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

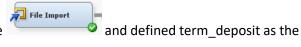
	after the client was last contacted from a previous campaign	
Previous	number of contacts performed before this campaign and for this client	Continuous
poutcome	outcome of the previous marketing campaign	Categorical

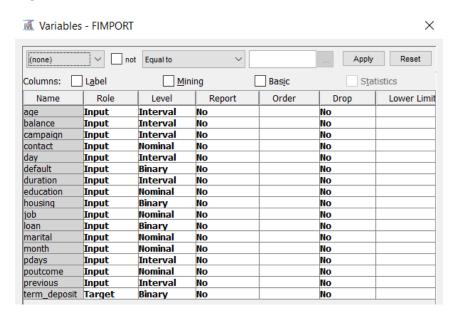
Its important to keep the binary column in the form of '0' and '1', so the data value 'yes' is replaced by 1 and data value '0' is replaced by 1.

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

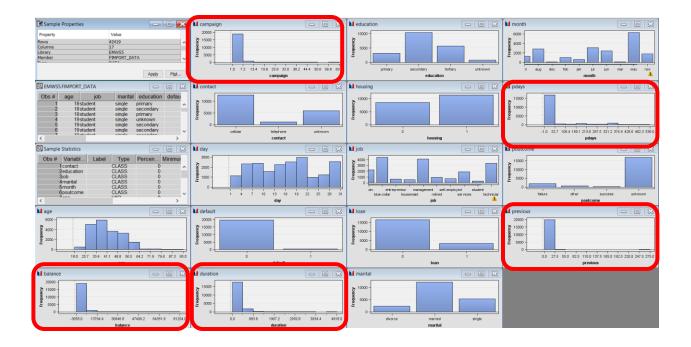
Exploratory Data Analysis

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





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.

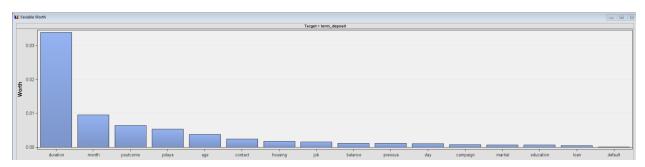
StatExplore

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

			Number					
Data	Variable		of			Mode		Mode2
Role	Name	Role	Levels	Missing	Mode	Percentage	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 Variable Frequency Role Name Role Level 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

Data Partition

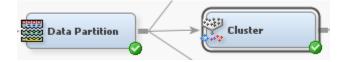
the model. Using Data partition node validation.

the data is divided into 75:25 for training and

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. <u>Click here for details</u>.

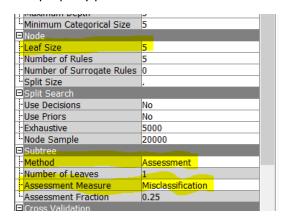
Variable I	mportance			
Variable	T = lo = l	Number of Splitting	Number of Surrogate	T
Name	Label	Rules	Rules	Importance
pdays		4	1	1.00000
previous		1	2	0.99438
poutcome		0	2	0.99299
month		0	9	0.96777
balance		7	7	0.63313
duration		0	8	0.56914
campaign		0	6	0.53094
age		6	4	0.47445
contact		0	5	0.29461
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.

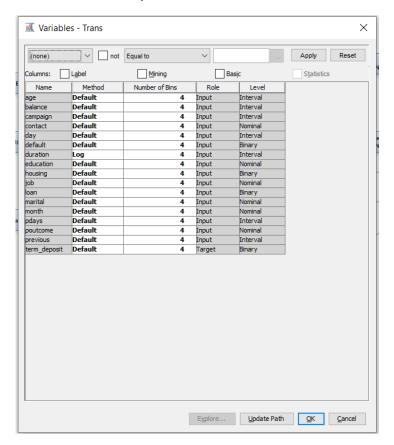
Event Class	sification T	able		
Data Role=7	TRAIN Target	=term_deposit	Target Label='	
False Negative	True Negative	False Positive	True Positive	
2001	28307	563	941	

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.



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.



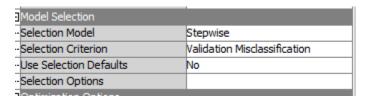
The odd estimates show that the log of duration has very much impact on predicting the term deposit, a point change in log duration can increase the probability of customer taking term deposit by 687.5%. Click here for more details.

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.



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%. <u>Click here for detail results</u>.

Regression with Clusters

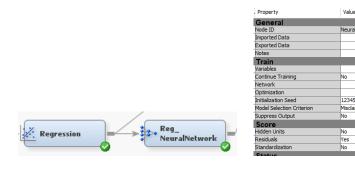
A regression node is linked with the cluster node. Renamed the regression node to Cluster_Regression for identification.



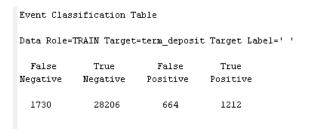
The selection model for the regression is set to stepwise and selection criteria is set as validation misclassification. The results show that the misclassification rate for this model is 0.08. The accuracy for this model is 91.76% and sensitivity is 0.29. Also, the odds ratio estimates for campaign (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.



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.

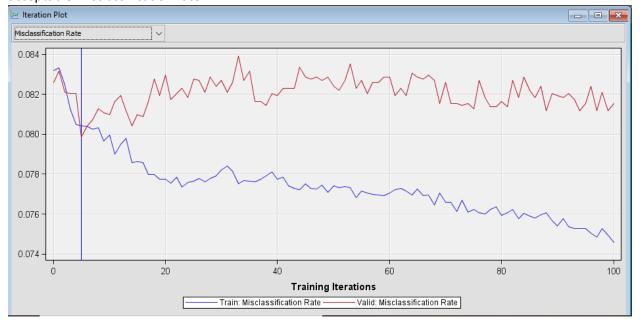


Neural network model on stepwise regression model

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



The misclassification rate for this model is 0.080. The iteration plot shows iteration number 5 gave the acceptable misclassification rate.

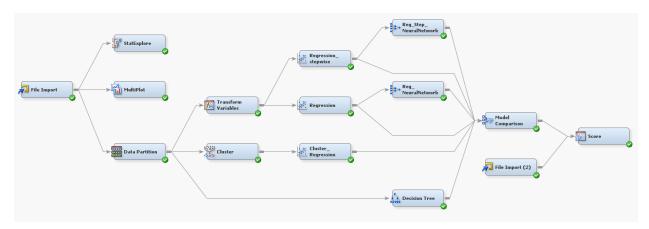


The sensitivity of this model is 0.33 and accuracy of the model is 91.9%. The details are here.

Event Clas	sification T	able		
Data Role=	TRAIN Target	=term_deposi	t Target Label='	
False Negative	True Negative	False Positive	True Positive	
1967	28279	591	975	

Model Assessment

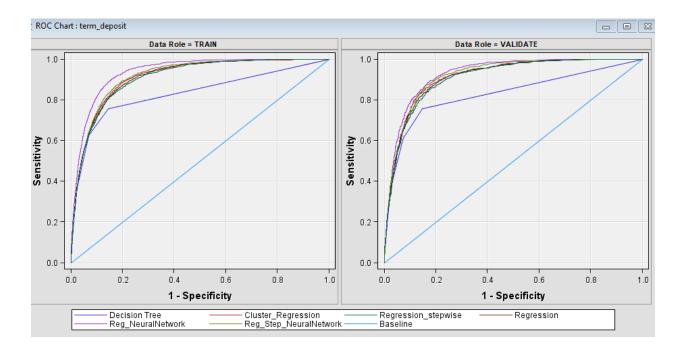
The final model is as below:



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.

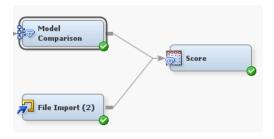
Out of 5 models, Reg_NeuralNetwork model is the best.

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

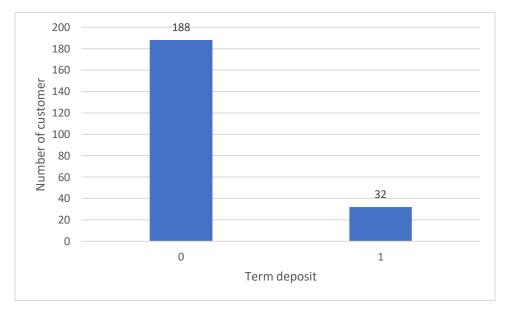
We have found the best model for Bank that helps to predict the customers who are likely to take term deposits. We have a sample customer data and we feed this to the model using file import node and check which all customers have probability to take term deposit. For scoring the sample customer data,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

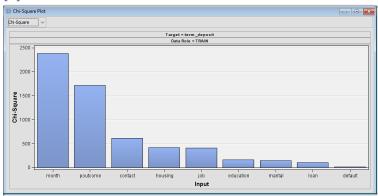


Below graphs shows the distribution of the customers based on the likelihood of taking term deposit.



Appendix

[a] Stats



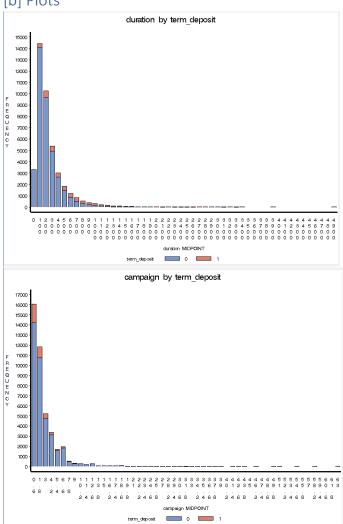
🗗 Results - Node: StatExplore Diagram: Project Final

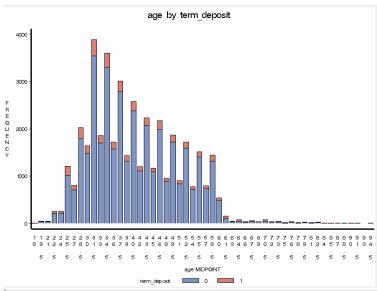
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96	_OVERALL_		3	0	cellular	63.94	un	known	29.87
97	term_deposit	0	3	0	cellular	62.26	un	known	31.61
98	term_deposit	1	3	0	cellular	80.40	un	known	12.74
99									
100									
101	Data Role=TRAI	N Variable	Name=defa	ult					
102									
103			Number						
104		Target	of			Mode		Mode	2
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107	OVERALL		2	0	0	98.10	1	1.9)
108	term deposit	0	2	0	0	98.04	1	1.9	5
109	term deposit	1	2	0	0	98.70	1	1.3)
110									
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112	Data Role=TRAI	N Variable	Name=educ	ation					
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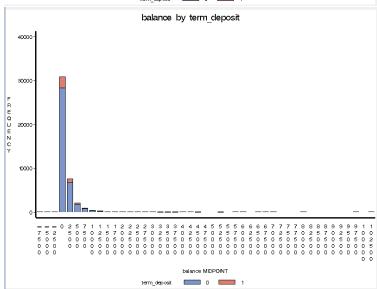
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42	term_deposi	t 1	12	0	ma	nagement	24.	54	technicia	n 1	6.34	
43 44												
45	Data Role=T	RAIN Variah	le Name=lo	an								
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L47 L48		Target	Number of				Mode		Mode2			
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L50												
.51 .52	_OVERALL_ term_deposi	t O	2	0	0		83.36 82.77	1	16.64 17.23			
53	term_deposi		2	0	ō		89.19	1	10.81			
154												
L55 L56	Data Role=T	RAIN Varia	le Name=ma	rital								
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179 1.00 1.0	Target _OVERALL_ term_deposi term_deposi term_deposi term_deposi ata Role-TRAIN Var Target lev OVERALL_ erm_deposit (erm_depo	Target Level t 0 t 1 Summary Statisty various printed tiable=age rget rel Hedia 0 3 0 3 riable=balance rget rel Hedia 0 40 0 40 0 40 0 40 0 40 0 40 0 40 0 4	Number Of Levels	## Missing ### ### ### ### ### ### ### ### ### #	Unit	Meximum Heximum 10217 95 95 95 102127 81204 Heximum 131 31	Percentag 84.62 85.55 75.48 Mean 40.82062 40.7914 41.10729 Mean 1332.847 1287.733 1775.232 Mean 15.85129 15.85219 15.85219 15.85219 15.85219 15.85219	fai	Skewness 0.587970 0.51457 0.879634 Skewness 8.330425 6.444774 7.471343 Skewness 4.824073 4.273422 Skewness 0.082067 0.084788 0.172449	Kuttosis 0.026631 0.04 0.026631 0.026631 140.6219 144.7594 113.1649 Kuttosis 3.6.3793 32.57296 Kuttosis -1.04996 -1.05021 -1.059941	Role IMPUT	age age sge sge sge sge sge sge sge sge sge s

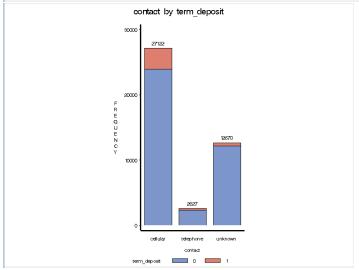
243 244	Data Role=TRA	IN Variable=	pdays											
244 245		Target				Non				Standard				
46	Target	Level	Medi	an M	issing	Missing	Minimum	Maximum	Mean	Deviation	Skewness	Kurtosis	Role	Label
247														
48	_OVERALL_			-1	0	42419	-1	536	34.21856	92.13923	2.596911	5.505176	INPUT	pdays
249	term_deposit	0		-1	0	38495	-1	536	33.24078	91.78995	2.629232	5.595471	INPUT	pdays
250	term_deposit	1		-1	0	3924	-1	520	43.81065	94.97772	2.329108	4.837624	INPUT	pdays
251														
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253	Data Role=TRA	IN Variable=	previou	S										
254														
255		Target				Non				Standard				
256	Target	Level	Medi	an M	issing	Missing	Minimum	Maximum	Mean	Deviation	Skewness	Kurtosis	Role	Label
257														
258	_OVERALL_	_		0	0	42419	0	275	0.465947	2.170725	52.06205	6083.774	INPUT	previo
59	term_deposit	0		0	0	38495	0	275	0.443097	2.181907	55.66168	6554.274	INPUT	previo
60	term_deposit	1		0	0	3924	0	58	0.690112	2.044569	9.949536	195.8507	INPUT	previo
261														
262 263														
264	Chi-Square St	atistics												
265	(maximum 500		nrinte	a)										
266	(maximum 500	observacions	prince	۵,										
267	Data Role=TRA	IN Target=te	rm deno:	sit.										
268														
269	Input	Chi-Square	Df	Prob										
270	•	•												
271	month	2384.4782	11	<.0001										
272	poutcome	1718.4782	3	<.0001										
273	contact	611.0131	2	<.0001										
274	housing	415.7714	1	<.0001										
275	job	408.0963	11	<.0001										
276	education	156.7703	3	<.0001										
277	marital	143.5088	2	<.0001										
278	loan	106.0112	1	<.0001										
279	default	8.4177	1	0.0037										

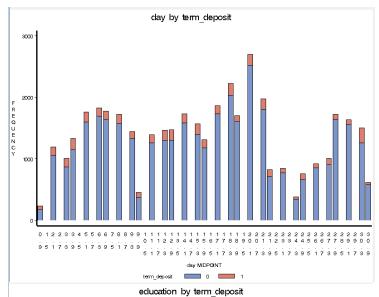
[b] Plots

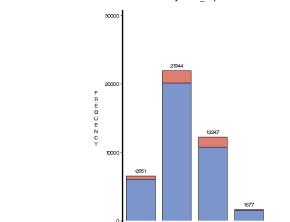


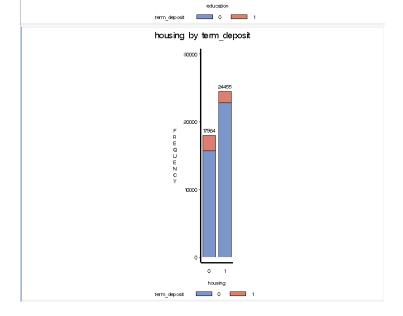


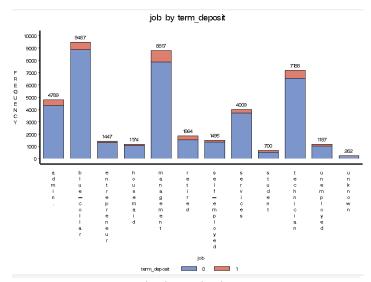




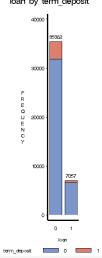


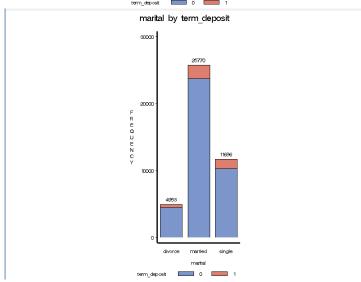


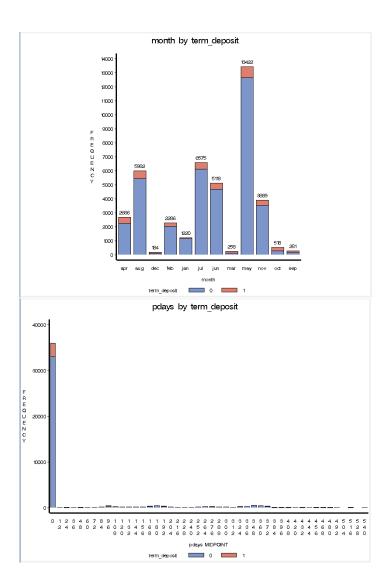


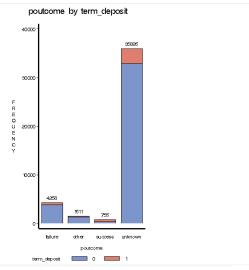


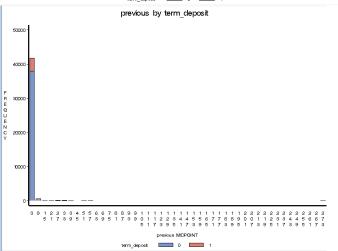






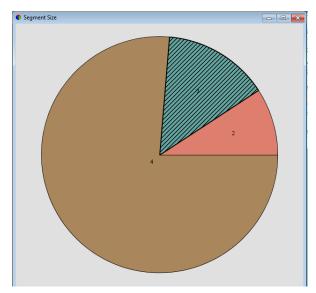






[c] Cluster





e <u>E</u> dit <u>V</u> iev	Window																							
□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	■ 4/																							
Mean Statis	ics																						-	- 4
Diustering Oriterion	Relative	Improvement in Clustering Criterion	Segment ld	Frequency of Cluster	Standard		Cluster	Distance to Nearest Cluster	age	balance	campaign	day	duration	pdays	previous	contact-cell ular	contact-tele phone	contact+unk nown	default=0	default-1		education=s econdary		educatio nknown
0.51343 0.51343 0.51343	0.005459 0.005459		1 2 3	2956 4533		30.99717 24.12324	3 4 4	117.7337 2.553168 3.604632	40 52.14851 39.61394	543 6727.395 1142.141	2 2.634641 2.093536	15.48748 14.04831	349 304.048 248.6115	262 7.847767 237.2411	275 0.159337 3.09133	0.629567 0.932716	0.165088 0.06552	0.205345 0.001765	0.992279	1.04E-16 0.007721	0.226996 0.13148	-1.1E-16 0.348444 0.549305	0.351827 0.289433	0.07:
0.51343	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	0.0
Result	- Node: Clu <u>W</u> indow	ister Diagra	am: Project		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		0.0
Results	- Node: Clu Window	uster Diagra	am: Project		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		
Results Edit Vie	- Node: Clu Window Window tics		am: Project		0.488514	17.61979	2					16.26273		-0.87287			0.048228		0.976647	0.023353				
Result:	- Node: Clu Window	ister Diagra	am: Project		0.488514 job-housem aid	17.61979 job-manage ment	2 job-retired				2.974385 job-technicis n	Job-unemplo yed	252.0642 job-unknow n	-0.87287	0.006291	0.58519 martal-divor	0.048228	0.386582 marital-single	0.976647	0.023353 month-aug	0.151098 month-dec	0.532933 month-feb		

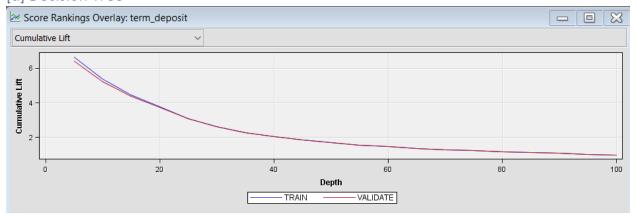
Results -	Node: Clus	ter Diagran	n: Project Fi	nal																			- 0) ×
File Edit View																								
Mean Statisti	ics																							o (# X
job=student	job=technicia n	job=unemplo yed	job=unknow n	loan+0	loan=1	marital=divor ce	marital=marri ed	marital-singl e	month+apr	month-aug	month+dec	month=feb	month+jan	month+jul	month+jun	month+mar	month-may	month-nov	month+oct	month-sep	poutcome=fa iture	poutcome=ot her	poutcome=s uccess	poutcome+u nknown
	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 0.023163 0.016528		0.036874 0.020296	0.002206	0.834547	0.165453	0.105548 0.119126 0.116767	0.576219		0.160159	0.222598 0.049857 0.148878	0.013898		0.012179 0.060666	0.10318 0.00728	0.167118	0.004191	0.108931 0.372601	0.175575 0.16435	0.026252	0.024696 0.016104 0.002878	0.671741	0.223252		0.92456

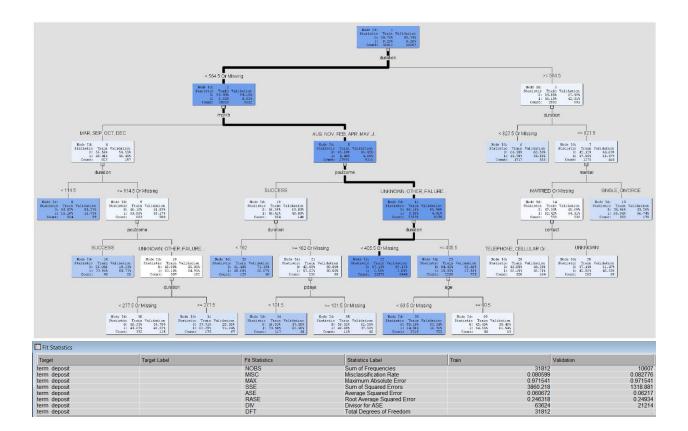
Output 😅					
12	Variabl	e Summary			
13		-			
14		Measurement	Frequency		
15	Role	Level	Count		
16					
17	ID	INTERVAL	1		
18	INPUT	BINARY	3		
19	INPUT	INTERVAL	7		
20	INPUT	NOMINAL	6		
21					
22					
23					
24		STER Procedure			
25	Centroi	d Hierarchical	l Cluster Analy	ysis	
26					
27		Eigenvalu	ues of the Cov	ariance Matrix	
28					
29		Eigenvalue	Difference	Proportion	Cumulative
30					
31	1	7213714.78	7167630.16	0.9927	0.9927
32	2	46084.61	38908.48	0.0063	0.9990
33	3	7176.13	7143.23	0.0010	1.0000
34	4	32.91	11.99	0.0000	1.0000
35	5	20.92	14.91	0.0000	1.0000
36	6	6.01	2.14	0.0000	1.0000
37	7	3.87	3.56	0.0000	1.0000
38 39	8 9	0.31 0.06	0.24	0.0000 0.0000	1.0000
40	10	0.06	0.00 0.02	0.0000	1.0000
41	11	0.04	0.02	0.0000	1.0000
42	12	0.04	0.02	0.0000	1.0000
43	13	0.02	0.01	0.0000	1.0000
44	14	0.02	0.01	0.0000	1.0000
45	15	0.01	0.00	0.0000	1.0000
46	16	0.01	0.00	0.0000	1.0000
47	17	0.01	0.00	0.0000	1.0000
48	18	0.00	0.00	0.0000	1.0000
49	19	0.00	0.00	0.0000	1.0000
50	20	0.00	0.00	0.0000	1.0000
51	21	0.00	0.00	0.0000	1.0000
52	22	0.00	0.00	0.0000	1.0000
53	23	0.00	0.00	0.0000	1.0000
54	24	0.00	0.00	0.0000	1.0000
55	25	0.00	0.00	0.0000	1.0000
56	26	0.00	0.00	0.0000	1.0000
57	27	0.00	0.00	0.0000	1.0000
58	28	0.00	0.00	0.0000	1.0000
59	29	0.00	0.00	0.0000	1.0000
60	30	0.00	0.00	0.0000	1.0000
61	31	0.00	0.00	0.0000	1.0000
62	32	0.00	0.00	0.0000	1.0000
63	33	0.00	0.00	0.0000	1.0000
64	34	0.00	0.00	0.0000	1.0000
65	35	0.00	0.00	0.0000	1.0000

d Outpu	ıt							
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	l-Sample Standa	rd Deviation	377.48			
84		-	-					
85	Root-Mean-	Square Dista	ance Between Ob	servations 381	2.361			
86		-						
87								
88				Cluster His	tory			
89	Number						Norm	
90	of				Pseudo F	Pseudo	Centroid	
91	Clusters	Clus	sters Joined	Freq	Statistic	t-Squared	Distance	Tie
92								
93	40							
93	49	0B3	0B5	272	58E7	1657	0.0035	
94	48	0B3 0B20	0B5 0B30	273	57E7	1657 1461	0.0035 0.0039	
					57E7			
94 95 96	48	0B20	0B30	273	57E7 83E6	1461	0.0039	
94 95 96 97	48 47 46 45	0B20 0B31 0B7 CL47	0B30 0B41 0B33 0B35	273 9786 598 12910	57E7 83E6 81E6 29E6	1461 23E4 12E3 28E3	0.0039 0.0076 0.0077 0.0105	
94 95 96 97 98	48 47 46 45 44	0B20 0B31 0B7 CL47 0B15	0B30 0B41 0B33 0B35 0B17	273 9786 598 12910 4028	57E7 83E6 81E6 29E6 24E6	1461 23E4 12E3 28E3 19E4	0.0039 0.0076 0.0077 0.0105 0.0109	
94 95 96 97 98 99	48 47 46 45 44 43	0B20 0B31 0B7 CL47 0B15 0B16	0B30 0B41 0B33 0B35 0B17 0B27	273 9786 598 12910 4028 952	57E7 83E6 81E6 29E6 24E6 23E6	1461 23E4 12E3 28E3 19E4 33E3	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135	
94 95 96 97 98 99	48 47 46 45 44 43	0B20 0B31 0B7 CL47 0B15 0B16 CL44	0B30 0B41 0B33 0B35 0B17 0B27 CL45	273 9786 598 12910 4028 952 16938	57E7 83E6 81E6 29E6 24E6 23E6 87E5	1461 23E4 12E3 28E3 19E4 33E3 32E3	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172	
94 95 96 97 98 99 100	48 47 46 45 44 43 42 41	0B20 0B31 0B7 CL47 0B15 0B16 CL44 0B36	0B30 0B41 0B33 0B35 0B17 0B27 CL45 0B49	273 9786 596 12910 4028 953 16938	57E7 83E6 81E6 29E6 24E6 23E6 87E5 89E5	1461 23E4 12E3 28E3 19E4 33E3 32E3 1993	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0238	
94 95 96 97 98 99 100 101	48 47 46 45 44 43 42 41	0B20 0B31 0B7 CL47 0B15 0B16 CL44 0B36 CL46	0B30 0B41 0B33 0B35 0B17 0B27 CL45 0B49 0B13	273 9786 598 12910 4028 952 16938 65	57E7 83E6 81E6 29E6 24E6 23E6 87E5 89E5 74E5	1461 23E4 12E3 28E3 19E4 33E3 32E3 1993 14E4	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0238 0.0251	
94 95 96 97 98 99 100 101 102	48 47 46 45 44 43 42 41 40	0B20 0B31 0B7 CL47 0B15 0B16 CL44 0B36 CL46 CL49	0B30 0B41 0B33 0B35 0B17 0B27 CL45 0B49 0B13	273 9786 598 12910 4026 952 16936 655 3922	57E7 83E6 81E6 29E6 24E6 23E6 87E5 89E5 74E5	1461 23E4 12E3 28E3 19E4 33E3 32E3 1993 14E4 18E3	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0238 0.0251 0.0268	
94 95 96 97 98 99 100 101 102 103	48 47 46 45 44 43 42 41 40 39	0B20 0B31 0B7 CL47 0B15 0B16 CL44 0B36 CL46 CL49 CL49	OB30 OB41 OB33 OB35 OB17 OB27 CL45 OB49 OB13 OB25 OB12	273 9788 598 12910 4022 952 16936 69 3922 366 4233	57E7 83E6 81E6 29E6 24E6 23E6 87E5 89E5 74E5 74E5 67E5	1461 23E4 12E3 28E3 19E4 33E3 32E3 1993 14E4 18E3 3342	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0238 0.0251 0.0268 0.03	
94 95 96 97 98 99 100 101 102 103 104	48 47 46 45 44 43 42 41 40 39 38 38	0B20 0B31 0B7 CL47 0B15 0B16 CL44 0B36 CL46 CL49 CL49 CL40 CL39	0B30 0B41 0B33 0B35 0B17 0B27 CL45 0B49 0B13 0B25 0B12 0B37	273 9786 598 12910 4028 953 16938 56 3922 366 4233 541	57E7 83E6 81E6 29E6 24E6 23E6 87E5 89E5 74E5 74E5 67E5 64E5	1461 23E4 12E3 28E3 19E4 33E3 32E3 1993 14E4 18E3 3342 1675	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0238 0.0251 0.0268 0.03	
94 95 96 97 98 99 100 101 102 103 104 105 106	48 47 46 45 44 43 42 41 40 39 38 37	0B20 0B31 0B7 CL47 0B15 0B16 CL44 0B36 CL46 CL49 CL40 CL39 0B1	0B30 0B41 0B33 0B35 0B17 0B27 CL45 0B49 0B13 0B25 0B12 0B37 CL43	273 9788 598 12910 4022 952 16938 63 3922 366 4233 547 2894	57E7 83E6 81E6 29E6 24E6 23E6 87E5 89E5 74E5 74E5 64E5 46E5	1461 23E4 12E3 28E3 19E4 33E3 32E3 1993 14E4 18E3 3342 1675	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0238 0.0251 0.0268 0.03 0.0361	
94 95 96 97 98 99 100 101 102 103 104 105 106 107	48 47 46 45 44 43 42 41 40 39 38 37 36 35	0B20 0B31 0B7 CL47 0B15 0B16 CL44 0B36 CL46 CL49 CL40 CL39 0B1 CL42	0B30 0B41 0B33 0B35 0B17 0E27 CL45 0B49 0B13 0E25 0E12 0B37 CL43	277 9766 596 1291(1 4026 952 16938 66 3922 366 4233 541 2894	57E7 83E6 81E6 29E6 24E6 23E6 87E5 89E5 74E5 67E5 64E5 46E5	1461 23E4 12E3 28E3 19E4 33E3 32E3 1993 14E4 18E3 3342 1675 1E5	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0238 0.0251 0.0268 0.03 0.0361 0.0377	
94 95 96 97 98 99 100 101 102 103 104 105 106 107 108	48 47 46 45 44 43 42 41 40 39 38 37 36 35	0B20 0B31 0B7 CL47 0B15 0B16 CL44 0B36 CL46 CL49 CL40 CL39 0B1 CL42 CL41	0B30 0B41 0B33 0B35 0B17 0B27 CL45 0B49 0B13 0B25 0B12 0B37 CL43 0B29	273 9786 598 1291C1 4026 953 16936 553 3922 366 4233 547 2894 17003	57E7 83E6 81E6 29E6 24E6 87E5 89E5 74E5 67E5 64E5 46E5 46E5	1461 23E4 12E3 28E3 19E4 33E3 32E3 1993 14E4 18E3 3342 1675 1E5 1468	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0238 0.0251 0.0268 0.03 0.0361 0.0377 0.041	
94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109	48 47 46 45 44 43 42 41 40 39 38 37 36 35 35	0B20 0B31 0B7 CL47 0B15 0B16 CL44 0B36 CL46 CL49 CL40 CL39 0B1 CL42 CL41 0B10	0B30 0B41 0B33 0B35 0B17 0B27 CL45 0B49 0B13 0B25 0B12 0B37 CL43 0B29 0B29	27: 9786 1291(1 4028 952 16938 66 3922 366 4233 547 2894 17000 540	57E7 63E6 61E6 29E6 24E6 23E6 87E5 69E5 74E5 64E5 46E5 46E5 46E5	1461 23E4 28E3 19E4 33E3 32E3 1993 14E4 18E3 3342 1675 1E5 1468 18E3	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0238 0.0251 0.0268 0.03 0.0361 0.0377 0.041	
94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110	48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 33	0B20 0B31 0B7 CL47 0B15 0B16 CL44 0B36 CL46 CL49 CL49 CL40 CL39 0B1 CL42 CL41 0B10 CL41	0B30 0B41 0B33 0B35 0B17 0B27 CL45 0B49 0B13 0B25 0B12 0B37 CL43 0B29 0B46 CL48	277: 9766 596 1291(1 4026 952 16936 65 3922 366 4233 541 2894 17005 544 425	57E7 63E6 61E6 29E6 24E6 67E5 69E5 74E5 74E5 64E5 46E5 46E5 46E5	1461 23E4 28E3 19E4 33E3 32E3 32E3 19E3 14E4 16E3 3342 1675 1E5 1468 18E3 62E3	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0238 0.0251 0.0268 0.03 0.0361 0.0377 0.041 0.042	
94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111	48 47 45 44 43 42 41 40 39 38 37 36 35 34 33 32 32 32 32 31	0B20 0B31 0B7 CL47 0B15 0B16 CL44 0B36 CL46 CL49 CL49 CL40 CL39 0B1 CL42 CL41 0B10 CL37	OB30 OB41 OB33 OB35 OB17 OB27 CL45 OB49 OB13 OB25 OB12 OB37 CL43 OB29 OB46 CL48 OB18 OB18	273 9786 598 1291(1 4022 952 16938 65 3922 364 4233 541 2894 17005 544 425 573	57E7 83E6 81E6 29E6 24E6 23E6 67E5 69E5 74E5 64E5 46E5 46E5 46E5 46E5 46E5	1461 23E4 12E3 28E3 19E4 33E3 32E3 1993 14E4 18E3 3342 1675 1E5 1468 18E3 62E3	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0238 0.0251 0.0268 0.03 0.0361 0.0377 0.041 0.042 0.0434 0.047	
94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 111	48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30	0B20 0B31 0B7 CL47 0B15 CL44 0B36 CL44 0B36 CL49 CL49 CL39 0B1 CL42 CL41 0B10 CL37 OB10 CL37 CL41 CL42 CL41 CL42 CL41 CL42 CL42 CL41 CL42 CL41 CL42 CL41 CL42 CL41 CL42 CL41 CL42 CL41 CL42 CL43 CL43 CL43 CL43 CL44 CL43 CL45 CL5 CL5 CL5 CL5 CL5 CL5 CL5 CL	0B30 0B41 0B33 0B35 0B17 0B27 CL45 0B49 0B13 0B25 0B12 0B37 CL43 0B29 0B46 CL48 0B18	27: 9766 596 1291(1 4026 952 16938 66 3922: 366 423: 541 2894 17005 544 425 57: 2424 1704	57E7 63E6 61E6 29E6 24E6 23E6 67E5 69E5 74E5 74E5 64E5 46E5 46E5 46E5 45E5 45E5 45E5	1461 23E4 12E3 28E3 19E4 33E3 32E3 19E3 14E4 18E3 3342 1675 1E5 1468 18E3 62E3 149 15E4	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0238 0.0251 0.0268 0.03 0.0361 0.0377 0.041 0.042 0.0434 0.047	
94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 111 112	48 47 46 45 44 43 42 41 40 39 38 37 36 55 34 32 31 30 29	0B20 0B31 0B7 CL47 0B15 0B16 CL44 0B36 CL46 CL49 CL49 CL40 CL39 0B1 CL41 CB10 CL41 CB10 CL37 CB21 CL37	0B30 0B41 0B33 0B35 0B17 0B27 CL45 0B49 0B13 0B25 0B12 0B37 CL43 0B29 0B46 CL48 0B32	273 9786 598 12916 4026 952 16938 653 3922 366 4233 541 2894 17005 544 425 573 242	57E7 83E6 81E6 29E6 24E6 23E6 87ES 69ES 74ES 64ES 46ES 46ES 46ES 45ES 45ES 36ES 36ES	1461 23E4 12E3 26E3 19F4 33E3 32E3 32E3 14E4 18E3 3342 1675 165 1466 16E3 62E3 1499 15E4 9588	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0258 0.0251 0.0268 0.033 0.0361 0.0377 0.041 0.042 0.0434 0.047 0.0493 0.0568	
94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 111 112 113 114	48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 22 31 30 22 28	OB20 OB31 OB7 CL47 OB15 OB16 CL446 CL49 CL49 CL40 CL39 OB1 CL41 CL41 CL41 CL41 CL41 CL41 CL41 CL4	OB30 OB41 OB33 OB45 OB17 OB27 CL45 OB49 OB13 OB25 OB12 OB37 CL43 OB29 OB46 CL48 OB18 OB32 OB24 OB18 OB32 OB24 OB34 OB34 OB34 OB34 OB34 OB34 OB34 OB3	27: 9766 596 1291(1 4026 952 16938 66 3922 366 4233 541 2894 17005 546 425 57: 244 1704 477: 276	57E7 63E6 61E6 29E6 24E6 23E6 67E5 67E5 67E5 64E5 46E5 46E5 46E5 46E5 46E5 46E5 46	1461 23E4 12E3 28E3 19E4 33E3 32E3 1993 14E4 18E3 3342 1675 1E5 1468 18E3 62E3 149 9588 12E3 7002	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0129 0.0251 0.0258 0.03 0.0361 0.0377 0.041 0.042 0.043 0.047 0.047	
94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115	48 47 46 45 44 43 42 41 41 40 39 38 37 36 35 34 33 32 31 30 29 29 28 27	OB20 OB31 OB31 OB7 CL47 OB16 OB16 CL44 OB36 CL46 CL49 CL39 OB16 CL40 CL39 OB26 CL40 CL39 OB21 CL41 CL42 CL41 OB10 CL37 OB21 CL33 CL38 CL38 CL38	OB30 OB41 OB33 OB35 OB17 OB27 CL45 OB49 OB13 OB25 OB12 OB37 CL43 OB29 OB46 CL48 OB18 OB32 OB29 OB46 CL48 OB18 OB32	273 9786 1291L1 4026 953 16938 65 3922 366 4233 541 2894 17005 547 425 244 170 4773 2776 6477	57E7 83E6 81E6 29E6 24E6 23E6 87E5 89E5 74E5 67E5 64E5 46E5 46E5 46E5 45E6 45E6 45E6 28E6 29E6	1461 23E4 12E3 28E3 19E4 33E3 32E3 14E4 18E3 3342 1675 1E5 1466 18E3 62E3 149 15E4 9588 12E3 7002	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0251 0.0258 0.033 0.0361 0.0361 0.041 0.042 0.043 0.047 0.049 0.0693 0.0595	
94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116	48 47 46 45 44 43 42 41 40 39 38 37 36 35 35 34 33 32 31 30 29 28 27 28	OB20 OB31 OB7 CL47 OB15 OB16 CL44 CL49 CL49 CL40 CL39 CL41 OB10 CL41 CL31 OB10 CL33 CL33 CL33 CL33 CL33 CL33 CL33 CL3	OB30 OB41 OB33 OB35 OB17 OB27 CL45 OB49 OB13 OE25 OB12 OB37 CL43 OB29 OB46 CL48 OB32 OB46 CL48 OB32 OB24 OB45 CL30 OB32	273 9786 598 12910 4022 952 16938 65 3922 366 4233 541 2894 17005 544 425 573 242 1704 4773 276 64477	57E7 63E6 81E6 29E6 24E6 23E6 67E5 69E5 74E5 64E5 46E5 46E5 46E5 45E5 45E5 29E5 14E5 14E5	1461 23E4 12E3 28E3 33E3 32E3 1993 14E4 18E3 3342 1675 1E5 1468 18E3 62E3 149 15E4 9588 12E3 7002	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0129 0.0251 0.0268 0.03 0.0361 0.037 0.041 0.042 0.0434 0.047 0.049 0.0576 0.0595 0.0753	
94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115	48 47 46 45 44 43 42 41 41 40 39 38 37 36 35 34 33 32 31 30 29 29 28 27	OB20 OB31 OB31 OB7 CL47 OB16 OB16 CL44 OB36 CL46 CL49 CL39 OB16 CL40 CL39 OB26 CL40 CL39 OB21 CL41 CL42 CL41 OB10 CL37 OB21 CL33 CL38 CL38 CL38	OB30 OB41 OB33 OB35 OB17 OB27 CL45 OB49 OB13 OB25 OB12 OB37 CL43 OB29 OB46 CL48 OB18 OB32 OB29 OB46 CL48 OB18 OB32	273 9786 1291L1 4026 953 16938 65 3922 366 4233 541 2894 17005 547 425 244 170 4773 2776 6477	57E7 63E6 61E6 29E6 24E6 23E6 67E5 69E5 74E5 74E5 74E5 46E5 46E5 46E5 46E5 46E5 46E5 46E5 4	1461 23E4 12E3 28E3 19E4 33E3 32E3 14E4 18E3 3342 1675 1E5 1466 18E3 62E3 149 15E4 9588 12E3 7002	0.0039 0.0076 0.0077 0.0105 0.0109 0.0135 0.0172 0.0251 0.0258 0.033 0.0361 0.0361 0.041 0.042 0.043 0.047 0.049 0.0693 0.0595	

≅ Outpu	ut						
119		23 CL26	CL35	19908	78E4	13E4	0.0796
120		22 OB2	CL28	1777	77E4	48E4	0.0814
121		21 CL31	0B28	355	8E5	1466	0.089
122		20 CL23	CL27	26385	34E4	42E3	0.0976
123		19 CL22	0B50	2627	32E4	17E3	0.1305
124		18 CL20	0B42	26386	34E4	6.1	0.1321
125		17 CL18	CL19	29013	22E4	18E3	0.1508
126		16 OB11	0B22	29	23E4	19E3	0.178
127		15 0B4	0B47	152	25E4	79E4	0.2119
128		14 0B40	0B44	439	27E4	13E5	0.224
129		13 CL14	0B48	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	0B26	30	23E4	124	0.3739
134		8 0B6	0B43	997	24E4	42E6	0.4334
135		7 CL10	0B8	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 0B19	0B34	3	23E3	24E6	5.0045
139		3 CL5	0B9	31779	8981	32 E 3	5.2923
140		2 CL3	CL9	31809	3982	12E3	11.51
141		1 CL2	CL4	31812		3982	24.287
142							
143							
144							
145	Candi	dates for Or	timum Number of Cl	usters			
146							
147		Number	Clustering				
148		of	Cubic				
149	0bs	Clusters	Criterion				
150							
151	1	4	-208.629				
152	2	7	45.076				
153		13	67.951				
154	4	18	102.842				
155	5	21	261.839				
156	6 7	24	389.256				
157		28 32	499.834				
158	8		587.249				
159	9	41	715.653				

[d] Decision Tree







File Edit View Window

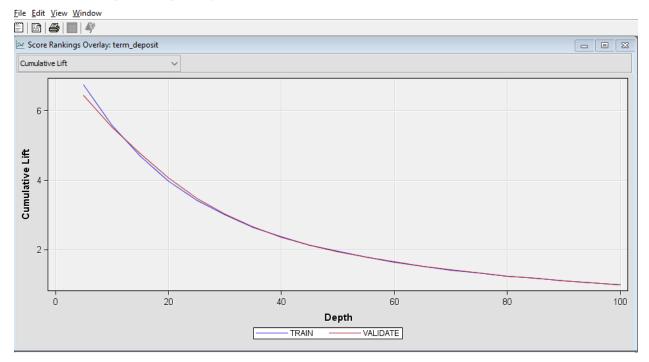
[3 1 4						
	🖺 Outp	out						
	12	Variable S	Summary					
	13		-					
	14		Measurement	Freque	ncy			
	15	Role	Level	Coun	t			
	16							
	17	ID	INTERVAL	1				
	18	INPUT	BINARY	3				
	19	INPUT	INTERVAL	7				
	20	INPUT	NOMINAL	6				
	21	TARGET	BINARY	1				
	22							
	23							
	24							
	25							
	26	Model Ever	nts					
	27							
	28					Number		
	29			Measur	ement	of		
	30	Target	Event	Lev	el	Levels	Order	Label
	31							
	32	term_depos	sit l	BINA	RY	2	Descending	
	33							
	34							
	35							
	36							
	37	Predicted	and decision	variable	S			
	38	m	77 d -1- 1	_		7 -11		
	39	Туре	Variabl	е		Label		
	40 41	TADCET						
	41	TARGET	term_depos:		Dundin	+	danaait-1	
	43	PREDICTED RESIDUAL	P_term_depo R term depo			ted: term_ al: term d		
	44	PREDICTED	P term dep			ar: cerm_u ted: term :	_	
	45	RESIDUAL	R term dep			al: term_d	-	
	46	FROM	F term dep			ar: cerm_u term depos:	_	
	47	INTO	I term dep			term_depos: term_depos:		
	48	11110	cerm_dep	0010	11100.	остш_деров.		

		_					
51	Variabl	e Importan	nce				
52							
53			Warning and				Ratio o
54 55	Variabl		Number of Splitting			TT-14 4-44	Validation to Trainin
56	variabi Name	e Labei		T		Validation	
55 57	Name	Labe.	l Rules	ттро	rtance	Importance	Importanc
57 58	duratio		6		1.0000	1.0000	1.000
59	month	n	1		1.0000 0.4775	0.5454	1.142
70		_	2		0.4775 0.3365	0.3434	1.142
70 71	poutcom	e	1		0.3365 0.1127	0.3433	1.104
71 72	age						
72 73	pdays marital		1 1		0.1087 0.0964	0.0832 0.0000	0.765 0.000
73 74	contact		1		0.0964 0.0694	0.0000	
74. 75	contact		1		0.0094	0.0334	0.481
75 76							
70 77							
	T 1 -	-6 D					
78 79	Tree Le	af Report					
				T			
30	Nada		Tueining	Training	Validation	Validation	
30 31	Node	Danah	Training	Percent	Validation	Validation	
30 31 32	Node Id	Depth	Training Observations	-	Validation Observations		
30 31 32 33	Id	-	Observations	Percent 1	Observations	Percent 1	
30 31 32 33	Id 22	4	Observations 25370	Percent 1 0.03	Observations 8440	Percent 1	
30 31 32 33 34 35	Id 22 38	4 5	Observations 25370 2215	Percent 1 0.03 0.15	Observations 8440 722	Percent 1 0.03 0.17	
30 31 32 33 34 35	1d 22 38 6	4 5 2	Observations 25370 2215 1717	Percent 1 0.03 0.15 0.36	Observations 8440 722 585	Percent 1 0.03 0.17 0.34	
30 31 32 33 34 35 36	1d 22 38 6 15	4 5 2 3	Observations 25370 2215 1717 552	Percent 1 0.03 0.15 0.36 0.65	Observations 8440 722 585 178	Percent 1 0.03 0.17 0.34 0.57	
30 31 32 33 34 35 36 37	1d 22 38 6 15 28	4 5 2 3 4	0bservations 25370 2215 1717 552 520	Percent 1 0.03 0.15 0.36 0.65 0.56	Observations 8440 722 585 178 164	0.03 0.17 0.34 0.57 0.57	
30 31 32 33 34 35 36 37 38	22 38 6 15 28 30	4 5 2 3 4 5	0bservations 25370 2215 1717 552 520 332	Percent 1 0.03 0.15 0.36 0.65 0.56 0.44	Observations 8440 722 585 178 164 115	0.03 0.17 0.34 0.57 0.57 0.45	
30 31 32 33 34 35 36 37 38 39	22 38 6 15 28 30 8	4 5 2 3 4 5 3	0bservations 25370 2215 1717 552 520 332 224	Percent 1 0.03 0.15 0.36 0.65 0.56 0.44 0.15	0bservations 8440 722 585 178 164 115 89	0.03 0.17 0.34 0.57 0.57 0.45 0.16	
30 31 32 33 34 35 36 37 38 39	22 38 6 15 28 30 8 29	4 5 2 3 4 5 3	Observations 25370 2215 1717 552 520 332 224 203	0.03 0.15 0.65 0.65 0.44 0.15	0bservations 8440 722 585 178 164 115 89 68	0.03 0.17 0.34 0.57 0.57 0.45 0.16	
30 31 32 33 34 35 36 37 38 39 90	1d 22 38 6 15 28 30 8 29 31	4 5 2 3 4 5 3 4 5	Observations 25370 2215 1717 552 520 332 224 203 175	0.03 0.15 0.36 0.65 0.56 0.44 0.15 0.43	0bservations 8440 722 585 178 164 115 89 68 67	0.03 0.17 0.34 0.57 0.57 0.45 0.16 0.49	
30 31 32 33 34 35 36 37 38 39 90 91 92	1d 22 38 6 15 28 30 8 29 31	4 5 2 3 4 5 3 4 5	0bservations 25370 2215 1717 552 520 332 224 203 175 129	0.03 0.15 0.36 0.65 0.56 0.44 0.15 0.43 0.62	0bservations 8440 722 585 178 164 115 89 68 67 60	0.03 0.17 0.34 0.57 0.57 0.45 0.16 0.49 0.72	
30 31 32 33 34 35 36 37 38 39 90 91 92 93	Id 22 38 6 15 28 30 8 29 31 20 35	4 5 2 3 4 5 3 4 5 4 5	0bservations 25370 2215 1717 552 520 332 224 203 175 129 118	Percent 1 0.03 0.15 0.36 0.65 0.56 0.44 0.15 0.43 0.62 0.19 0.41	0bservations 8440 722 585 178 164 115 89 68 67 60 40	Percent 1 0.03 0.17 0.34 0.57 0.57 0.45 0.16 0.49 0.72 0.27 0.38	
80 31 32 33 34 35 36 37 38 39 90 91 92 93 94 95	22 38 6 15 28 30 8 29 31 20 35 34	4 5 2 3 4 5 3 4 5 4 5 5	0bservations 25370 2215 1717 552 520 332 224 203 175 129 118 117	Percent 1 0.03 0.15 0.36 0.65 0.56 0.44 0.15 0.43 0.62 0.19 0.41 0.74	0bservations 8440 722 585 178 164 115 89 68 67 60 40 40	Percent 1 0.03 0.17 0.34 0.57 0.57 0.45 0.16 0.49 0.72 0.27 0.38 0.63	
30 31 32 33 34 35 36 37 38 39 90 91 92 93	Id 22 38 6 15 28 30 8 29 31 20 35	4 5 2 3 4 5 3 4 5 4 5	0bservations 25370 2215 1717 552 520 332 224 203 175 129 118	Percent 1 0.03 0.15 0.36 0.65 0.56 0.44 0.15 0.43 0.62 0.19 0.41	0bservations 8440 722 585 178 164 115 89 68 67 60 40	Percent 1 0.03 0.17 0.34 0.57 0.57 0.45 0.16 0.49 0.72 0.27 0.38	

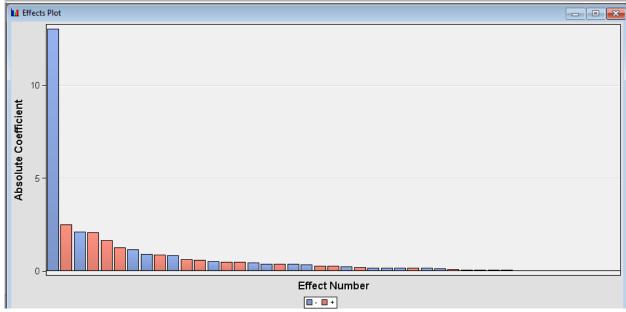
102	put Fit Stati	stics					
103							
104	Target=te	rm deposit	Target Label=	1 1			
105	-		-				
106	Fit						
107	Statistic	s Statis	tics Label		Train	Val:	idation
108							
109	NOBS	Sum of	Frequencies		31812.00	106	607.00
110	_misc_	Miscla	ssification R	ate	0.08		0.08
111	MAX	Maximu	m Absolute Er:	ror	0.97		0.97
112	SSE	Sum of	Squared Erro	rs	3860.22	13	318.88
113	ASE	Averag	e Squared Err	or	0.06		0.06
114	RASE	Root A	verage Square	d Error	0.25		0.25
115	DIA	Diviso	r for ASE		63624.00	212	214.00
116	DFT	Total	Degrees of Fr	eedom	31812.00		
117			_				
118							
119							
120							
121	Classific	ation Table					
122							
123	Data Role	=TRAIN Targ	et Variable=t	erm deposi	t Target I	abel='	1
124							
125			Target	Outcom	e Freq	uency	Total
126	Target	Outcome	Percentage	Percenta	ge Co	unt	Percentac
127	-		-		-		
128	0	0	93.3978	98.049	9 28	307	88.9821
129	1	0	6.6022	68.015	0 2	:001	6.2901
130	0	1	37.4335	1.950	1	563	1.7698
131	1	1	62.5665	31.985		941	2.9580
132							
133							
134	Data Role	=VALIDATE T	arget Variabl	e=term dep	osit Targe	t Labe	1=''
135			-		-		
136			Target	Outcom	e Fred	quency	Total
137	Target	Outcome	Percentage	Percenta		unt	Percentag
138	_				-		•
139	0	0	93.2207	98.005	2 9	433	88.9318
140	1	0	6.7793	69.857		686	6.4674
141	0	1	39.3443	1.994	8	192	1.8101
142	1	1	60.6557	30.142		296	2.7906
143							
144							
145							
146							
147	Event Cla	ssification	Table				
148							
149	Data Role	=TRAIN Tard	et=term_depos:	it Target	Label=' '		
150		rary					
151	False	True	False	True			
	Negative	Negative		Positiv	e		
152			10010100	101010	-		
152 153							
152 153 154	2001	28307	563	941			

157 Data Role=VALIDATE Target=term_deposit Target Label=' ' 158 159 False True False True 160 Negative Negative Positive Positive 161 162 9433 192 296 163 164 165 166 167 Assessment Score Rankings 168 169 Data Role=TRAIN Target Variable=term_deposit Target Label=' ' 170 Mean 171 172 ÷ Number of Cumulative Cumulative Posterior 173 Depth Gain Response % Response Observations Probability 174 175 565.364 6.65364 6.65364 61.5334 61.5334 1591 0.61533 49.8725 0.38212 439.274 4.13184 5.39274 38.2116 1591 176 10 347.002 0.24262 177 2.62343 4.47002 24.2617 41.3392 1590 15 178 20 275.271 1.60121 3.75271 14.8081 34.7054 1591 0.14808 179 25 207.682 0.37199 3.07682 3.4402 28.4547 1590 0.03440180 30 161.521 0.30773 2.61521 2.8459 24.1857 1591 0.02846 181 35 128.551 0.30773 2.28551 2.8459 21.1366 1591 0.02846 182 40 103.838 0.30773 2.03838 2.8459 18.8511 1590 0.02846 183 45 84.605 0.30773 1.84605 2.8459 17.0724 1591 0.02846 184 50 69.227 0.30773 1.69227 2.8459 15.6503 1590 0.02846 185 55 56.638 0.30773 1.56638 2.8459 14.4860 1591 0.02846 0.30773 2.8459 13.5158 186 46.147 1.46147 1591 0.02846 60 37.275 0.30773 1.37275 2.8459 12.6953 1590 0.02846 187 65 188 29.666 0.30773 1.29666 2.8459 11.9916 1591 0.02846 70 1,23076 1590 0.02846 189 75 23,076 0.307732.8459 11.3821 190 80 17.305 0.30773 1.17305 2.8459 10.8485 1591 0.02846 191 85 12,214 0.30773 1.12214 2.8459 10.3777 1591 0.02846 192 90 7.691 0.30773 1.07691 2.8459 9.9594 1590 0.02846 193 95 3.642 0.30773 1.03642 2.8459 9.5849 1591 0.02846 194 100 0.000 0.30773 1.00000 2.8459 9.2481 1590 0.02846 195 197 198 Data Role=VALIDATE Target Variable=term_deposit Target Label=' ' 199 Mean Cumulative Posterior 201 Depth Gain Lift Lift Response % Response Observations Probability 202 203 541.665 6.41665 59.4056 0.61034 204 10 422.525 4.03161 5.22525 37.3248 48.3756 530 0.38079 205 338.730 2.71298 4.38730 25.1169 40.6178 0.24546 206 3.74364 16.7590 20 274.364 1.81021 34.6587 530 0.14808 207 25 208.213 0.43360 3.08213 4.0143 28.5345 530 0.03862 208 161.898 0.30587 2.61898 2.8318 209 35 128.881 0.30587 2.28881 2.8318 21.1898 530 0.02846 210 211 0.30587 0.30587 2.04111 2.8318 530 531 40 45 104.111 18.8967 0.02846 0.02846 84.811 17.1098 212 50 69,400 0.30587 1.69400 2.8318 15.6831 530 0.02846 1.56789 2.8318 60 214 46.261 0.30587 1.46261 2.8318 13.5409 531 0.02846 215 65 70 37.369 29.747 0.30587 1.37369 2.8318 2.8318 12.7177 530 530 0.02846 0.30587 12.0120 0.02846 216 217 75 23,129 0.30587 1.23129 2.8318 11.3993 531 0.02846 0.30587 1.17349 2.8318 219 85 12.249 0.30587 1.12249 2.8318 10.3920 530 0.02846 1.07707 1.03651 220 90 7.707 0.30587 2,8318 9.9715 531 0.02846 221 3.651 2.8318 0.02846 222 100 0.000 0.30587 1.00000 2.8318 9.2580 530 0.02846 223 224 225 227 Assessment Score Distribution 228 Data Role=TRAIN Target Variable=term_deposit Target Label=' ' 229 Data Role=VALIDATE Target Variable=term_deposit Target Label=' ' 230 248 249 Posterior Number 232 Probability of Number of Posterior 250 251 252 Probability Range Number of Posterior Probability Nonevents Probability 233 Range Events Percentage 0.70-0.75 235 157 0.73709 0.6696 0.70-0.75 253 0.73683 0.6222 236 237 0.65-0.70 0.60-0.65 359 109 1.7352 193 0.65036 254 0.65-0.70 101 0.65036 1.6781 0.62286 255 256 257 66 0.60-0.65 0 62286 0.6317 0.56154 0.54545 1.5461 238 0.55-0.60 292 228 0.56154 1.6346 0.50-0.55 258 240 0.40-0.45 280 373 0.42879 2.0527 0.40-0.45 100 123 0.42888 2.1024 613 58 5.3973 1.1096 241 0.35-0.40 1104 0.35702 259 0.35-0.40 196 389 0.35702 5.5152 1.4047 6.8068 79.5701 0.16431 260 261 262 0.15-0.20 119 0.16558 0.15-0.20 295 242 243 0.10-0.15 328 1887 0.14808 6.9628 0.02846 0.00-0.05 0.02846

🗗 Results - Node: Regression Diagram: Project Final



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	
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	1 21214
term deposit		ERR	Error Function	12547.48	
term deposit		FPE	Final Prediction Error	0.058958	3
term deposit		MAX	Maximum Absolute Error	0.999911	
term deposit		MSE	Mean Square Error	0.058879	
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	
term deposit		SBC	Schwarz's Bayesian Criterion	12993.28	s .
term deposit		SSE	Sum of Squared Errors	3741.043	
term deposit		SUMW	Sum of Case Weights Times Freq	63624	21214
term deposit		MISC	Misclassification Rate	0.08019	0.082964



🗗 Results - Node: Regression Diagram: Project Final

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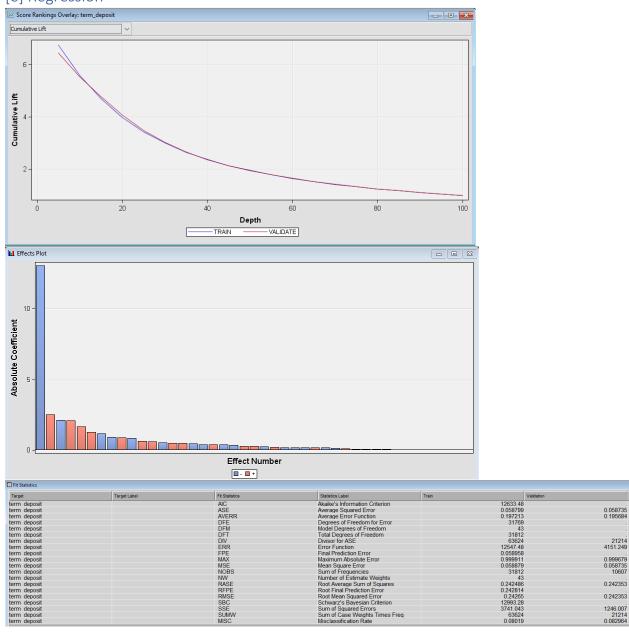
	∌ ∭ ₽					
Outpu	it					
120						
121	Likelihood	l Ratio	Test for Globs	al Null Hyp	othesis	BETA=0
122						
123	-2 Log Li	relihood	Like	lihood		
124	Intercept	Interd	ept &	Ratio		
125	Only	Covar	iates Chi-	-Square	DF	Pr > ChiSq
126						
127	19611.480	1254	7.477 706	4.0027	42	<.0001
128						
129						
L30	Туре	3 Anal	ysis of Effect	s		
131						
132			Wald			
L33	Effect	DF	Chi-Square	Pr > Chi	Sq	
134						
L35	LOG_duration	1	3082.0500	<.00		
136	age	1	0.0030	0.95		
L37	balance	1	7.3305	0.00		
138	campaign	1	9.8909	0.00		
139	contact	2	348.5125	<.00		
140	day	1	10.9766	0.00		
141	default	1	0.3260	0.56		
142	education	3	16.9831	0.00		
143	housing	1	94.2647	<.00		
144	job	11	60.6369	<.00		
145	loan	1	18.7171	<.00		
146	marital	2	22.9380	<.00		
147	month	11	818.4653	<.00		
148	pdays	1	30.7282	<.00		
149	poutcome	3	384.7628	<.00		
150	previous	1	0.0161	0.89	90	
151						

Analysis	nt.	Maximim	Likelihood	Estimates

			Analysis o	f Maximum Li	kelihood Estim	ates		
				Standard	Wald		Standardized	
Parameter		DF	Estimate	Error	Chi-Square	Pr > ChiSq	Estimate	Exp(Est)
Intercept		1	-13.0492	0.2938	1972.93	<.0001		0.000
LOG_duration	L.	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
		_						

		Point
ffect		Estimate
OG_duratio	n	7.875
ige		1.000
alance		1.000
ampaign		0.963
ontact	cellular vs unknown	5.350
ontact	telephone vs unknown	4.840
lay		1.011
lefault	0 vs 1	0.897
ducation	primary vs unknown	0.816
ducation	secondary vs unknown	0.893
ducation	tertiary vs unknown	1.147
ousing	0 vs 1	1.747
ob	admin. vs unknown	1.714
ob	blue-collar vs unknown	1.183
ob	entrepreneur vs unknown	1.048
ob	housemaid vs unknown	0.860
ob	management vs unknown	1.347
ob	retired vs unknown	1.932
ob	self-employed vs unknown	1.154
ob	services vs unknown	1.306
ob	student vs unknown	2.459
ob	technician vs unknown	1.372
ob	unemployed vs unknown	1.285
oan	0 vs 1	1.370
arital	divorce vs single	1.007
arital	•	0.786
onth	married vs single	0.700
	apr vs sep	0.325
onth	aug vs sep	
onth	dec vs sep	0.922
onth	feb vs sep	0.233
onth	jan vs sep	0.047
onth	jul vs sep	0.124
onth	jun vs sep	0.627
onth	mar vs sep	4.695
onth	may vs sep	0.263
onth	nov vs sep	0.156
onth	oct vs sep	1.356
days		0.997
outcome	failure vs unknown	1.789
outcome	other vs unknown	1.866
outcome	success vs unknown	13.388

[e] Regression



1246.007 21214 0.082964

152									
153				Analysis o	f Maximum Li	ikelihood Estim	ates		
154									
155					Standard	Wald		Standardized	
156	Parameter		DF	Estimate	Error	Chi-Square	Pr > ChiSq	Estimate	Exp(Est)
157						•	•		• • • •
158	Intercept		1	-13.0492	0.2938	1972.93	<.0001		0.000
159	LOG_duratio	n	1	2.0637	0.0372	3082.05	<.0001	1.0412	7.875
160	age		1	0.000159	0.00291	0.00	0.9563	0.000894	1.000
161	balance		1	0.000018	6.579E-6	7.33	0.0068	0.0301	1.000
162	campaign		1	-0.0376	0.0120	9.89	0.0017	-0.0659	0.963
163	contact	cellular	1	0.5925	0.0479	152.74	<.0001		1.808
164	contact	telephone	1	0.4922	0.0736	44.71	<.0001		1.636
165	day		1	0.0113	0.00342	10.98	0.0009	0.0518	1.011
166	default	0	1	-0.0543	0.0950	0.33	0.5680		0.947
167	education	primary	1	-0.1589	0.0655	5.88	0.0153		0.853
168	education	secondary	1	-0.0684	0.0465	2.16	0.1413		0.934
169	education	tertiary	1	0.1824	0.0572	10.18	0.0014		1.200
170	housing	0	1	0.2789	0.0287	94.26	<.0001		1.322
171	job	admin.	1	0.2526	0.0755	11.20	0.0008		1.287
172	job	blue-collar	1	-0.1187	0.0702	2.86	0.0910		0.888
173	job	entrepreneur	1	-0.2395	0.1342	3.18	0.0745		0.787
174	job	housemaid	1	-0.4368	0.1558	7.86	0.0050		0.646
175	job	management	1	0.0119	0.0698	0.03	0.8642		1.012
176	job	retired	1	0.3722	0.1064	12.25	0.0005		1.451
177	job	self-employed	1	-0.1432	0.1221	1.37	0.2410		0.867
178	job	services	1	-0.0196	0.0877	0.05	0.8230		0.981
179	job	student	1	0.6133	0.1374	19.91	<.0001		1.847
180	job	technician	1	0.0297	0.0672	0.20	0.6583		1.030
181	job	unemployed	1	-0.0358	0.1273	0.08	0.7787		0.965
182	loan	0	1	0.1575	0.0364	18.72	<.0001		1.171
183	marital	divorce	1	0.0847	0.0496	2.92	0.0875		1.088
184	marital	married	1	-0.1627	0.0347	21.93	<.0001		0.850
185	month	apr	1	-0.1744	0.0790	4.87	0.0273		0.840
186	month	aug	1	-0.8231	0.0714	132.96	<.0001		0.439
187	month	dec	1	0.8687	0.1988	19.09	<.0001		2.384
188	month	feb	1	-0.5068	0.1018	24.78	<.0001		0.602
189	month	jan	1	-2.1149	0.1673	159.87	<.0001		0.121
190	month	jul	1	-1.1405	0.0752	230.02	<.0001		0.320
191	month	jun	1	0.4840	0.0932	26.94	<.0001		1.623
192	month	mar	1	2.4965	0.1634	233.36	<.0001		12.140
193	month	may	1	-0.3843	0.0679	32.04	<.0001		0.681
194	month	nov	1	-0.9096	0.0808	126.82	<.0001		0.403
195	month	oct	1	1.2543	0.1316	90.77	<.0001		3.505
196	pdays		1	-0.00300	0.000540	30.73	<.0001	-0.1514	0.997
197	poutcome	failure	1	-0.3684	0.0783	22.14	<.0001		0.692
198	poutcome	other	1	-0.3262	0.0998	10.68	0.0011		0.722
199	poutcome	success	1	1.6445	0.0889	342.53	<.0001		5.178
200	previous		1	0.00117	0.00923	0.02	0.8990	0.00149	1.001
201									

203		Odds Ratio Estimates	
204			
205			Point
206	Effect		Estimate
207			
208	LOG_duration		7.875
209	age		1.000
210	balance		1.000
211	campaign		0.963
212	contact	cellular vs unknown	5.350
213	contact	telephone vs unknown	4.840
214	day		1.011
215	default	0 vs 1	0.897
216	education	primary vs unknown	0.816
217	education	secondary vs unknown	0.893
218	education	tertiary vs unknown	1.147
219	housing	0 vs 1	1.747
220	job	admin. vs unknown	1.714
221	job	blue-collar vs unknown	1.183
222	job	entrepreneur vs unknown	1.048
223	job	housemaid vs unknown	0.860
224	job	management vs unknown	1.347
225	job	retired vs unknown	1.932
226	job	self-employed vs unknown	1.154
227	job	services vs unknown	1.306
228	job	student vs unknown	2.459
229	job	technician vs unknown	1.372
230	job	unemployed vs unknown	1.285
231	loan	0 vs 1	1.370
232	marital	divorce vs single	1.007
233	marital	married vs single	0.786
234	month	apr vs sep	0.325
235	month	aug vs sep	0.170
236	month	dec vs sep	0.922
237	month	feb vs sep	0.233
238	month	jan vs sep	0.047
239	month	jul vs sep	0.124
240	month	jun vs sep	0.627
241	month	mar vs sep	4.695
242	month	may vs sep	0.263
243	month	nov vs sep	0.156
244	month	oct vs sep	1.356
245	pdays		0.997
246	poutcome	failure vs unknown	1.789
247	poutcome	other vs unknown	1.866
248	poutcome	success vs unknown	13.388
249	previous		1.001
050			

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

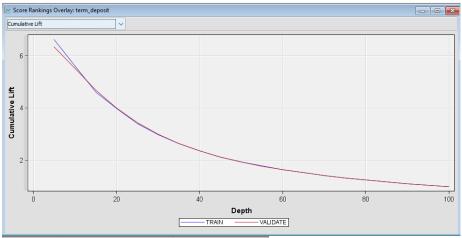
Event Classification Table

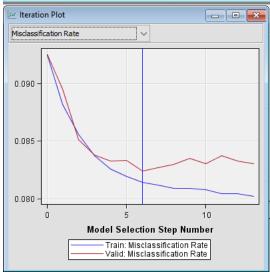
Data Role=TRAIN Target=term_deposit Target Label=' '

False	True	False	True
Negative	Negative	Positive	Positive
2039	28358	512	

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

[f] Stepwise Regression





Target	Target Label	Fit Statistics	Statistics Label	Train	Validation	
term deposit		AIC	Akaike's Information Criterion	1273		
term deposit		ASE	Average Squared Error	0.059		0.05944
term deposit		AVERR	Average Error Function	0.199		0.1985
term deposit		DFE	Degrees of Freedom for Error	31	782	
term deposit		DFM	Model Degrees of Freedom		30	
term deposit		DFT	Total Degrees of Freedom		812	
term deposit		DIV	Divisor for ASE		624	21214
term deposit		ERR	Error Function	1267	1.12	4212.89
term deposit		FPE	Final Prediction Error	0.059		
term deposit		MAX	Maximum Absolute Error	0.999		0.99960
term deposit		MSE	Mean Square Error	0.059	341	0.05944
term deposit		NOBS	Sum of Frequencies	31	812	1060
term deposit		NW	Number of Estimate Weights		30	
term deposit		RASE	Root Average Sum of Squares	0.243	484	0.243813
term deposit		RFPE	Root Final Prediction Error	0.243		
term deposit		RMSE	Root Mean Squared Error	0.243	599	0.243813
term deposit		SBC	Schwarz's Bayesian Criterion	1299).15	
term deposit		SSE	Sum of Squared Errors	3771.	928	1261.06
term deposit		SUMW	Sum of Case Weights Times Freq	63	624	21214
term deposit		MISC	Misclassification Rate	0.081	416	0.08239

Type 3 Analysis of Effects

		Wald	
Effect	DF	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

				Standard	Wald		Standardized	
Parameter		DF	Estimate	Error	Chi-Square	Pr > ChiSq	Estimate	Exp(Est)
Intercept		1	-13.2518	0.2261	3435.72	<.0001		0.000
LOG_duration	n .	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	ı	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

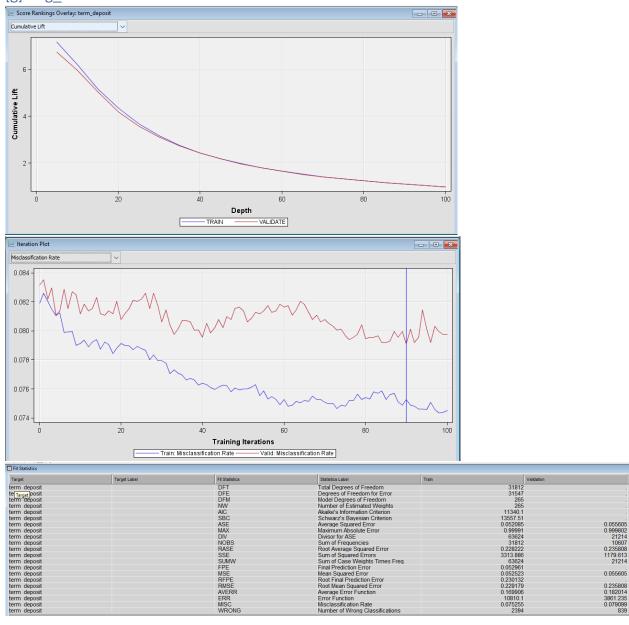
Event Classification Table

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

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

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

[g] Reg_NeuralNetwork



0.235808 0.182014 3861.235 0.079099 839

The NEURAL Procedure

Preliminary	Starting	Objective	Number	
Training	Random	Function	of	Terminating
Run	Seed	Value	Iterations	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=' '

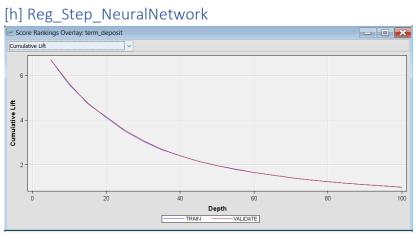
Target	Outcome	Target Percentage	Outcome Percentage	Frequency Count	Total Percentage
0	0	94.0533	97.4442	9379	88.4227
1	0	5.9467	60.3870	593	5.5906
0	1	38.7402	2.5558	246	2.3192
1	1	61.2598	39.6130	389	3.6674

Event Classification Table

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

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

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



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	0.05713
term deposit		MAX	Maximum Absolut	0.999959	0.99973
term deposit		DIV	Divisor for ASE	63624	2121
term deposit		NOBS	Sum of Frequencies	31812	1060
term deposit		RASE	Root Average Squ	0.239882	0.23903
term deposit		SSE	Sum of Squared E	3661.148	1212.07
term deposit		SUMW	Sum of Case Wei	63624	2121
term deposit		FPE	Final Prediction Er	0.058224	
term deposit		MSE	Mean Squared Error	0.057884	0.05713
term deposit		RFPE	Root Final Predicti	0.241297	
term deposit		RMSE	Root Mean Squar	0.24059	0.23903
term deposit		AVERR	Average Error Fun	0.189798	0.18790
term deposit		ERR	Error Function	12075.7	3986.12
term deposit		MISC	Misclassification	0.08041	0.07985
term deposit		WRONG	Number of Wrong	2558	84

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

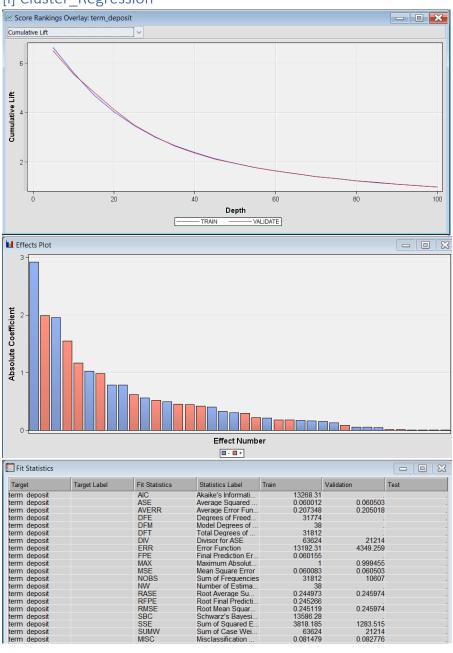
Event Classification Table

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

False	True	False	True
Negative	Negative	Positive	Positive
1967	28279	591	

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

[i] Cluster_Regression



Analysis of Maximum Likelihood Estimates

			-					
				Standard	Wald		Standardized	
Parameter	:	DF	Estimate	Error	Chi-Square	Pr > ChiSq	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

job

loan

month

pdays

housing 0 vs 1

admin. vs unknown

blue-collar vs unknown

housemaid vs unknown

management vs unknown

retired vs unknown

student vs unknown

0 vs 1

marital divorce vs single

marital married vs single

apr vs sep

aug vs sep

dec vs sep

feb vs sep

jul vs sep

jun vs sep

mar vs sep

nov vs sep

oct vs sep

poutcome failure vs unknown

poutcome success vs unknown

poutcome other vs unknown

month may vs sep

jan vs sep

entrepreneur vs unknown

self-employed vs unknown

services vs unknown

technician vs unknown

unemployed vs unknown

Classification Table

1.795 1.460

1.025

0.945 0.713

1.185

1.776

1.002

1.107

1.962

1.183

1.164

1.434

1.023

0.798

0.422

0.191

1.125

0.240

0.059

0.150

0.658 3.070

0.303

0.192 1.355

0.997

1.571

1.735

11.054

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

E	Offect	Point Estimate	Target	Outcome	Target Percentage	Outcome Percentage	Frequency Count	Total Percentage
d e e	empaign contact cellular vs unknown contact telephone vs unknown duration education primary vs unknown education secondary vs unknown education tertiary vs unknown	0.946 5.450 4.597 1.004 0.803 0.911 1.142	0 1 0 1	0 0 1 1	93.1749 6.8251 37.3188 62.6812	98.2161 70.5982 1.7839 29.4018	28355 2077 515 865	89.1330 6.5290 1.6189 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

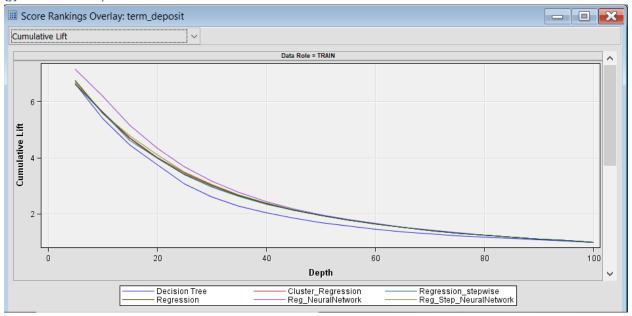
Event Classification Table

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

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

False	True	False	True		
Negative	Negative	Positive	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		Data		Target	False	True	False	True
Node	Model Description	Role	Target	Label	Negative	Negative	Positive	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