentage
OVERALL		3	0	married	60.75	single	27.57
term_deposit	0	3	0	married	61.62	single	26.81
term_deposit	1	3	0	married	52.22	single	35.04

Data Role=TRAIN Variable Name=month

Target	Target Level	Number of Levels	Missing	Mode	Mode Percentage	Mode2	Mode2 Percentage
OVERALL		12	0	may	31.64	jul	15.50
term_deposit	0	12	0	may	32.81	jul	15.89
term_deposit	1	12	0	may	20.13	aug	13.99

Data Role=TRAIN Variable Name=poutcome

Target	Target Level	Number of Levels	Missing	Mode	Mode Percentage	Mode2	Mode2 Percentage
OVERALL		4	0	unknown	84.62	failure	10.04
term_deposit	0	4	0	unknown	85.55	failure	10.03
term_deposit	1	4	0	unknown	75.48	failure	10.09

Output

Interval Variable Summary Statistics by Class Target
(maximum 500 observations printed)

Data Role=TRAIN Variable=age

Target	Target Level	Median	Missing	Non Missing	Minimum	Maximum	Mean	Standard Deviation	Skewness	Kurtosis	Role	Label
OVERALL		39	0	42419	18	95	40.82062	10.16159	0.587978	0.026631	INPUT	age
term_deposit	0	39	0	38495	18	95	40.7914	9.883536	0.51457	-0.21494	INPUT	age
term_deposit	1	38	0	3924	18	95	41.10729	12.56522	0.879634	0.478714	INPUT	age

Data Role=TRAIN Variable=balance

Target	Target Level	Median	Missing	Non Missing	Minimum	Maximum	Mean	Standard Deviation	Skewness	Kurtosis	Role	Label
OVERALL		429	0	42419	-8019	102127	1332.847	3015.304	8.330425	140.6219	INPUT	balance
term_deposit	0	408	0	38495	-8019	102127	1287.753	2973.485	8.454374	144.7594	INPUT	balance
term_deposit	1	697	0	3924	-3058	81204	1775.232	3366.921	7.471343	113.1649	INPUT	balance

Data Role=TRAIN Variable=campaign

Target	Target Level	Median	Missing	Non Missing	Minimum	Maximum	Mean	Standard Deviation	Skewness	Kurtosis	Role	Label
OVERALL		2	0	42419	1	63	2.819161	3.166977	4.824073	37.83503	INPUT	campaign
term_deposit	0	2	0	38495	1	63	2.877906	3.252578	4.763574	36.5793	INPUT	campaign
term_deposit	1	2	0	3924	1	32	2.242864	2.067405	4.273422	32.57296	INPUT	campaign

Data Role=TRAIN Variable=day

Target	Target Level	Median	Missing	Non Missing	Minimum	Maximum	Mean	Standard Deviation	Skewness	Kurtosis	Role	Label
OVERALL		16	0	42419	1	31	15.85219	8.28983	0.092067	-1.04996	INPUT	day
term_deposit	0	16	0	38495	1	31	15.92017	8.263114	0.084788	-1.05021	INPUT	day
term_deposit	1	15	0	3924	1	31	15.18527	8.519853	0.172459	-1.03941	INPUT	day

Data Role=TRAIN Variable=duration

Target	Target Level	Median	Missing	Non Missing	Minimum	Maximum	Mean	Standard Deviation	Skewness	Kurtosis	Role	Label
OVERALL		176	0	42419	0	4918	255.8154	258.4897	3.157149	17.98294	INPUT	duration
term_deposit	0	164	0	38495	0	4918	221.2227	206.8787	3.517431	27.53078	INPUT	duration
term_deposit	1	513	0	3924	8	3881	595.1748	419.0139	1.497906	4.121712	INPUT	duration

Data Role=TRAIN Variable=pdays

Target	Target Level	Median	Missing	Non Missing	Minimum	Maximum	Mean	Standard Deviation	Skewness	Kurtosis	Role	Label
OVERALL		-1	0	42419	-1	536	34.21856	92.13923	2.596911	5.505176	INPUT	pdays
term_deposit	0	-1	0	38495	-1	536	33.24078	91.78995	2.629232	5.595471	INPUT	pdays
term_deposit	1	-1	0	3924	-1	520	43.81065	94.97772	2.329108	4.837624	INPUT	pdays

Data Role=TRAIN Variable=previous

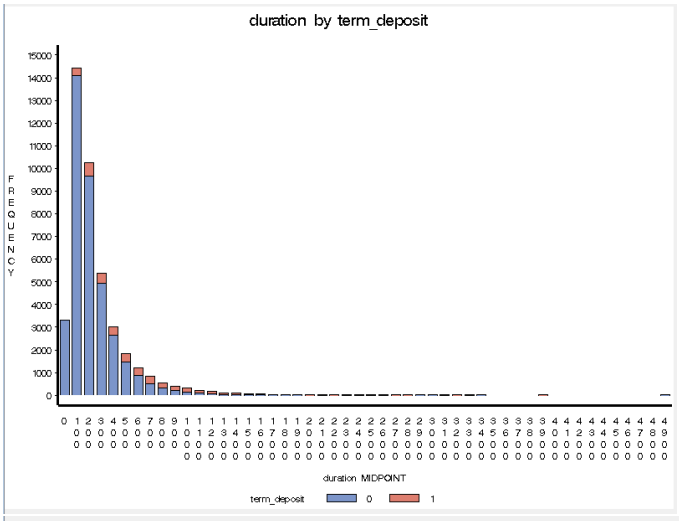
Target	Target Level	Median	Missing	Non Missing	Minimum	Maximum	Mean	Standard Deviation	Skewness	Kurtosis	Role	Label
OVERALL		0	0	42419	0	275	0.465947	2.170725	52.06205	6083.774	INPUT	previous
term_deposit	0	0	0	38495	0	275	0.443097	2.181907	55.66168	6554.274	INPUT	previous
term_deposit	1	0	0	3924	0	58	0.690112	2.044569	9.949536	195.8507	INPUT	previous

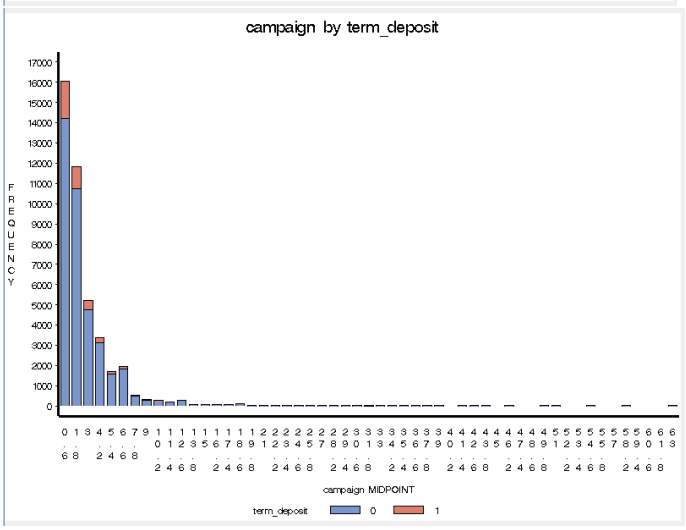
Chi-Square Statistics
(maximum 500 observations printed)

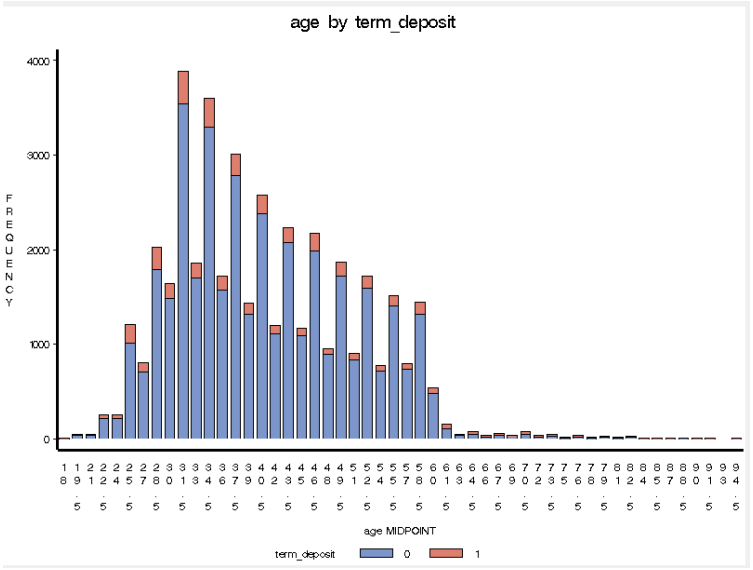
Data Role=TRAIN Target=term_deposit

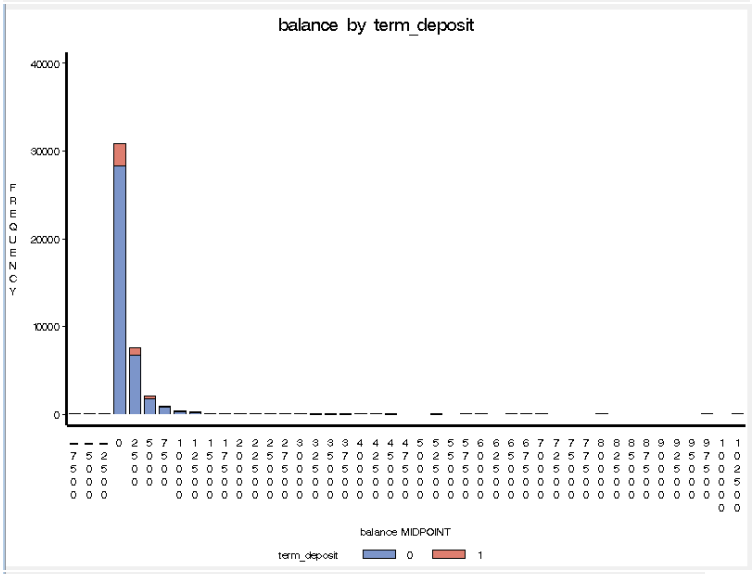
Input	Chi-Square	Df	Prob
month	2384.4782	11	<.0001
poutcome	1718.4782	3	<.0001
contact	611.0131	2	<.0001
housing	415.7714	1	<.0001
job	408.0963	11	<.0001
education	156.7703	3	<.0001
marital	143.5088	2	<.0001
loan	106.0112	1	<.0001
default	8.4177	1	0.0037

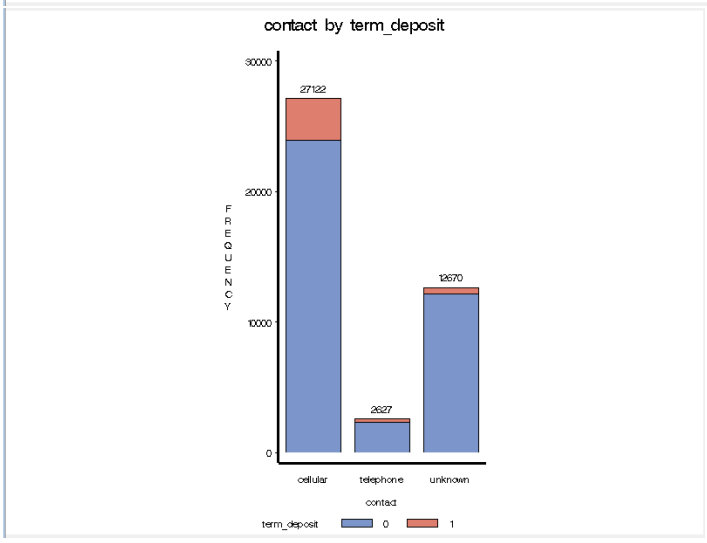
[b] Plots

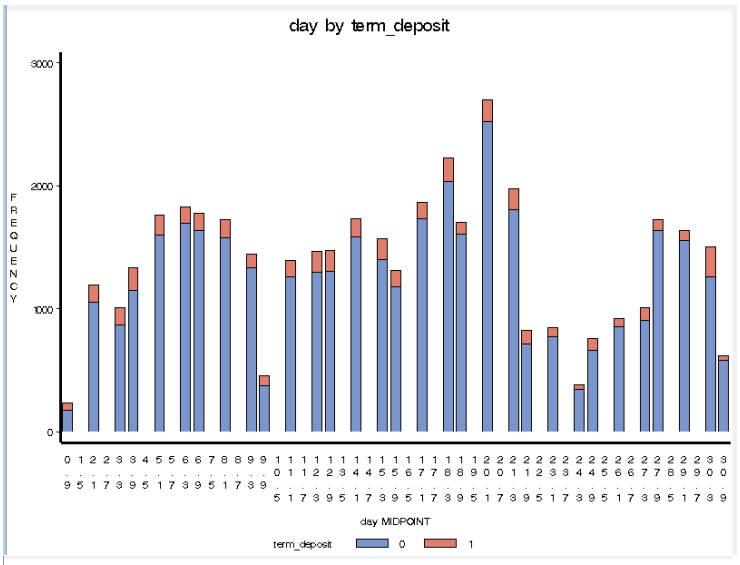

duration by term_deposit
FREQUENCY
duration MIDPOINT
term_deposit 0 1

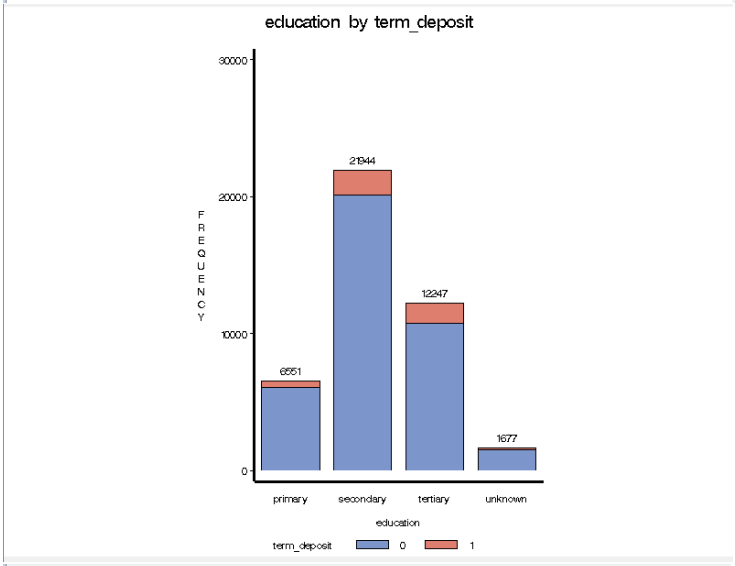

campaign by term_deposit
FREQUENCY
campaign MIDPOINT
term_deposit 0 1

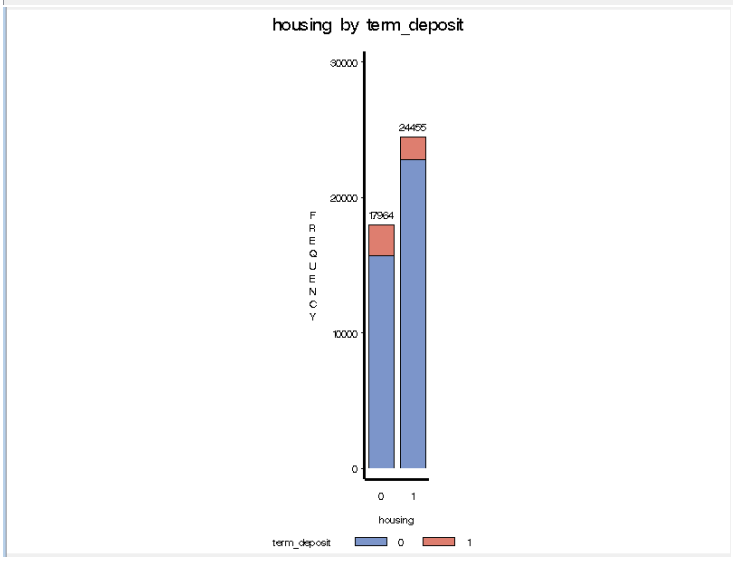

age by term_deposit
FREQUENCY
4000
3000
2000
1000
0
18 19 21 22 24 25 27 28 30 31 33 34 36 37 39 40 42 43 45 46 48 49 51 52 54 55 57 58 60 61 63 64 66 67 69 70 72 73 75 76 78 79 81 82 84 85 87 88 90 91 93 94
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
age MIDPOINT
term_deposit 0 1

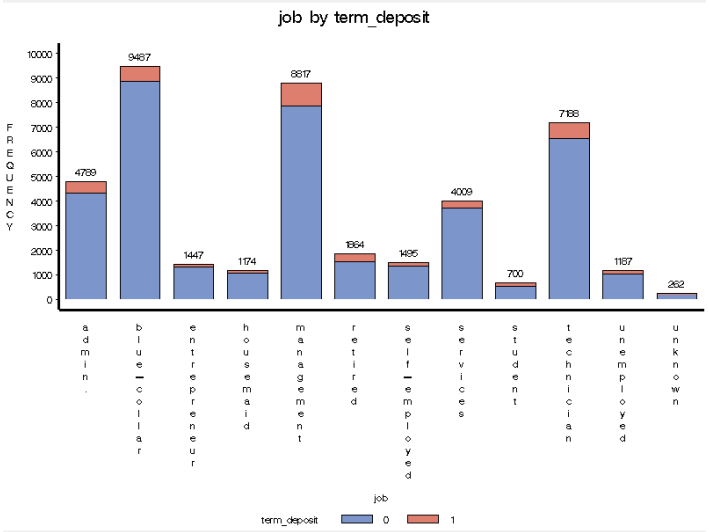

balance by term_deposit
FREQUENCY
40000
30000
20000
10000
0
-7500 -5000 -2500 0 2500 5000 7500 10000 12500 15000 17500 20000 22500 25000 27500 30000 32500 35000 37500 40000 42500 45000 47500 50000 52500 55000 57500 60000 62500 65000 67500 70000 72500 75000 77500 80000 82500 85000 87500 90000 92500 95000 97500 100000 102500
balance MIDPOINT
term_deposit 0 1

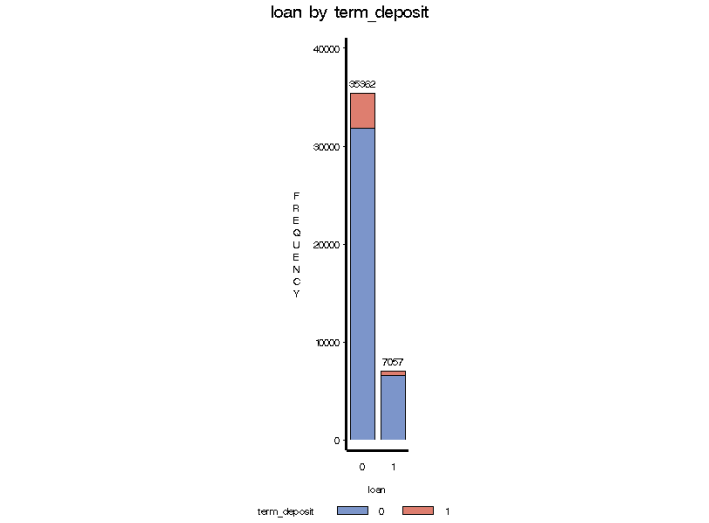

contact by term_deposit
FREQUENCY
30000
20000
10000
0
27122
2627
12670
cellular
telephone
unknown
contact
term_deposit 0 1

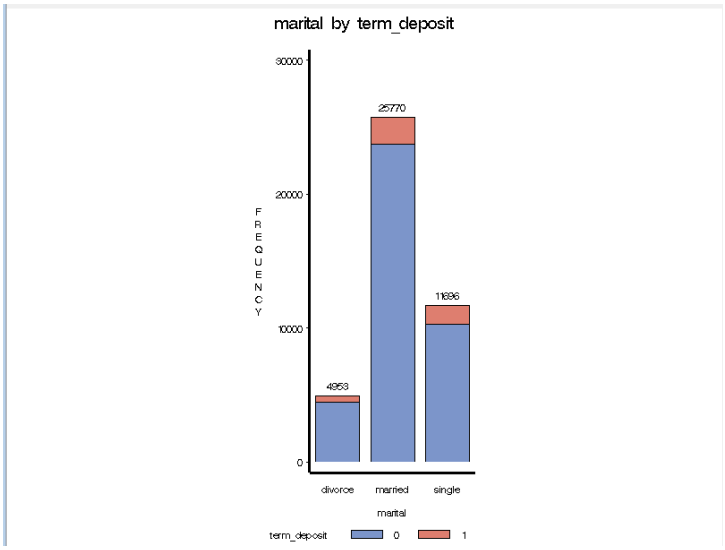

day by term_deposit
FREQUENCY
3000
2000
1000
0
day MIDPOINT
term_deposit 0 1

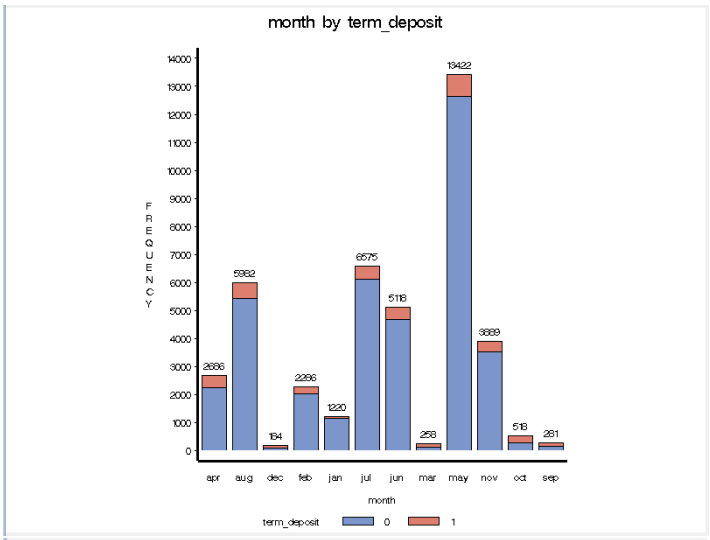

education by term_deposit
FREQUENCY
30000
20000
10000
0
6551
21944
12247
1677
primary
secondary
tertiary
unknown
education
term_deposit 0 1

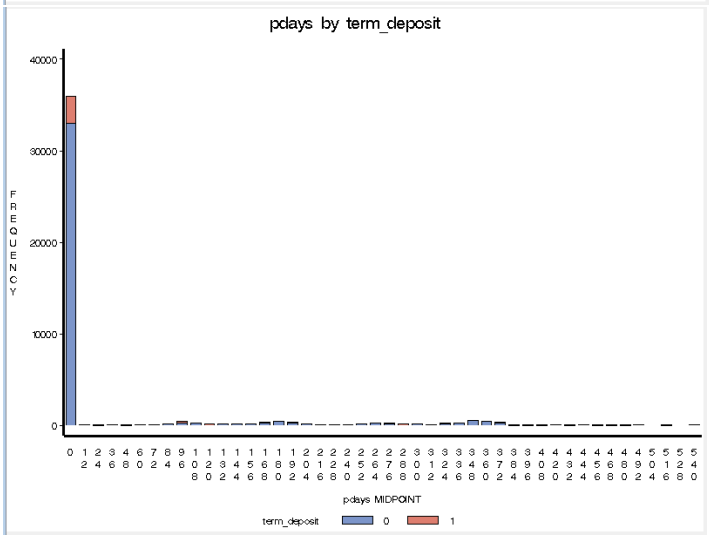

housing by term_deposit
FREQUENCY
30000
20000
10000
0
17964
24455
0
1
housing
term_deposit 0 1

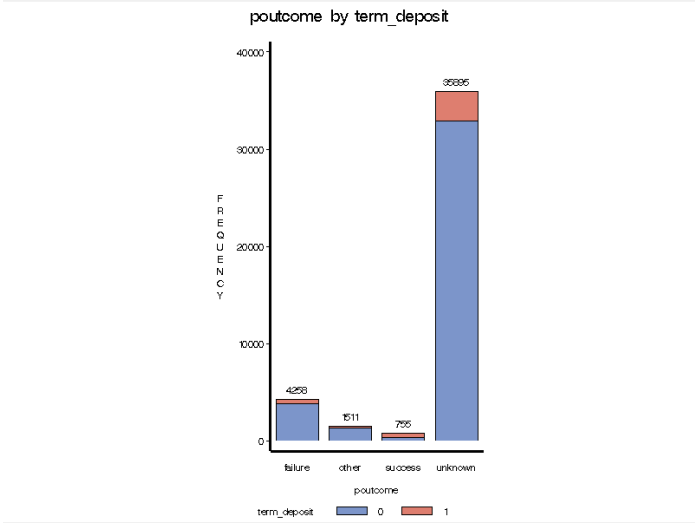

job by term_deposit
FREQUENCY
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
4789
9487
1447
1174
8817
1964
1495
4009
700
7188
1187
262
admin.
blue-collar
entrepreneur
housemaid
management
retired
self-employed
services
student
technician
unemployed
unknown
job
term_deposit
0
1

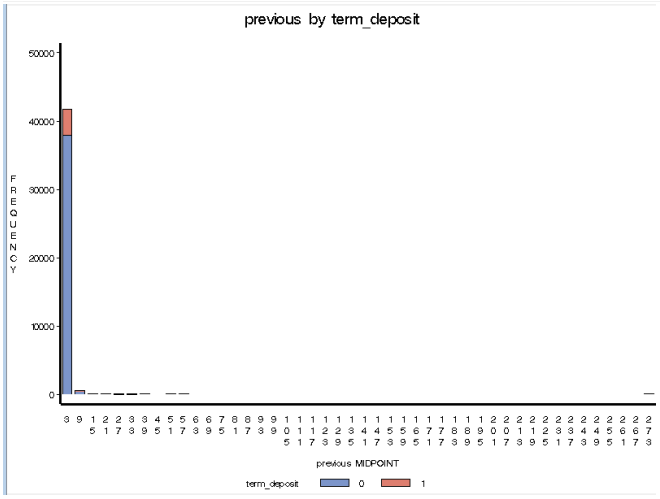

loan by term_deposit
FREQUENCY
40000
30000
20000
10000
0
35362
7057
0
1
loan
term_deposit
0
1


marital by term_deposit
FREQUENCY
30000
20000
10000
0
4953
25770
11896
divorce
married
single
marital
term_deposit
0
1


month by term_deposit
FREQUENCY
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
2686
5932
184
2296
1220
6575
5118
258
13422
3889
518
281
apr
aug
dec
feb
jan
jul
jun
mar
may
nov
oct
sep
month
term_deposit
0
1

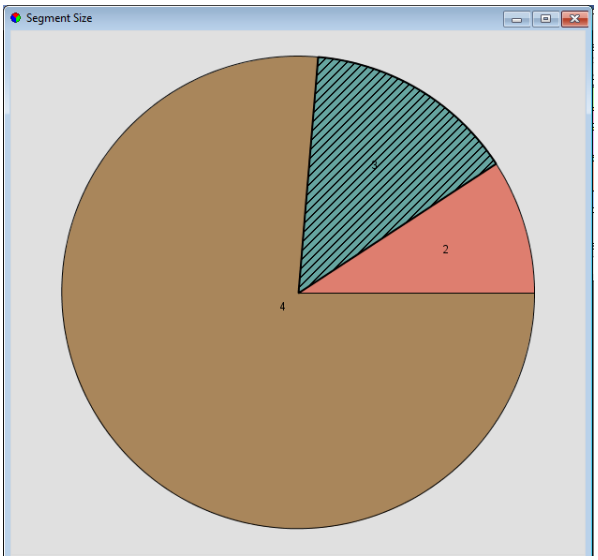

pdays by term_deposit
FREQUENCY
40000
30000
20000
10000
0
pdays MIDPOINT
term_deposit
0
1

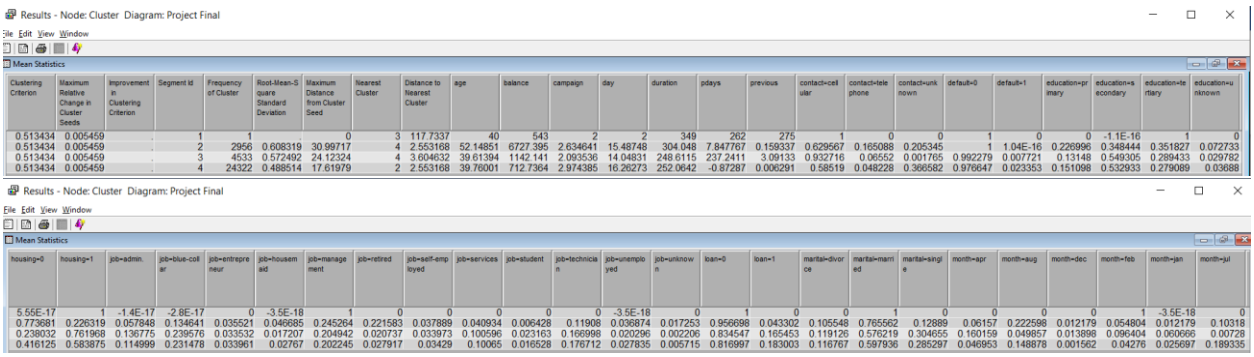

poutcome by term_deposit
FREQUENCY
40000
30000
20000
10000
0
4258
1511
755
35885
failure
other
success
unknown
poutcome
term_deposit
0
1

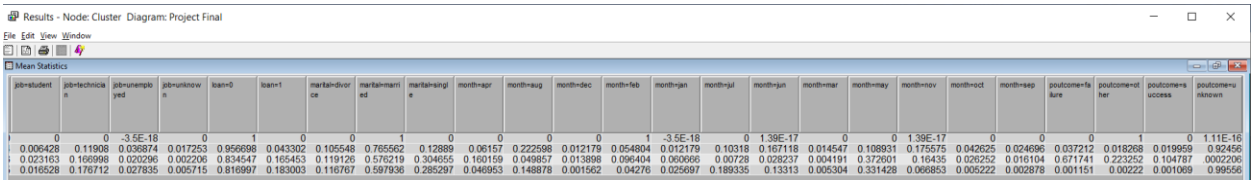

previous by term_deposit
FREQUENCY
50000
40000
30000
20000
10000
0
previous MIDPOINT
term_deposit
0
1

[c] Cluster


Results - Node: Cluster Diagram: Project Final
File Edit View Window
Segment Plot
Variable = age
Variable = balance
Variable = campaign
Variable = contact
Variable = day
Variable = duration
Variable = education
Variable = housing
Variable = job
Variable = marital
Variable = month
Variable = pdays
Variable = poutcome
Variable = previous
Percent (Sum)
Segment Variable


Segment Size
3
2
4


Results - Node: Cluster Diagram: Project Final
File Edit View Window
Mean Statistics
Clustering Criterion
Maximum Relative Change in Cluster Seeds
Improvement in Clustering Criterion
Segment Id
Frequency of Cluster
Root-Mean-Square Standard Deviation
Maximum Distance from Cluster Seed
Nearest Cluster
Distance to Nearest Cluster
age
balance
campaign
day
duration
pdays
previous
contact=cellular
contact=telephone
contact=unknown
default=0
default=1
education=primary
education=secondary
education=tertiary
education=unknown
0.513434 0.005459 1 1 0 3 117.7337 40 543 2 2 349 262 275 1 0 0 1 0 0 -1.1E-16 1 0
0.513434 0.005459 2 2956 0.608319 30.99717 4 2.553168 52.14851 6727.395 2.634641 15.48748 304.048 7.847767 0.159337 0.629567 0.165088 0.205345 1 1.04E-16 0.226996 0.348444 0.351827 0.072733
0.513434 0.005459 3 4533 0.572492 24.12324 4 3.604632 39.61394 1142.141 2.093536 14.04831 248.6115 237.2411 3.09133 0.932716 0.06552 0.001765 0.992279 0.007721 0.13148 0.549305 0.289433 0.029782
0.513434 0.005459 4 24322 0.488514 17.61979 2 2.553168 39.76001 712.7364 2.974385 16.26273 252.0642 -0.87287 0.006291 0.58519 0.048228 0.366582 0.976647 0.023353 0.151098 0.532933 0.279089 0.03888
Results - Node: Cluster Diagram: Project Final
File Edit View Window
Mean Statistics
housing=0
housing=1
job=admin.
job=blue-collar
job=entrepreneur
job=housemaid
job=management
job=retired
job=self-employed
job=services
job=student
job=technician
job=unemployed
job=unknown
loan=0
loan=1
marital=divorce
marital=married
marital=single
month=apr
month=aug
month=dec
month=feb
month=jan
month=jul
5.55E-17 1 -1.4E-17 -2.8E-17 0 -3.5E-18 1 0 0 0 0 0 -3.5E-18 0 1 0 0 1 0 0 0 0 1 -3.5E-18 0
0.773681 0.226319 0.057848 0.134641 0.035521 0.046685 0.245264 0.221583 0.037889 0.040934 0.006428 0.11908 0.036874 0.017253 0.956698 0.043302 0.105548 0.765562 0.12889 0.06157 0.222598 0.012179 0.054804 0.012179 0.10318
0.238032 0.761968 0.136775 0.239576 0.033532 0.017207 0.204942 0.020737 0.033973 0.100596 0.023163 0.166998 0.020296 0.002206 0.834547 0.165453 0.119126 0.576219 0.304655 0.160159 0.049857 0.013898 0.096404 0.060666 0.00728
0.416125 0.583875 0.114999 0.231478 0.033961 0.02767 0.202245 0.027917 0.03429 0.10065 0.016528 0.176712 0.027835 0.005715 0.816997 0.183003 0.116767 0.597936 0.285297 0.046953 0.148878 0.001562 0.04276 0.025697 0.189335



job=student	job=technician	job=unemployed	job=unknown	loan=0	loan=1	marital=divorce	marital=married	marital=single	month=apr	month=aug	month=dec	month=feb	month=jan	month=jul	month=jun	month=mar	month=may	month=nov	month=oct	month=sep	poutcome=failure	poutcome=other	poutcome=success	poutcome=unknown
0	0	-3.5E-18	0	1	0	0	1	0	0	0	0	1	-3.5E-18	0	1.39E-17	0	0	1.39E-17	0	0	0	1	0	1.11E-16
0.006428	0.11908	0.036874	0.017253	0.956698	0.043302	0.105548	0.765562	0.12889	0.06157	0.222598	0.012179	0.054804	0.012179	0.10318	0.167118	0.014547	0.108931	0.175575	0.042625	0.024696	0.037212	0.018268	0.019959	0.92456
0.023163	0.168998	0.020296	0.002206	0.834547	0.165453	0.119126	0.576219	0.304655	0.160159	0.049857	0.013898	0.096404	0.060666	0.00728	0.028237	0.004191	0.372601	0.16435	0.026252	0.016104	0.671741	0.223252	0.104787	0.002206
0.016528	0.176712	0.027835	0.005715	0.816997	0.183003	0.116767	0.597936	0.285297	0.046953	0.148878	0.001562	0.04276	0.025697	0.189335	0.13313	0.005304	0.331428	0.066853	0.005222	0.002878	0.001151	0.00222	0.001069	0.99556

Output

Variable Summary

Role	Measurement Level	Frequency Count
ID	INTERVAL	1
INPUT	BINARY	3
INPUT	INTERVAL	7
INPUT	NOMINAL	6

The CLUSTER Procedure
Centroid Hierarchical Cluster Analysis

Eigenvalues of the Covariance Matrix

	Eigenvalue	Difference	Proportion	Cumulative
1	7213714.78	7167630.16	0.9927	0.9927
2	46084.61	38908.48	0.0063	0.9990
3	7176.13	7143.23	0.0010	1.0000
4	32.91	11.99	0.0000	1.0000
5	20.92	14.91	0.0000	1.0000
6	6.01	2.14	0.0000	1.0000
7	3.87	3.56	0.0000	1.0000
8	0.31	0.24	0.0000	1.0000
9	0.06	0.00	0.0000	1.0000
10	0.06	0.02	0.0000	1.0000
11	0.04	0.01	0.0000	1.0000
12	0.04	0.02	0.0000	1.0000
13	0.02	0.01	0.0000	1.0000
14	0.02	0.01	0.0000	1.0000
15	0.01	0.00	0.0000	1.0000
16	0.01	0.00	0.0000	1.0000
17	0.01	0.00	0.0000	1.0000
18	0.00	0.00	0.0000	1.0000
19	0.00	0.00	0.0000	1.0000
20	0.00	0.00	0.0000	1.0000
21	0.00	0.00	0.0000	1.0000
22	0.00	0.00	0.0000	1.0000
23	0.00	0.00	0.0000	1.0000
24	0.00	0.00	0.0000	1.0000
25	0.00	0.00	0.0000	1.0000
26	0.00	0.00	0.0000	1.0000
27	0.00	0.00	0.0000	1.0000
28	0.00	0.00	0.0000	1.0000
29	0.00	0.00	0.0000	1.0000
30	0.00	0.00	0.0000	1.0000
31	0.00	0.00	0.0000	1.0000
32	0.00	0.00	0.0000	1.0000
33	0.00	0.00	0.0000	1.0000
34	0.00	0.00	0.0000	1.0000
35	0.00	0.00	0.0000	1.0000

Output

65	35	0.00	0.00	0.0000	1.0000
66	36	0.00	0.00	0.0000	1.0000
67	37	0.00	0.00	0.0000	1.0000
68	38	0.00	0.00	0.0000	1.0000
69	39	0.00	0.00	0.0000	1.0000
70	40	0.00	0.00	0.0000	1.0000
71	41	0.00	0.00	0.0000	1.0000
72	42	0.00	0.00	0.0000	1.0000
73	43	0.00	0.00	0.0000	1.0000
74	44	0.00	0.00	0.0000	1.0000
75	45	0.00	0.00	0.0000	1.0000
76	46	0.00	0.00	0.0000	1.0000
77	47	-0.00	0.00	-0.0000	1.0000
78	48	-0.00	0.00	-0.0000	1.0000
79	49	-0.00	0.00	-0.0000	1.0000
80	50	-0.00	0.00	-0.0000	1.0000
81	51	-0.00		-0.0000	1.0000
82					
83	Root-Mean-Square Total-Sample Standard Deviation			377.48	
84					
85	Root-Mean-Square Distance Between Observations			3812.361	
86					
87					
88			Cluster History		

	Number of Clusters	------Clusters Joined-------		Freq	Pseudo F Statistic	Pseudo t-Squared	Norm Centroid Distance	Tie
92								
93	49	OB3	OB5	272	58E7	1657	0.0035	
94	48	OB20	OB30	273	57E7	1461	0.0039	
95	47	OB31	OB41	9786	83E6	23E4	0.0076	
96	46	OB7	OB33	598	81E6	12E3	0.0077	
97	45	CL47	OB35	12910	29E6	28E3	0.0105	
98	44	OB15	OB17	4028	24E6	19E4	0.0109	
99	43	OB16	OB27	952	23E6	33E3	0.0135	
100	42	CL44	CL45	16938	87E5	32E3	0.0172	
101	41	OB36	OB49	69	89E5	1993	0.0238	
102	40	CL46	OB13	3922	74E5	14E4	0.0251	
103	39	CL49	OB25	366	74E5	18E3	0.0268	
104	38	CL40	OB12	4233	67E5	3342	0.03	
105	37	CL39	OB37	547	64E5	1675	0.0361	
106	36	OB1	CL43	2894	46E5	1E5	0.0377	
107	35	CL42	OB29	17009	46E5	1468	0.041	
108	34	CL41	OB46	540	46E5	18E3	0.042	
109	33	OB10	CL48	429	45E5	62E3	0.0434	
110	32	CL37	OB18	573	46E5	149	0.047	
111	31	OB21	OB32	242	45E5	15E4	0.0493	
112	30	CL33	OB24	1704	36E5	9588	0.0576	
113	29	CL38	CL34	4773	28E5	12E3	0.0603	
114	28	OB14	OB45	276	29E5	7002	0.0695	
115	27	CL29	CL30	6477	14E5	12E3	0.0753	
116	26	CL36	OB38	2899	15E5	91.6	0.0769	
117	25	CL32	OB39	601	15E5	378	0.0791	
118	24	CL25	OB23	602	16E5	8.4	0.0779	

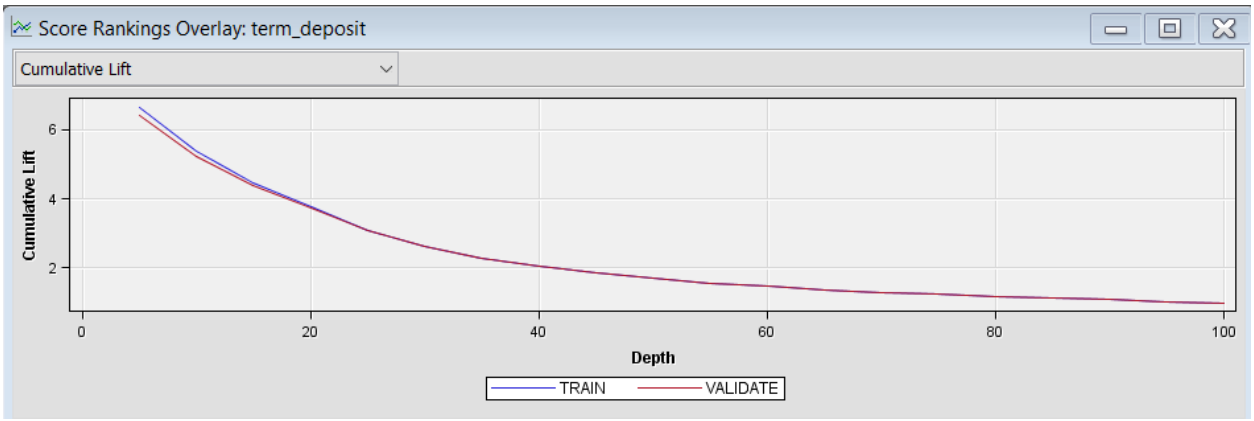
Output

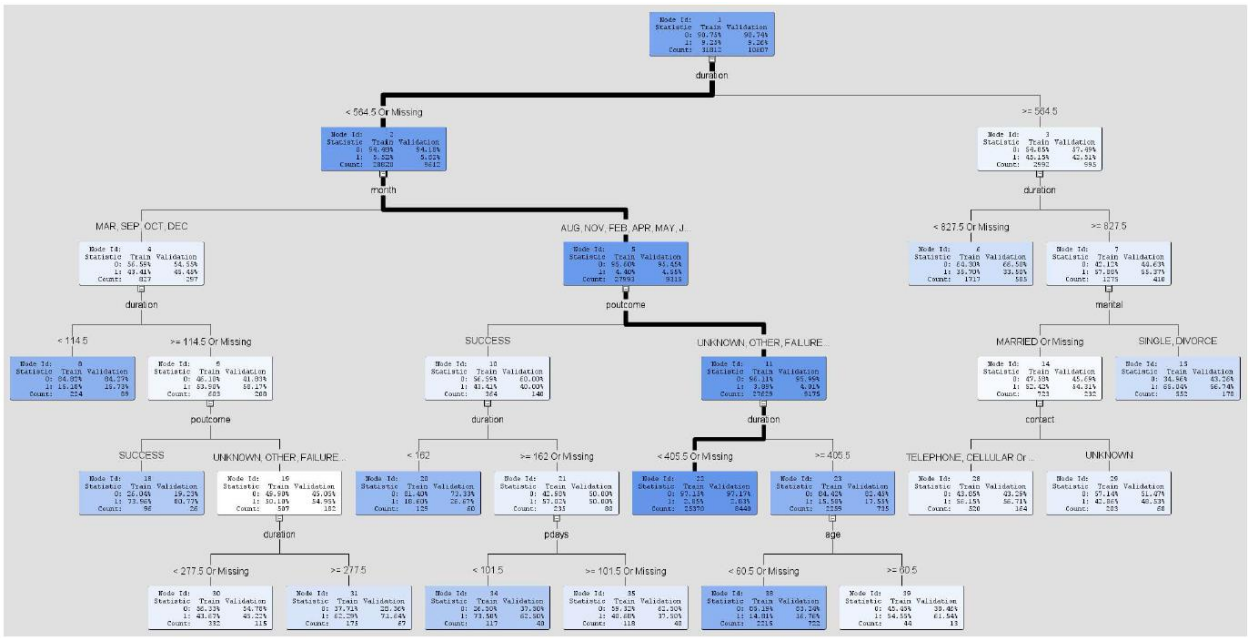
119	23	CL26	CL35	19908	78E4	13E4	0.0796
120	22	OB2	CL28	1777	77E4	48E4	0.0814
121	21	CL31	OB28	355	8E5	1466	0.089
122	20	CL23	CL27	26385	34E4	42E3	0.0976
123	19	CL22	OB50	2627	32E4	17E3	0.1305
124	18	CL20	OB42	26386	34E4	6.1	0.1321
125	17	CL18	CL19	29013	22E4	18E3	0.1508
126	16	OB11	OB22	29	23E4	19E3	0.178
127	15	OB4	OB47	152	25E4	79E4	0.2119
128	14	OB40	OB44	439	27E4	13E5	0.224
129	13	CL14	OB48	440	29E4	26.3	0.2511
130	12	CL17	CL21	29368	27E4	5287	0.27
131	11	CL12	CL24	29970	23E4	8360	0.2819
132	10	CL11	CL13	30410	21E4	7232	0.3442
133	9	CL16	OB26	30	23E4	124	0.3739
134	8	OB6	OB43	997	24E4	42E6	0.4334
135	7	CL10	OB8	30446	27E4	1888	0.6791
136	6	CL15	CL8	1149	22E4	5773	1.002
137	5	CL7	CL6	31595	17E3	33E4	2.0343
138	4	OB19	OB34	3	23E3	24E6	5.0045
139	3	CL5	OB9	31779	8981	32E3	5.2923
140	2	CL3	CL9	31809	3982	12E3	11.51
141	1	CL2	CL4	31812	.	3982	24.287

Candidates for Optimum Number of Clusters

Obs	Number of Clusters	Clustering Cubic Criterion
1	4	-208.629
2	7	45.076
3	13	67.951
4	18	102.842
5	21	261.839
6	24	389.256
7	28	499.834
8	32	587.249
9	41	715.653

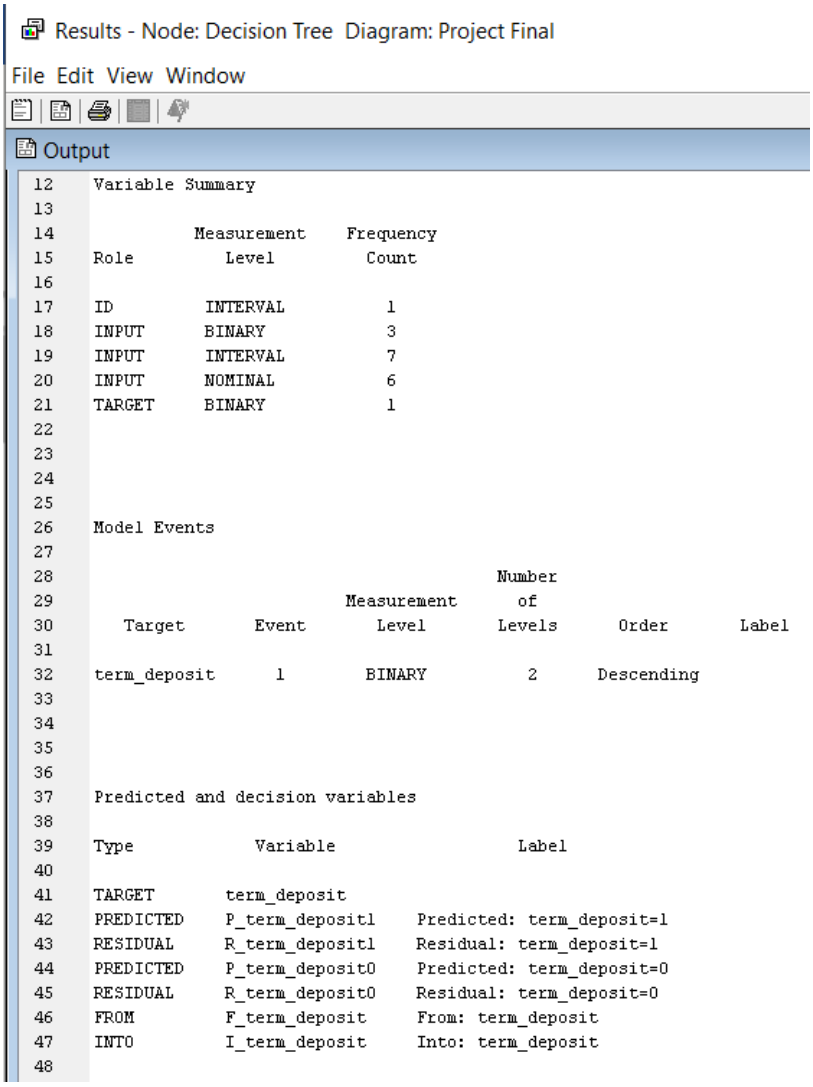
[d] Decision Tree





Fit Statistics

Target	Target Label	Fit Statistics	Statistics Label	Train	Validation
term_deposit		NOBS	Sum of Frequencies	31812	10607
term_deposit		MISC	Misclassification Rate	0.080599	0.082776
term_deposit		MAX	Maximum Absolute Error	0.971541	0.971541
term_deposit		SSE	Sum of Squared Errors	3860.218	1318.881
term_deposit		ASE	Average Squared Error	0.060672	0.06217
term_deposit		RASE	Root Average Squared Error	0.246318	0.24934
term_deposit		DIV	Divisor for ASE	63624	21214
term_deposit		DFT	Total Degrees of Freedom	31812	.



Variable Summary

Role	Measurement Level	Frequency Count
ID	INTERVAL	1
INPUT	BINARY	3
INPUT	INTERVAL	7
INPUT	NOMINAL	6
TARGET	BINARY	1

Model Events

Target	Event	Measurement Level	Number of Levels	Order	Label
term_deposit	1	BINARY	2	Descending	

Predicted and decision variables

Type	Variable	Label
TARGET	term_deposit	
PREDICTED	P_term_deposit1	Predicted: term_deposit=1
RESIDUAL	R_term_deposit1	Residual: term_deposit=1
PREDICTED	P_term_deposit0	Predicted: term_deposit=0
RESIDUAL	R_term_deposit0	Residual: term_deposit=0
FROM	F_term_deposit	From: term_deposit
INTO	I_term_deposit	Into: term_deposit

Output

Variable Importance

Variable Name	Label	Number of Splitting Rules	Importance	Validation Importance	Ratio of Validation to Training Importance
duration		6	1.0000	1.0000	1.0000
month		1	0.4775	0.5454	1.1423
poutcome		2	0.3365	0.3433	1.0203
age		1	0.1127	0.1245	1.1048
pdays		1	0.1087	0.0832	0.7658
marital		1	0.0964	0.0000	0.0000
contact		1	0.0694	0.0334	0.4816

Tree Leaf Report

Node Id	Depth	Training Observations	Training Percent 1	Validation Observations	Validation Percent 1
22	4	25370	0.03	8440	0.03
38	5	2215	0.15	722	0.17
6	2	1717	0.36	585	0.34
15	3	552	0.65	178	0.57
28	4	520	0.56	164	0.57
30	5	332	0.44	115	0.45
8	3	224	0.15	89	0.16
29	4	203	0.43	68	0.49
31	5	175	0.62	67	0.72
20	4	129	0.19	60	0.27
35	5	118	0.41	40	0.38
34	5	117	0.74	40	0.63
18	4	96	0.74	26	0.81
39	5	44	0.55	13	0.62

Output

Fit Statistics

Target=term_deposit Target Label=' '

Fit Statistics	Statistics Label	Train	Validation
NOBS	Sum of Frequencies	31812.00	10607.00
MISC	Misclassification Rate	0.08	0.08
MAX	Maximum Absolute Error	0.97	0.97
SSE	Sum of Squared Errors	3860.22	1318.88
ASE	Average Squared Error	0.06	0.06
RASE	Root Average Squared Error	0.25	0.25
DIV	Divisor for ASE	63624.00	21214.00
DFT	Total Degrees of Freedom	31812.00	.

Classification Table

Data Role=TRAIN Target Variable=term_deposit Target Label=' '

Target	Outcome	Target Percentage	Outcome Percentage	Frequency Count	Total Percentage
0	0	93.3978	98.0499	28307	88.9821
1	0	6.6022	68.0150	2001	6.2901
0	1	37.4335	1.9501	563	1.7698
1	1	62.5665	31.9850	941	2.9580

Data Role=VALIDATE Target Variable=term_deposit Target Label=' '

Target	Outcome	Target Percentage	Outcome Percentage	Frequency Count	Total Percentage
0	0	93.2207	98.0052	9433	88.9318
1	0	6.7793	69.8574	686	6.4674
0	1	39.3443	1.9948	192	1.8101
1	1	60.6557	30.1426	296	2.7906

Event Classification Table

Data Role=TRAIN Target=term_deposit Target Label=' '

False Negative	True Negative	False Positive	True Positive
2001	28307	563	941

Data Role=VALIDATE Target=term_deposit Target Label=' '

False Negative	True Negative	False Positive	True Positive
686	9433	192	296

Assessment Score Rankings

Data Role=TRAIN Target Variable=term_deposit Target Label=' '

Depth	Gain	Lift	Cumulative Lift	% Response	Cumulative % Response	Number of Observations	Mean Posterior Probability
5	565.364	6.65364	6.65364	61.5334	61.5334	1591	0.61533
10	439.274	4.13184	5.39274	38.2116	49.8725	1591	0.38212
15	347.002	2.62343	4.47002	24.2617	41.3392	1590	0.24262
20	275.271	1.60121	3.75271	14.8081	34.7054	1591	0.14808
25	207.682	0.37199	3.07682	3.4402	28.4547	1590	0.03440
30	161.521	0.30773	2.61521	2.8459	24.1857	1591	0.02846
35	128.551	0.30773	2.28551	2.8459	21.1366	1591	0.02846
40	103.838	0.30773	2.03838	2.8459	18.8511	1590	0.02846
45	84.605	0.30773	1.84605	2.8459	17.0724	1591	0.02846
50	69.227	0.30773	1.69227	2.8459	15.6503	1590	0.02846
55	56.638	0.30773	1.56638	2.8459	14.4860	1591	0.02846
60	46.147	0.30773	1.46147	2.8459	13.5158	1591	0.02846
65	37.275	0.30773	1.37275	2.8459	12.6953	1590	0.02846
70	29.666	0.30773	1.29666	2.8459	11.9916	1591	0.02846
75	23.076	0.30773	1.23076	2.8459	11.3821	1590	0.02846
80	17.305	0.30773	1.17305	2.8459	10.8485	1591	0.02846
85	12.214	0.30773	1.12214	2.8459	10.3777	1591	0.02846
90	7.691	0.30773	1.07691	2.8459	9.9594	1590	0.02846
95	3.642	0.30773	1.03642	2.8459	9.5849	1591	0.02846
100	0.000	0.30773	1.00000	2.8459	9.2481	1590	0.02846

Data Role=VALIDATE Target Variable=term_deposit Target Label=' '

Depth	Gain	Lift	Cumulative Lift	% Response	Cumulative % Response	Number of Observations	Mean Posterior Probability
5	541.665	6.41665	6.41665	59.4056	59.4056	531	0.61034
10	422.525	4.03161	5.22525	37.3248	48.3756	530	0.38079
15	338.730	2.71298	4.38730	25.1169	40.6178	531	0.24546
20	274.364	1.81021	3.74364	16.7590	34.6587	530	0.14808
25	208.213	0.43360	3.08213	4.0143	28.5345	530	0.03862
30	161.898	0.30587	2.61898	2.8318	24.2466	531	0.02846
35	128.881	0.30587	2.28881	2.8318	21.1898	530	0.02846
40	104.111	0.30587	2.04111	2.8318	18.8967	530	0.02846
45	84.811	0.30587	1.84811	2.8318	17.1098	531	0.02846
50	69.400	0.30587	1.69400	2.8318	15.6831	530	0.02846
55	56.789	0.30587	1.56789	2.8318	14.5156	530	0.02846
60	46.261	0.30587	1.46261	2.8318	13.5409	531	0.02846
65	37.369	0.30587	1.37369	2.8318	12.7177	530	0.02846
70	29.747	0.30587	1.29747	2.8318	12.0120	530	0.02846
75	23.129	0.30587	1.23129	2.8318	11.3993	531	0.02846
80	17.349	0.30587	1.17349	2.8318	10.8642	530	0.02846
85	12.249	0.30587	1.12249	2.8318	10.3920	530	0.02846
90	7.707	0.30587	1.07707	2.8318	9.9715	531	0.02846
95	3.651	0.30587	1.03651	2.8318	9.5960	530	0.02846
100	0.000	0.30587	1.00000	2.8318	9.2580	530	0.02846

Assessment Score Distribution

Data Role=TRAIN Target Variable=term_deposit Target Label=' '

Posterior Probability Range	Number of Events	Number of Nonevents	Mean Posterior Probability	Percentage
0.70-0.75	157	56	0.73709	0.6696
0.65-0.70	359	193	0.65036	1.7352
0.60-0.65	109	66	0.62286	0.5501
0.55-0.60	292	228	0.56154	1.6346
0.50-0.55	24	20	0.54545	0.1383
0.40-0.45	280	373	0.42879	2.0527
0.35-0.40	613	1104	0.35702	5.3973
0.15-0.20	58	295	0.16431	1.1096
0.10-0.15	328	1887	0.14808	6.9628
0.00-0.05	722	24648	0.02846	79.7498

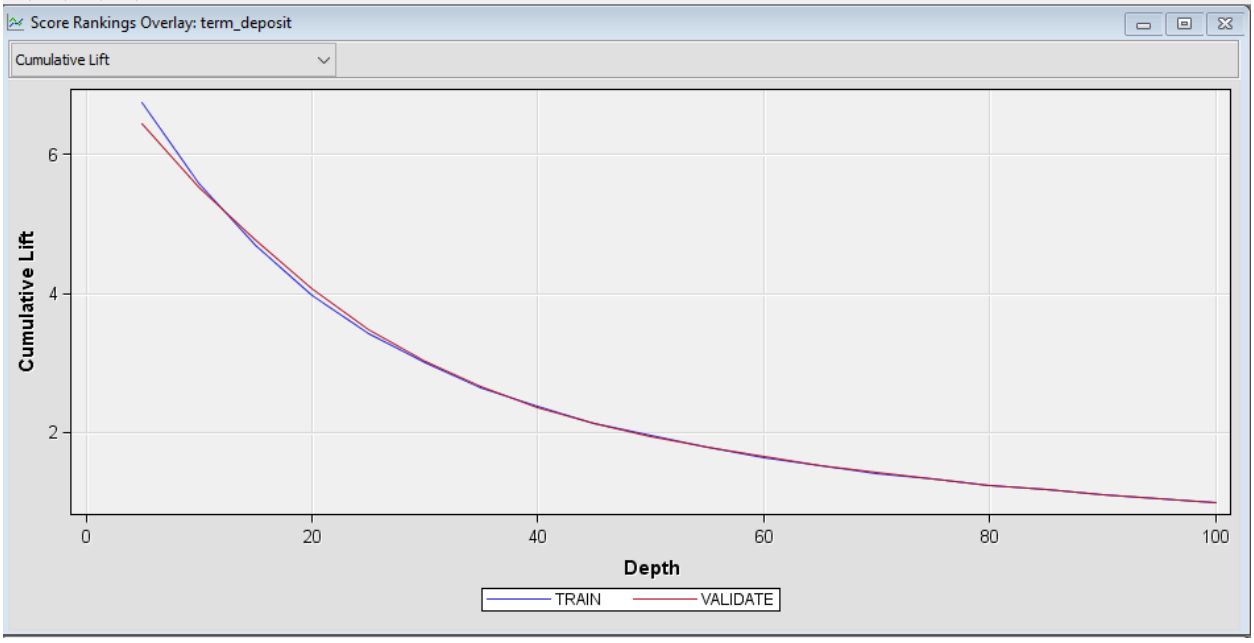
Data Role=VALIDATE Target Variable=term_deposit Target Label=' '

Posterior Probability Range	Number of Events	Number of Nonevents	Mean Posterior Probability	Percentage
0.70-0.75	46	20	0.73683	0.6222
0.65-0.70	101	77	0.65036	1.6781
0.60-0.65	48	19	0.62286	0.6317
0.55-0.60	93	71	0.56154	1.5461
0.50-0.55	8	5	0.54545	0.1226
0.40-0.45	100	123	0.42888	2.1024
0.35-0.40	196	389	0.35702	5.5152
0.15-0.20	30	119	0.16558	1.4047
0.10-0.15	121	601	0.14808	6.8068
0.00-0.05	239	8201	0.02846	79.5701

[e] Regression Model

Results - Node: Regression Diagram: Project Final

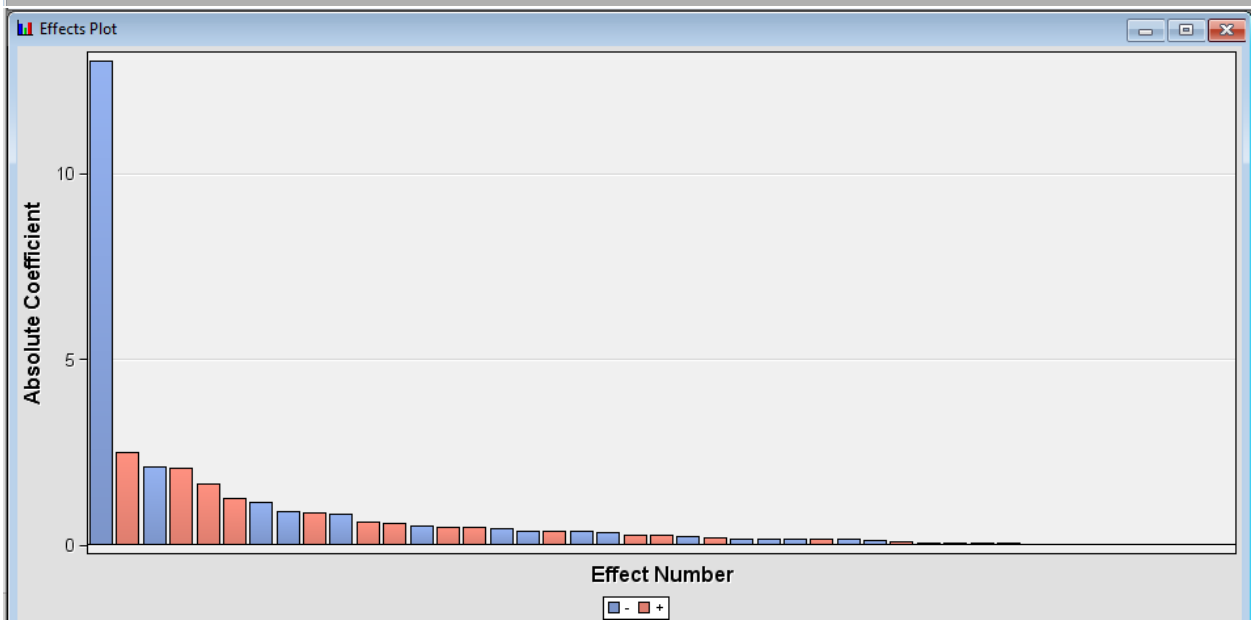
File Edit View Window

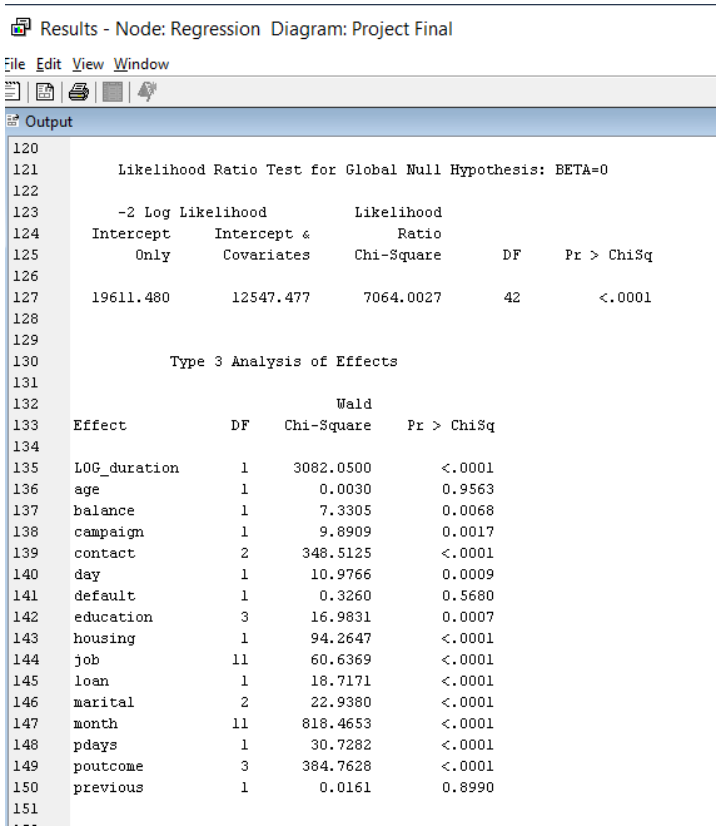


Fit Statistics

Log

Target	Target Label	Fit Statistics	Statistics Label	Train	Validation
term deposit		AIC	Akaike's Information Criterion	12633.48	
term deposit		ASE	Average Squared Error	0.058799	0.058735
term deposit		AVERR	Average Error Function	0.197213	0.195684
term deposit		DFE	Degrees of Freedom for Error	31769	.
term deposit		DFM	Model Degrees of Freedom	43	.
term deposit		DFT	Total Degrees of Freedom	31812	.
term deposit		DIV	Divisor for ASE	63624	21214
term deposit		ERR	Error Function	12547.48	4151.249
term deposit		FPE	Final Prediction Error	0.058958	.
term deposit		MAX	Maximum Absolute Error	0.999911	0.999679
term deposit		MSE	Mean Square Error	0.058879	0.058735
term deposit		NOBS	Sum of Frequencies	31812	10607
term deposit		NW	Number of Estimate Weights	43	.
term deposit		RASE	Root Average Sum of Squares	0.242486	0.242353
term deposit		RFPE	Root Final Prediction Error	0.242814	.
term deposit		RMSE	Root Mean Squared Error	0.24265	0.242353
term deposit		SBC	Schwarz's Bayesian Criterion	12993.28	.
term deposit		SSE	Sum of Squared Errors	3741.043	1246.007
term deposit		SUMW	Sum of Case Weights Times Freq	63624	21214
term deposit		MISC	Misclassification Rate	0.08019	0.082964





Likelihood Ratio Test for Global Null Hypothesis: BETA=0

-2 Log Likelihood Intercept Only	-2 Log Likelihood Intercept & Covariates	Likelihood Ratio Chi-Square	DF	Pr > ChiSq
19611.480	12547.477	7064.0027	42	<.0001

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
LOG_duration	1	3082.0500	<.0001
age	1	0.0030	0.9563
balance	1	7.3305	0.0068
campaign	1	9.8909	0.0017
contact	2	348.5125	<.0001
day	1	10.9766	0.0009
default	1	0.3260	0.5680
education	3	16.9831	0.0007
housing	1	94.2647	<.0001
job	11	60.6369	<.0001
loan	1	18.7171	<.0001
marital	2	22.9380	<.0001
month	11	818.4653	<.0001
pdays	1	30.7282	<.0001
poutcome	3	384.7628	<.0001
previous	1	0.0161	0.8990

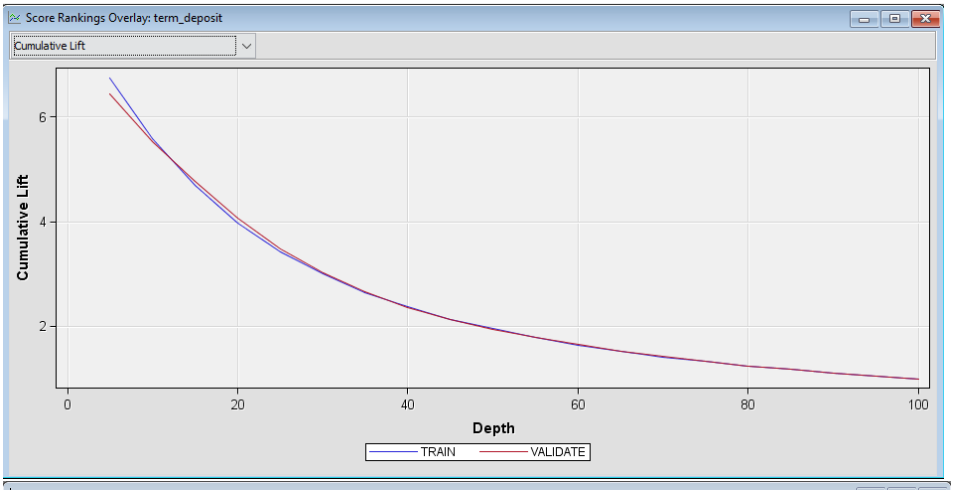
Analysis of Maximum Likelihood Estimates

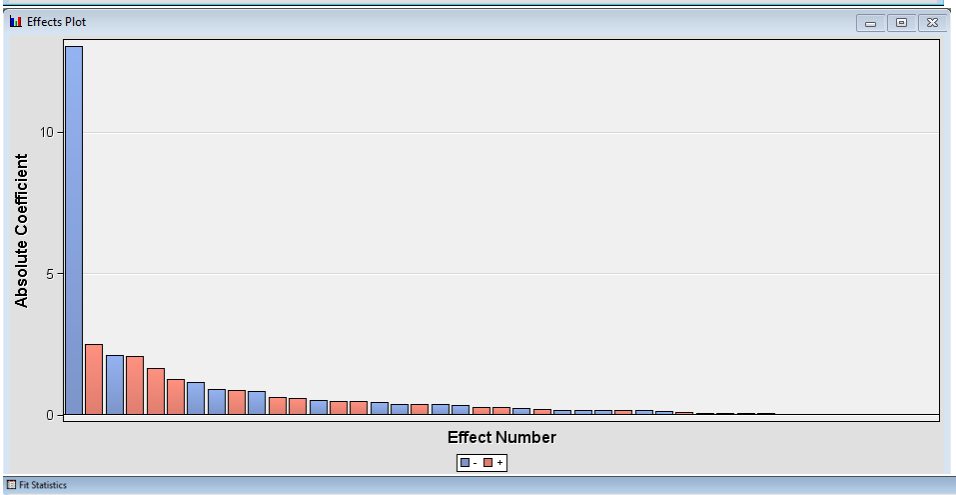
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Standardized Estimate	Exp(Est)
Intercept		1	-13.0492	0.2938	1972.93	<.0001		0.000
LOG_duration		1	2.0637	0.0372	3082.05	<.0001	1.0412	7.875
age		1	0.000159	0.00291	0.00	0.9563	0.000894	1.000
balance		1	0.000018	6.579E-6	7.33	0.0068	0.0301	1.000
campaign		1	-0.0376	0.0120	9.89	0.0017	-0.0659	0.963
contact	cellular	1	0.5925	0.0479	152.74	<.0001		1.808
contact	telephone	1	0.4922	0.0736	44.71	<.0001		1.636
day		1	0.0113	0.00342	10.98	0.0009	0.0518	1.011
default	0	1	-0.0543	0.0950	0.33	0.5680		0.947
education	primary	1	-0.1589	0.0655	5.88	0.0153		0.853
education	secondary	1	-0.0684	0.0465	2.16	0.1413		0.934
education	tertiary	1	0.1824	0.0572	10.18	0.0014		1.200
housing	0	1	0.2789	0.0287	94.26	<.0001		1.322
job	admin.	1	0.2526	0.0755	11.20	0.0008		1.287
job	blue-collar	1	-0.1187	0.0702	2.86	0.0910		0.888
job	entrepreneur	1	-0.2395	0.1342	3.18	0.0745		0.787
job	housemaid	1	-0.4368	0.1558	7.86	0.0050		0.646
job	management	1	0.0119	0.0698	0.03	0.8642		1.012
job	retired	1	0.3722	0.1064	12.25	0.0005		1.451
job	self-employed	1	-0.1432	0.1221	1.37	0.2410		0.867
job	services	1	-0.0196	0.0877	0.05	0.8230		0.981
job	student	1	0.6133	0.1374	19.91	<.0001		1.847
job	technician	1	0.0297	0.0672	0.20	0.6583		1.030
job	unemployed	1	-0.0358	0.1273	0.08	0.7787		0.965
loan	0	1	0.1575	0.0364	18.72	<.0001		1.171
marital	divorce	1	0.0847	0.0496	2.92	0.0875		1.088
marital	married	1	-0.1627	0.0347	21.93	<.0001		0.850
month	apr	1	-0.1744	0.0790	4.87	0.0273		0.840
month	aug	1	-0.8231	0.0714	132.96	<.0001		0.439
month	dec	1	0.8687	0.1988	19.09	<.0001		2.384
month	feb	1	-0.5068	0.1018	24.78	<.0001		0.602
month	jan	1	-2.1149	0.1673	159.87	<.0001		0.121
month	jul	1	-1.1405	0.0752	230.02	<.0001		0.320
month	jun	1	0.4840	0.0932	26.94	<.0001		1.623
month	mar	1	2.4965	0.1634	233.36	<.0001		12.140
month	may	1	-0.3843	0.0679	32.04	<.0001		0.681
month	nov	1	-0.9096	0.0808	126.82	<.0001		0.403
month	oct	1	1.2543	0.1316	90.77	<.0001		3.505
pdays		1	-0.00300	0.000540	30.73	<.0001	-0.1514	0.997
poutcome	failure	1	-0.3684	0.0783	22.14	<.0001		0.692
poutcome	other	1	-0.3262	0.0998	10.68	0.0011		0.722
poutcome	success	1	1.6445	0.0889	342.53	<.0001		5.178
previous		1	0.00117	0.00923	0.02	0.8990	0.00149	1.001

Odds Ratio Estimates

Effect		Point Estimate
LOG_duration		7.875
age		1.000
balance		1.000
campaign		0.963
contact	cellular vs unknown	5.350
contact	telephone vs unknown	4.840
day		1.011
default	0 vs 1	0.897
education	primary vs unknown	0.816
education	secondary vs unknown	0.893
education	tertiary vs unknown	1.147
housing	0 vs 1	1.747
job	admin. vs unknown	1.714
job	blue-collar vs unknown	1.183
job	entrepreneur vs unknown	1.048
job	housemaid vs unknown	0.860
job	management vs unknown	1.347
job	retired vs unknown	1.932
job	self-employed vs unknown	1.154
job	services vs unknown	1.306
job	student vs unknown	2.459
job	technician vs unknown	1.372
job	unemployed vs unknown	1.285
loan	0 vs 1	1.370
marital	divorce vs single	1.007
marital	married vs single	0.786
month	apr vs sep	0.325
month	aug vs sep	0.170
month	dec vs sep	0.922
month	feb vs sep	0.233
month	jan vs sep	0.047
month	jul vs sep	0.124
month	jun vs sep	0.627
month	mar vs sep	4.695
month	may vs sep	0.263
month	nov vs sep	0.156
month	oct vs sep	1.356
pdays		0.997
poutcome	failure vs unknown	1.789
poutcome	other vs unknown	1.866
poutcome	success vs unknown	13.388
previous		1.001

[e] Regression





Fit Statistics

Target	Target Label	Fit Statistics	Statistics Label	Train	Validation
term_deposit		AIC	Akaike's Information Criterion	12633.48	.
term_deposit		ASE	Average Squared Error	0.058799	0.058735
term_deposit		AVERR	Average Error Function	0.197213	0.195684
term_deposit		DFE	Degrees of Freedom for Error	31769	.
term_deposit		DFM	Model Degrees of Freedom	43	.
term_deposit		DFT	Total Degrees of Freedom	31812	.
term_deposit		DIV	Divisor for ASE	63624	21214
term_deposit		ERR	Error Function	12547.48	4151.249
term_deposit		FPE	Final Prediction Error	0.058958	.
term_deposit		MAX	Maximum Absolute Error	0.999911	0.999679
term_deposit		MSE	Mean Square Error	0.058879	0.058735
term_deposit		NOBS	Sum of Frequencies	31812	10607
term_deposit		NW	Number of Estimate Weights	43	.
term_deposit		RASE	Root Average Sum of Squares	0.242486	0.242353
term_deposit		RFPE	Root Final Prediction Error	0.242814	.
term_deposit		RMSE	Root Mean Squared Error	0.24265	0.242353
term_deposit		SBC	Schwarz's Bayesian Criterion	12993.28	.
term_deposit		SSE	Sum of Squared Errors	3741.043	1246.007
term_deposit		SUMW	Sum of Case Weights Times Freq	63624	21214
term_deposit		MISC	Misclassification Rate	0.08019	0.082964

Analysis of Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Standardized Estimate	Exp(Est)
Intercept		1	-13.0492	0.2938	1972.93	<.0001		0.000
LOG_duration		1	2.0637	0.0372	3082.05	<.0001	1.0412	7.875
age		1	0.000159	0.00291	0.00	0.9563	0.000894	1.000
balance		1	0.000018	6.579E-6	7.33	0.0068	0.0301	1.000
campaign		1	-0.0376	0.0120	9.89	0.0017	-0.0659	0.963
contact	cellular	1	0.5925	0.0479	152.74	<.0001		1.808
contact	telephone	1	0.4922	0.0736	44.71	<.0001		1.636
day		1	0.0113	0.00342	10.98	0.0009	0.0518	1.011
default	0	1	-0.0543	0.0950	0.33	0.5680		0.947
education	primary	1	-0.1589	0.0655	5.88	0.0153		0.853
education	secondary	1	-0.0684	0.0465	2.16	0.1413		0.934
education	tertiary	1	0.1824	0.0572	10.18	0.0014		1.200
housing	0	1	0.2789	0.0287	94.26	<.0001		1.322
job	admin.	1	0.2526	0.0755	11.20	0.0008		1.287
job	blue-collar	1	-0.1187	0.0702	2.86	0.0910		0.888
job	entrepreneur	1	-0.2395	0.1342	3.18	0.0745		0.787
job	housemaid	1	-0.4368	0.1558	7.86	0.0050		0.646
job	management	1	0.0119	0.0698	0.03	0.8642		1.012
job	retired	1	0.3722	0.1064	12.25	0.0005		1.451
job	self-employed	1	-0.1432	0.1221	1.37	0.2410		0.867
job	services	1	-0.0196	0.0877	0.05	0.8230		0.981
job	student	1	0.6133	0.1374	19.91	<.0001		1.847
job	technician	1	0.0297	0.0672	0.20	0.6583		1.030
job	unemployed	1	-0.0358	0.1273	0.08	0.7787		0.965
loan	0	1	0.1575	0.0364	18.72	<.0001		1.171
marital	divorce	1	0.0847	0.0496	2.92	0.0875		1.088
marital	married	1	-0.1627	0.0347	21.93	<.0001		0.850
month	apr	1	-0.1744	0.0790	4.87	0.0273		0.840
month	aug	1	-0.8231	0.0714	132.96	<.0001		0.439
month	dec	1	0.8687	0.1988	19.09	<.0001		2.384
month	feb	1	-0.5068	0.1018	24.78	<.0001		0.602
month	jan	1	-2.1149	0.1673	159.87	<.0001		0.121
month	jul	1	-1.1405	0.0752	230.02	<.0001		0.320
month	jun	1	0.4840	0.0932	26.94	<.0001		1.623
month	mar	1	2.4965	0.1634	233.36	<.0001		12.140
month	may	1	-0.3843	0.0679	32.04	<.0001		0.681
month	nov	1	-0.9096	0.0808	126.82	<.0001		0.403
month	oct	1	1.2543	0.1316	90.77	<.0001		3.505
pdays		1	-0.00300	0.000540	30.73	<.0001	-0.1514	0.997
poutcome	failure	1	-0.3684	0.0783	22.14	<.0001		0.692
poutcome	other	1	-0.3262	0.0998	10.68	0.0011		0.722
poutcome	success	1	1.6445	0.0889	342.53	<.0001		5.178
previous		1	0.00117	0.00923	0.02	0.8990	0.00149	1.001

Odds Ratio Estimates

Effect		Point Estimate
LOG_duration		7.875
age		1.000
balance		1.000
campaign		0.963
contact	cellular vs unknown	5.350
contact	telephone vs unknown	4.840
day		1.011
default	0 vs 1	0.897
education	primary vs unknown	0.816
education	secondary vs unknown	0.893
education	tertiary vs unknown	1.147
housing	0 vs 1	1.747
job	admin. vs unknown	1.714
job	blue-collar vs unknown	1.183
job	entrepreneur vs unknown	1.048
job	housemaid vs unknown	0.860
job	management vs unknown	1.347
job	retired vs unknown	1.932
job	self-employed vs unknown	1.154
job	services vs unknown	1.306
job	student vs unknown	2.459
job	technician vs unknown	1.372
job	unemployed vs unknown	1.285
loan	0 vs 1	1.370
marital	divorce vs single	1.007
marital	married vs single	0.786
month	apr vs sep	0.325
month	aug vs sep	0.170
month	dec vs sep	0.922
month	feb vs sep	0.233
month	jan vs sep	0.047
month	jul vs sep	0.124
month	jun vs sep	0.627
month	mar vs sep	4.695
month	may vs sep	0.263
month	nov vs sep	0.156
month	oct vs sep	1.356
pdays		0.997
poutcome	failure vs unknown	1.789
poutcome	other vs unknown	1.866
poutcome	success vs unknown	13.388
previous		1.001

Classification Table

Data Role=TRAIN Target Variable=term_deposit Target Label=' '

Target	Outcome	Target Percentage	Outcome Percentage	Frequency Count	Total Percentage
0	0	93.2921	98.2265	28358	89.1425
1	0	6.7079	69.3066	2039	6.4095
0	1	36.1837	1.7735	512	1.6095
1	1	63.8163	30.6934	903	2.8386

Data Role=VALIDATE Target Variable=term_deposit Target Label=' '

Target	Outcome	Target Percentage	Outcome Percentage	Frequency Count	Total Percentage
0	0	93.1426	98.0779	9440	88.9978
1	0	6.8574	70.7739	695	6.5523
0	1	39.1949	1.9221	185	1.7441
1	1	60.8051	29.2261	287	2.7058

Event Classification Table

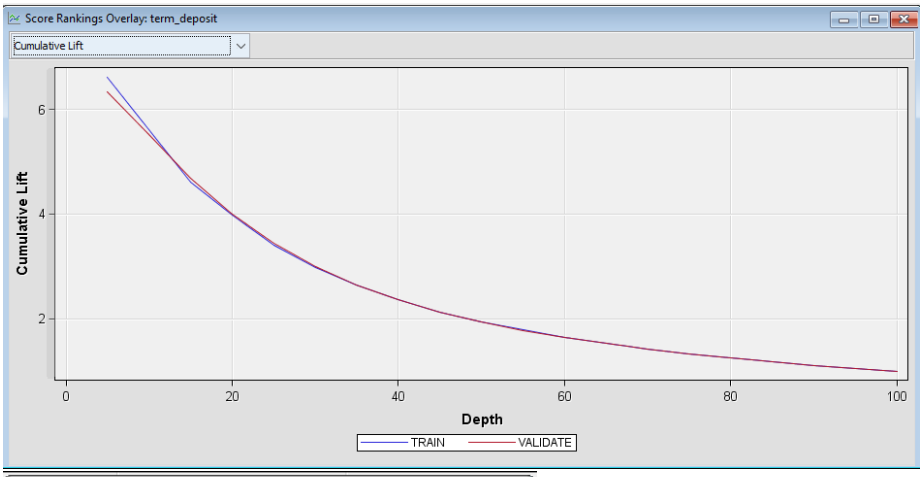
Data Role=TRAIN Target=term_deposit Target Label=' '

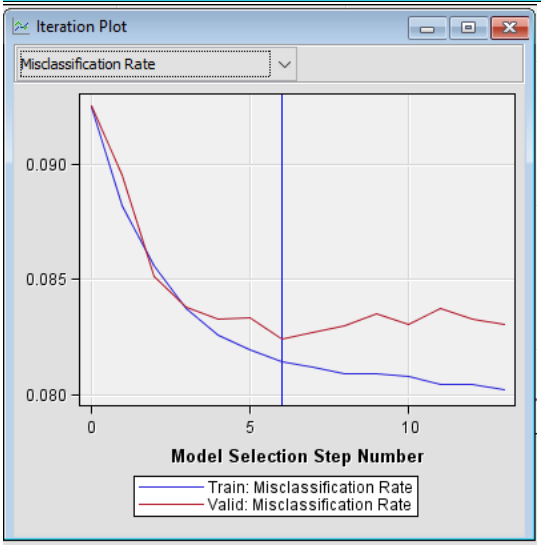
False Negative	True Negative	False Positive	True Positive
2039	28358	512	903

Data Role=VALIDATE Target=term_deposit Target Label=' '

False Negative	True Negative	False Positive	True Positive
695	9440	185	287

[f] Stepwise Regression





Fit Statistics

Target	Target Label	Fit Statistics	Statistics Label	Train	Validation
term_deposit		AIC	Akaike's Information Criterion	12739.12	
term_deposit		ASE	Average Squared Error	0.059285	0.059445
term_deposit		AVERR	Average Error Function	0.199282	0.19859
term_deposit		DFE	Degrees of Freedom for Error	31782	.
term_deposit		DFM	Model Degrees of Freedom	30	.
term_deposit		DFT	Total Degrees of Freedom	31812	.
term_deposit		DIV	Divisor for ASE	63624	21214
term_deposit		ERR	Error Function	12679.12	4212.898
term_deposit		FPE	Final Prediction Error	0.059397	.
term_deposit		MAX	Maximum Absolute Error	0.999916	0.999606
term_deposit		MSE	Mean Square Error	0.059341	0.059445
term_deposit		NOBS	Sum of Frequencies	31812	10607
term_deposit		NW	Number of Estimate Weights	30	.
term_deposit		RASE	Root Average Sum of Squares	0.243484	0.243813
term_deposit		RFPE	Root Final Prediction Error	0.243714	.
term_deposit		RMSE	Root Mean Squared Error	0.243599	0.243813
term_deposit		SBC	Schwarz's Bayesian Criterion	12990.15	.
term_deposit		SSE	Sum of Squared Errors	3771.928	1261.063
term_deposit		SUMW	Sum of Case Weights Times Freq	63624	21214
term_deposit		MISC	Misclassification Rate	0.081416	0.082398

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
LOG_duration	1	3105.4075	<.0001
contact	2	345.9514	<.0001
housing	1	119.0426	<.0001
job	11	98.4515	<.0001
month	11	896.6625	<.0001
poutcome	3	379.3701	<.0001

Analysis of Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Standardized Estimate	Exp(Est)
Intercept		1	-13.2518	0.2261	3435.72	<.0001		0.000
LOG_duration		1	2.0473	0.0367	3105.41	<.0001	1.0330	7.747
contact	cellular	1	0.6027	0.0468	166.09	<.0001		1.827
contact	telephone	1	0.4286	0.0722	35.29	<.0001		1.535
housing	0	1	0.3084	0.0283	119.04	<.0001		1.361
job	admin.	1	0.2122	0.0726	8.54	0.0035		1.236
job	blue-collar	1	-0.2647	0.0661	16.05	<.0001		0.767
job	entrepreneur	1	-0.2459	0.1329	3.42	0.0643		0.782
job	housemaid	1	-0.5037	0.1519	10.99	0.0009		0.604
job	management	1	0.1753	0.0587	8.93	0.0028		1.192
job	retired	1	0.2999	0.0932	10.36	0.0013		1.350
job	self-employed	1	-0.0497	0.1192	0.17	0.6764		0.951
job	services	1	-0.1074	0.0852	1.59	0.2075		0.898
job	student	1	0.7851	0.1292	36.93	<.0001		2.193
job	technician	1	0.0513	0.0651	0.62	0.4309		1.053
job	unemployed	1	-0.0342	0.1263	0.07	0.7864		0.966
month	apr	1	-0.1458	0.0772	3.56	0.0591		0.864
month	aug	1	-0.8946	0.0694	165.96	<.0001		0.409
month	dec	1	0.8548	0.1989	18.46	<.0001		2.351
month	feb	1	-0.6250	0.0956	42.76	<.0001		0.535
month	jan	1	-1.9462	0.1601	147.77	<.0001		0.143
month	jul	1	-1.2280	0.0721	289.74	<.0001		0.293
month	jun	1	0.3851	0.0889	18.78	<.0001		1.470
month	mar	1	2.4804	0.1622	233.90	<.0001		11.946
month	may	1	-0.4403	0.0664	44.03	<.0001		0.644
month	nov	1	-0.8270	0.0786	110.70	<.0001		0.437
month	oct	1	1.3742	0.1306	110.71	<.0001		3.952
poutcome	failure	1	-0.6201	0.0676	84.26	<.0001		0.538
poutcome	other	1	-0.5233	0.0918	32.48	<.0001		0.593
poutcome	success	1	1.6452	0.0880	349.46	<.0001		5.182

Odds Ratio Estimates

Effect		Point Estimate
LOG_duration		7.747
contact	cellular vs unknown	5.124
contact	telephone vs unknown	4.306
housing	0 vs 1	1.853
job	admin. vs unknown	1.700
job	blue-collar vs unknown	1.055
job	entrepreneur vs unknown	1.075
job	housemaid vs unknown	0.831
job	management vs unknown	1.638
job	retired vs unknown	1.855
job	self-employed vs unknown	1.308
job	services vs unknown	1.235
job	student vs unknown	3.014
job	technician vs unknown	1.447
job	unemployed vs unknown	1.328
month	apr vs sep	0.314
month	aug vs sep	0.149
month	dec vs sep	0.854
month	feb vs sep	0.194
month	jan vs sep	0.052
month	jul vs sep	0.106
month	jun vs sep	0.534
month	mar vs sep	4.340
month	may vs sep	0.234
month	nov vs sep	0.159
month	oct vs sep	1.436
poutcome	failure vs unknown	0.888
poutcome	other vs unknown	0.979
poutcome	success vs unknown	8.559

Classification Table

Data Role=TRAIN Target Variable=term_deposit Target Label=' '

Target	Outcome	Target Percentage	Outcome Percentage	Frequency Count	Total Percentage
0	0	93.2009	98.1919	28348	89.1110
1	0	6.7991	70.2923	2068	6.5007
0	1	37.3926	1.8081	522	1.6409
1	1	62.6074	29.7077	874	2.7474

Data Role=VALIDATE Target Variable=term_deposit Target Label=' '

Target	Outcome	Target Percentage	Outcome Percentage	Frequency Count	Total Percentage
0	0	93.1211	98.1714	9449	89.0827
1	0	6.8789	71.0794	698	6.5806
0	1	38.2609	1.8286	176	1.6593
1	1	61.7391	28.9206	284	2.6775

Event Classification Table

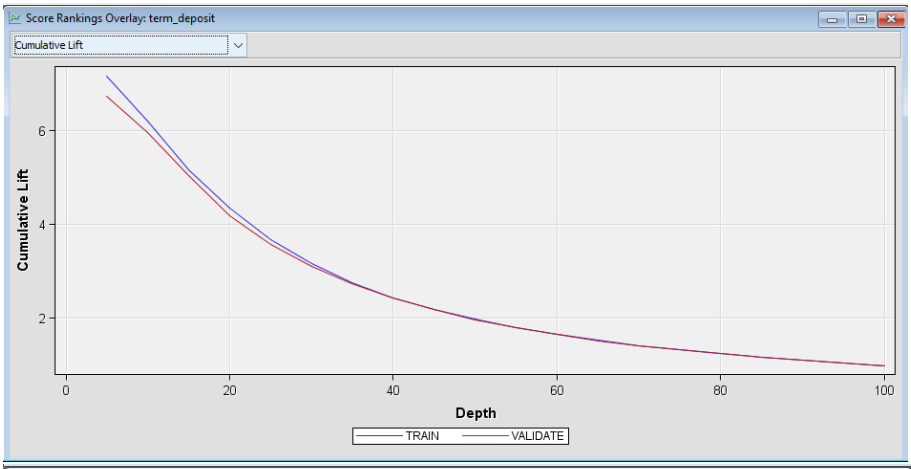
Data Role=TRAIN Target=term_deposit Target Label=' '

False Negative	True Negative	False Positive	True Positive
2068	28348	522	874

Data Role=VALIDATE Target=term_deposit Target Label=' '

False Negative	True Negative	False Positive	True Positive
698	9449	176	284

[g] Reg_NeuralNetwork



Fit Statistics

Target	Target Label	Fit Statistics	Statistics Label	Train	Validation
term_deposit		DFT	Total Degrees of Freedom	31812	.
term_deposit		DFE	Degrees of Freedom for Error	31547	.
term_deposit		DFM	Model Degrees of Freedom	265	.
term_deposit		NW	Number of Estimated Weights	265	.
term_deposit		AIC	Akaike's Information Criterion	11340.1	.
term_deposit		SBC	Schwarz's Bayesian Criterion	13557.51	.
term_deposit		ASE	Average Squared Error	0.052085	0.055605
term_deposit		MAX	Maximum Absolute Error	0.99991	0.999802
term_deposit		DIV	Divisor for ASE	63624	21214
term_deposit		NOBS	Sum of Frequencies	31812	10607
term_deposit		RASE	Root Average Squared Error	0.228222	0.235808
term_deposit		SSE	Sum of Squared Errors	3313.886	1179.613
term_deposit		SUMW	Sum of Case Weights Times Freq	63624	21214
term_deposit		FPE	Final Prediction Error	0.052961	.
term_deposit		MSE	Mean Squared Error	0.052523	0.055605
term_deposit		RFPE	Root Final Prediction Error	0.230132	.
term_deposit		RMSE	Root Mean Squared Error	0.229179	0.235808
term_deposit		AVERR	Average Error Function	0.169906	0.182014
term_deposit		ERR	Error Function	10810.1	3861.235
term_deposit		MISC	Misclassification Rate	0.075255	0.079099
term_deposit		WRONG	Number of Wrong Classifications	2394	839

The NEURAL Procedure

Preliminary Training Run	Starting Random Seed	Objective Function Value	Number of Iterations	Terminating Criteria
1	12345	0.196470398915	10	
2	37160956	0.199357791755	10	
3	1615307595	0.200790095118	10	
4	2014201968	0.200658889318	10	
5	876742626	0.194532639434	10	

Classification Table

Data Role=TRAIN Target Variable=term_deposit Target Label=' '

Target	Outcome	Target Percentage	Outcome Percentage	Frequency Count	Total Percentage
0	0	94.2210	97.7000	28206	88.6647
1	0	5.7790	58.8035	1730	5.4382
0	1	35.3945	2.3000	664	2.0873
1	1	64.6055	41.1965	1212	3.8099

Data Role=VALIDATE Target Variable=term_deposit Target Label=' '

Target	Outcome	Target Percentage	Outcome Percentage	Frequency Count	Total Percentage
0	0	94.0533	97.4442	9379	88.4227
1	0	5.9467	60.3870	593	5.5906
0	1	38.7402	2.5558	246	2.3192
1	1	61.2598	39.6130	389	3.6674

Event Classification Table

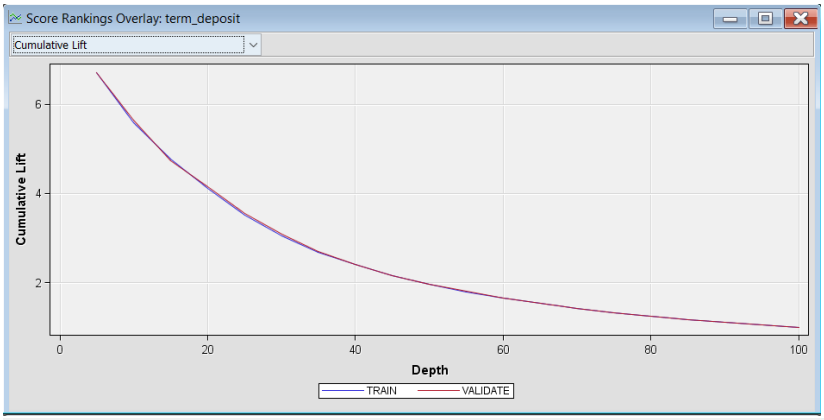
Data Role=TRAIN Target=term_deposit Target Label=' '

False Negative	True Negative	False Positive	True Positive
1730	28206	664	1212

Data Role=VALIDATE Target=term_deposit Target Label=' '

False Negative	True Negative	False Positive	True Positive
593	9379	246	389

[h] Reg_Step_NeuralNetwork



Fit Statistics

Target	Target Label	Fit Statistics	Statistics Label	Train	Validation
term_deposit		DFT	Total Degrees of ...	31812	.
term_deposit		DFE	Degrees of Freed...	31625	.
term_deposit		DFM	Model Degrees of ...	187	.
term_deposit		NW	Number of Estima...	187	.
term_deposit		AIC	Akaike's Informati...	12449.7	.
term_deposit		SBC	Schwarz's Bayesi...	14014.45	.
term_deposit		ASE	Average Squared ...	0.057544	0.057136
term_deposit		MAX	Maximum Absolut...	0.999959	0.999736
term_deposit		DIV	Divisor for ASE	63624	21214
term_deposit		NOBS	Sum of Frequencies	31812	10607
term_deposit		RASE	Root Average Squ...	0.239882	0.239031
term_deposit		SSE	Sum of Squared E...	3661.148	1212.075
term_deposit		SUMW	Sum of Case Wei...	63624	21214
term_deposit		FPE	Final Prediction Er...	0.058224	.
term_deposit		MSE	Mean Squared Error	0.057884	0.057136
term_deposit		RFPE	Root Final Predicti...	0.241297	.
term_deposit		RMSE	Root Mean Squar...	0.24059	0.239031
term_deposit		AVERR	Average Error Fun...	0.189798	0.187901
term_deposit		ERR	Error Function	12075.7	3986.125
term_deposit		MISC	Misclassification ...	0.08041	0.079853
term_deposit		WRONG	Number of Wrong ...	2558	847

The NEURAL Procedure

Preliminary Training Run	Starting Random Seed	Objective Function Value	Number of Iterations	Terminating Criteria
1	12345	0.212439351493	10	
2	1452355784	0.199709874075	10	
3	1161293754	0.199927884621	10	
4	796374574	0.198754423062	10	
5	1807677195	0.193511634863	10	

Classification Table

Data Role=TRAIN Target Variable=term_deposit Target Label=' '

Target	Outcome	Target Percentage	Outcome Percentage	Frequency Count	Total Percentage
0	0	93.4967	97.9529	28279	88.8941
1	0	6.5033	66.8593	1967	6.1832
0	1	37.7395	2.0471	591	1.8578
1	1	62.2605	33.1407	975	3.0649

Data Role=VALIDATE Target Variable=term_deposit Target Label=' '

Target	Outcome	Target Percentage	Outcome Percentage	Frequency Count	Total Percentage
0	0	93.4813	98.0364	9436	88.9601
1	0	6.5187	67.0061	658	6.2035
0	1	36.8421	1.9636	189	1.7818
1	1	63.1579	32.9939	324	3.0546

Event Classification Table

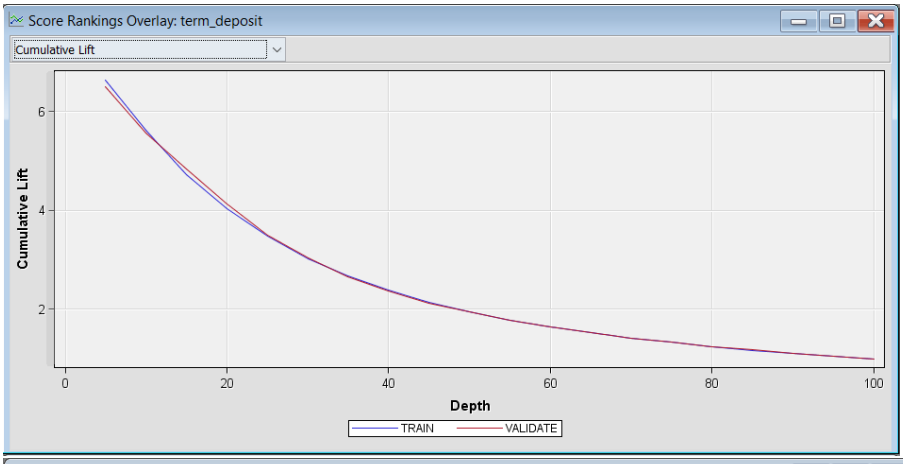
Data Role=TRAIN Target=term_deposit Target Label=' '

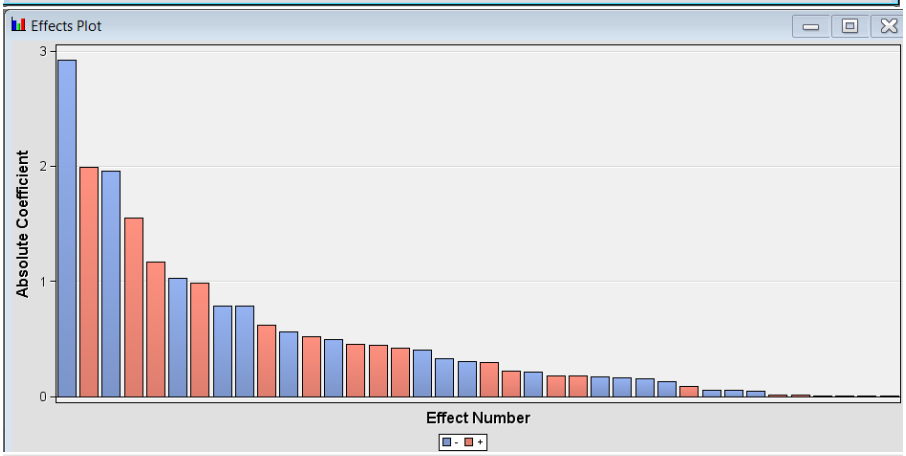
False Negative	True Negative	False Positive	True Positive
1967	28279	591	975

Data Role=VALIDATE Target=term_deposit Target Label=' '

False Negative	True Negative	False Positive	True Positive
658	9436	189	324

[i] Cluster_Regression





Fit Statistics

Target	Target Label	Fit Statistics	Statistics Label	Train	Validation	Test
term deposit		AIC	Akaike's Informati...	13268.31	.	.
term deposit		ASE	Average Squared ...	0.060012	0.060503	.
term deposit		AVERR	Average Error Fun...	0.207348	0.205018	.
term deposit		DFE	Degrees of Freed...	31774	.	.
term deposit		DFM	Model Degrees of ...	38	.	.
term deposit		DFT	Total Degrees of ...	31812	.	.
term deposit		DIV	Divisor for ASE	63624	21214	.
term deposit		ERR	Error Function	13192.31	4349.259	.
term deposit		FPE	Final Prediction Er...	0.060155	.	.
term deposit		MAX	Maximum Absolut...	1	0.999455	.
term deposit		MSE	Mean Square Error	0.060083	0.060503	.
term deposit		NOBS	Sum of Frequencies	31812	10607	.
term deposit		NW	Number of Estima...	38	.	.
term deposit		RASE	Root Average Su...	0.244973	0.245974	.
term deposit		RFPE	Root Final Predicti...	0.245266	.	.
term deposit		RMSE	Root Mean Squar...	0.245119	0.245974	.
term deposit		SBC	Schwarz's Bayesi...	13586.28	.	.
term deposit		SSE	Sum of Squared E...	3818.185	1283.515	.
term deposit		SUMW	Sum of Case Wei...	63624	21214	.
term deposit		MISC	Misclassification ...	0.081479	0.082776	.

Analysis of Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Standardized Estimate	Exp(Est)
Intercept		1	-2.9178	0.1147	647.13	<.0001		0.054
campaign		1	-0.0560	0.0118	22.50	<.0001	-0.0980	0.946
contact	cellular	1	0.6219	0.0469	175.52	<.0001		1.862
contact	telephone	1	0.4518	0.0714	40.08	<.0001		1.571
duration		1	0.00438	0.000080	3021.91	<.0001	0.6287	1.004
education	primary	1	-0.1744	0.0659	7.00	0.0082		0.840
education	secondary	1	-0.0483	0.0463	1.09	0.2973		0.953
education	tertiary	1	0.1777	0.0563	9.98	0.0016		1.194
housing	0	1	0.2926	0.0285	105.54	<.0001		1.340
job	admin.	1	0.2243	0.0742	9.14	0.0025		1.251
job	blue-collar	1	-0.1292	0.0707	3.34	0.0677		0.879
job	entrepreneur	1	-0.2107	0.1355	2.42	0.1198		0.810
job	housemaid	1	-0.4926	0.1591	9.58	0.0020		0.611
job	management	1	0.0154	0.0690	0.05	0.8233		1.016
job	retired	1	0.4201	0.0935	20.20	<.0001		1.522
job	self-employed	1	-0.1527	0.1225	1.55	0.2126		0.858
job	services	1	-0.0522	0.0889	0.34	0.5574		0.949
job	student	1	0.5199	0.1281	16.48	<.0001		1.682
job	technician	1	0.0141	0.0669	0.04	0.8330		1.014
job	unemployed	1	-0.00216	0.1278	0.00	0.9865		0.998
loan	0	1	0.1803	0.0370	23.72	<.0001		1.198
marital	divorce	1	0.0907	0.0480	3.58	0.0586		1.095
marital	married	1	-0.1584	0.0343	21.29	<.0001		0.854
month	apr	1	0.00160	0.0760	0.00	0.9832		1.002
month	aug	1	-0.7880	0.0698	127.54	<.0001		0.455
month	dec	1	0.9834	0.1871	27.64	<.0001		2.674
month	feb	1	-0.5637	0.0942	35.80	<.0001		0.569
month	jan	1	-1.9604	0.1713	130.99	<.0001		0.141
month	jul	1	-1.0291	0.0744	191.25	<.0001		0.357
month	jun	1	0.4473	0.0868	26.55	<.0001		1.564
month	mar	1	1.9868	0.1462	184.75	<.0001		7.292
month	may	1	-0.3284	0.0667	24.21	<.0001		0.720
month	nov	1	-0.7842	0.0784	100.16	<.0001		0.456
month	oct	1	1.1694	0.1198	95.25	<.0001		3.220
pdays		1	-0.00260	0.000526	24.52	<.0001	-0.1316	0.997
poutcome	failure	1	-0.3998	0.0761	27.63	<.0001		0.670
poutcome	other	1	-0.3004	0.0962	9.75	0.0018		0.741
poutcome	success	1	1.5515	0.0828	351.38	<.0001		4.718

Odds Ratio Estimates

Effect		Point Estimate
campaign		0.946
contact	cellular vs unknown	5.450
contact	telephone vs unknown	4.597
duration		1.004
education	primary vs unknown	0.803
education	secondary vs unknown	0.911
education	tertiary vs unknown	1.142
housing	0 vs 1	1.795
job	admin. vs unknown	1.460
job	blue-collar vs unknown	1.025
job	entrepreneur vs unknown	0.945
job	housemaid vs unknown	0.713
job	management vs unknown	1.185
job	retired vs unknown	1.776
job	self-employed vs unknown	1.002
job	services vs unknown	1.107
job	student vs unknown	1.962
job	technician vs unknown	1.183
job	unemployed vs unknown	1.164
loan	0 vs 1	1.434
marital	divorce vs single	1.023
marital	married vs single	0.798
month	apr vs sep	0.422
month	aug vs sep	0.191
month	dec vs sep	1.125
month	feb vs sep	0.240
month	jan vs sep	0.059
month	jul vs sep	0.150
month	jun vs sep	0.658
month	mar vs sep	3.070
month	may vs sep	0.303
month	nov vs sep	0.192
month	oct vs sep	1.355
pdays		0.997
poutcome	failure vs unknown	1.571
poutcome	other vs unknown	1.735
poutcome	success vs unknown	11.054

Classification Table

Data Role=TRAIN Target Variable=term_deposit Target Label=' '

Target	Outcome	Target Percentage	Outcome Percentage	Frequency Count	Total Percentage
0	0	93.1749	98.2161	28355	89.1330
1	0	6.8251	70.5982	2077	6.5290
0	1	37.3188	1.7839	515	1.6189
1	1	62.6812	29.4018	865	2.7191

Data Role=VALIDATE Target Variable=term_deposit Target Label=' '

Target	Outcome	Target Percentage	Outcome Percentage	Frequency Count	Total Percentage
0	0	93.1099	98.1403	9446	89.0544
1	0	6.8901	71.1813	699	6.5900
0	1	38.7446	1.8597	179	1.6876
1	1	61.2554	28.8187	283	2.6680

Event Classification Table

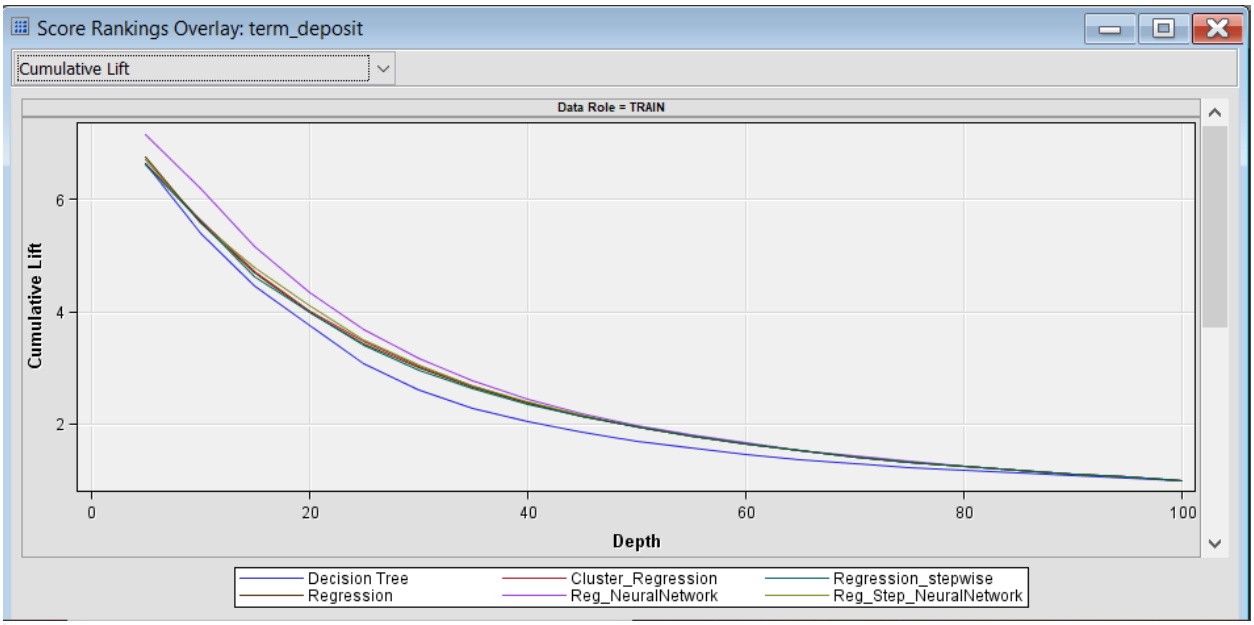
Data Role=TRAIN Target=term_deposit Target Label=' '

False Negative	True Negative	False Positive	True Positive
2077	28355	515	865

Data Role=VALIDATE Target=term_deposit Target Label=' '

False Negative	True Negative	False Positive	True Positive
699	9446	179	283

[j] Model comparision



Fit Statistics
Model Selection based on Valid: Misclassification Rate (_VMISC_)

Selected Model	Model Node	Model Description	Valid: Misclassification Rate	Train: Average Squared Error	Train: Misclassification Rate	Valid: Average Squared Error
Y	Neural2	Reg_NeuralNetwork	0.079099	0.052085	0.075255	0.055605
	Neural	Reg_Step_NeuralNetwork	0.079853	0.057544	0.080410	0.057136
	Reg2	Regression_stepwise	0.082398	0.059285	0.081416	0.059445
	Reg3	Cluster_Regression	0.082776	0.060012	0.081479	0.060503
	Tree	Decision Tree	0.082776	0.060672	0.080599	0.062170
	Reg	Regression	0.082964	0.058799	0.080190	0.058735

Event Classification Table
Model Selection based on Valid: Misclassification Rate (_VMISC_)

Model Node	Model Description	Data Role	Target	Target Label	False Negative	True Negative	False Positive	True Positive
Tree	Decision Tree	TRAIN	term_deposit		2001	28307	563	941
Tree	Decision Tree	VALIDATE	term_deposit		686	9433	192	296
Reg3	Cluster_Regression	TRAIN	term_deposit		2077	28355	515	865
Reg3	Cluster_Regression	VALIDATE	term_deposit		699	9446	179	283
Reg	Regression	TRAIN	term_deposit		2039	28358	512	903
Reg	Regression	VALIDATE	term_deposit		695	9440	185	287
Reg2	Regression_stepwise	TRAIN	term_deposit		2068	28348	522	874
Reg2	Regression_stepwise	VALIDATE	term_deposit		698	9449	176	284
Neural	Reg_Step_NeuralNetwork	TRAIN	term_deposit		1967	28279	591	975
Neural	Reg_Step_NeuralNetwork	VALIDATE	term_deposit		658	9436	189	324
Neural2	Reg_NeuralNetwork	TRAIN	term_deposit		1730	28206	664	1212
Neural2	Reg_NeuralNetwork	VALIDATE	term_deposit		593	9379	246	389