SAS® Enterprise Miner™

Tips and Tricks

Agenda

Tips for SAS® Enterprise Miner™

- My favorite node that no one knows about
- Can I do this in Enterprise Miner nodes?
- The 2 most versatile nodes
- The node that changes everything
- The newest node you should know about
- Tips from the community
- Wish I would have known

Icon Key

SAS Communities Tip

Advanced User Tip

My favorite node that no one knows about

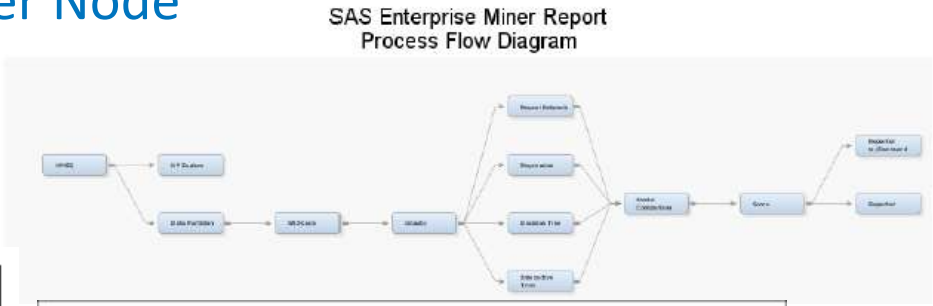
My favorite node that no one knows about

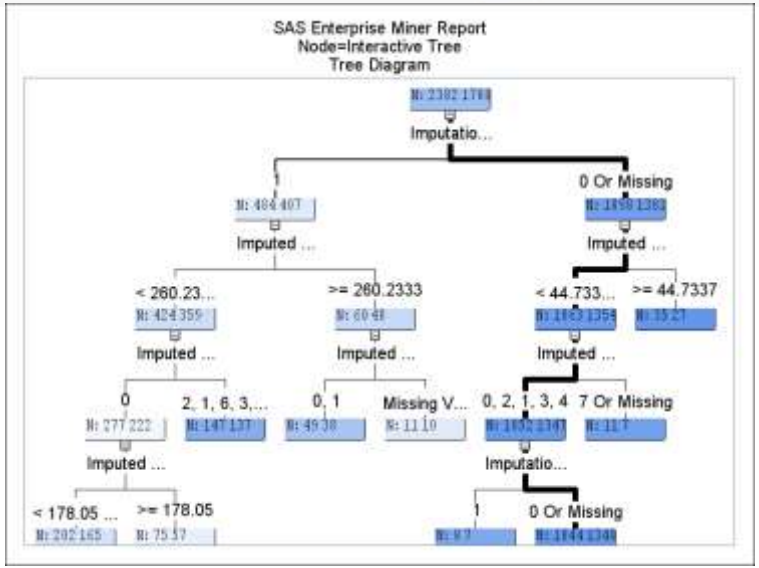
Reporter Node

Generating Reports

Role	Level	Frequency Count	Name
TARGET	BINARY	1	BAD
INPUT	BINARY	1	REASON
INPUT	INTERVAL	7	CLAGE CLNO DEBTINC LOAN MORTDUE VALUE YOJ
INPUT	NOMINAL	4	DELINQ DEROG JOB NINQ

- Creates .pdf or .rtf file documented entire flow
- Process Flow Diagram
- Shows all settings
- Detailed information for each node





My favorite node that no one knows about

Create a Scorecard in the Reporter Node

Train	
Document Format	PDF
Style	Default
Nodes	Summary
Show All	No
Font size	
Summary Report Options	
Basic Reports	Yes
Summarization	Yes
Variable Ranking	Yes
Classification Matrix	Yes
Cross Tabs	Yes
Lift Chart	Yes
Fit Statistics	Yes
Model Comparison	Yes

91 + 373 + 400 + 89 =

953

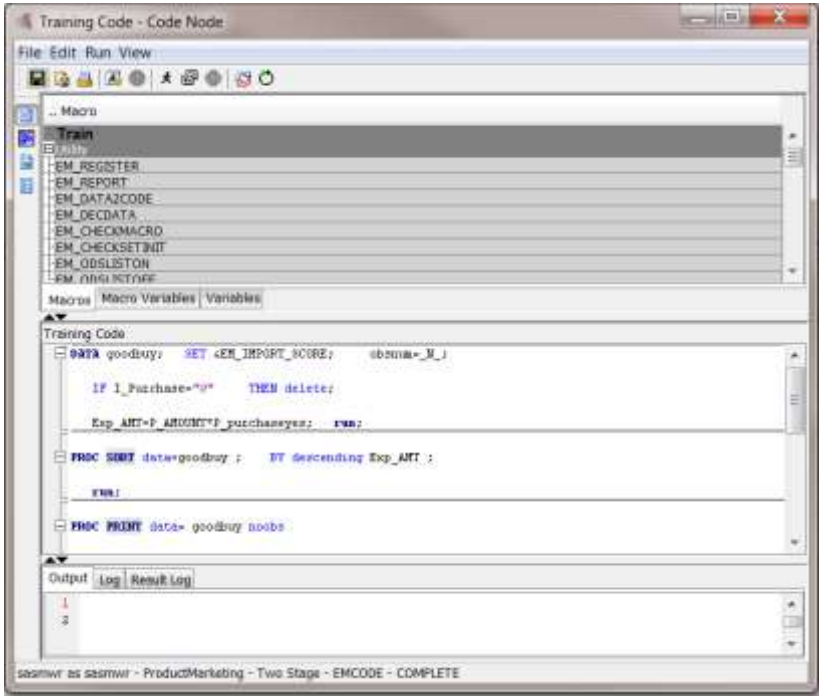
		Scorecard Points	Overall N	Overall %	BAD			
					0		1	
					N	%	N	%
CLAGE	1: LOW - 81.195	91.00	301.00	12.64	196.00	10.28	105.00	22.11
	2: 81.195 - 163.454	76.00	852.00	35.77	643.00	33.72	209.00	44.00
	3: 163.454 - 243.697	38.00	738.00	30.98	622.00	32.62	116.00	24.42
	4: 243.697 - HIGH	0.00	491.00	20.61	446.00	23.39	45.00	9.47
DEBTINC	1: LOW - 44.734	0.00	2347.00	98.53	1905.00	99.90	442.00	93.05
	2: 44.734 - HIGH	373.00	35.00	1.47	2.00	0.10	33.00	6.95
DELINQ	0	0.00	1679.00	70.49	1452.00	76.14	227.00	47.79
	1	27.00	250.00	10.50	172.00	9.02	78.00	16.42
	10	409.00	1.00	0.04	0.00	0.00	1.00	0.21
	11	447.00	1.00	0.04	0.00	0.00	1.00	0.21
	12	319.00	1.00	0.04	0.00	0.00	1.00	0.21
	13	409.00	1.00	0.04	0.00	0.00	1.00	0.21
	15	371.00	1.00	0.04	0.00	0.00	1.00	0.21
	2	45.00	95.00	3.99	55.00	2.88	40.00	8.42
	3	64.00	52.00	2.18	22.00	1.15	30.00	6.32
	4	83.00	33.00	1.39	13.00	0.68	20.00	4.21
	5	400.00	14.00	0.59	2.00	0.10	12.00	2.53
	6	353.00	10.00	0.42	0.00	0.00	10.00	2.11
	7	404.00	9.00	0.38	0.00	0.00	9.00	1.89
	8	349.00	3.00	0.13	0.00	0.00	3.00	0.63
LUE	1: LOW [illegible]26475	89.00	67.00	2.81	8.00	0.42	59.00	12.42
	2: 26475 [illegible]43670	21.00	148.00	6.21	99.00	5.19	49.00	10.32
	3: 43670 - HIGH	0.00	2167.00	90.97	1800.00	94.39	367.00	77.26

Can I do this in SAS® Enterprise Miner™ node?

Can I do this in Enterprise Miner node

SAS Code Node

- Easy inclusion of your SAS code into EM
- Code divided by type
  - TRAINING read input data, build function
  - SCORING create new columns
  - REPORTING generate output
- Under Utility Tab



Can I do this in Enterprise Miner node

SAS Code Node

- Macros generated for all metadata
  - Input and output tables: train, validate, test, score
  - Interval, class, target, etc… variables
  - Input, output, and summary tables
  - System environment

Variables
EM_INTERVAL
EM_CLASS
EM_TARGET
EM_TARGET_LEVEL
EM_BINARY_TARGET
EM_ORDINAL_TARGET
EM_NOMINAL_TARGET
EM_INTERVAL_TARGET
EM_INPUT
EM_BINARY_INPUT
EM_ORDINAL_INPUT
EM_NOMINAL_INPUT
EM_INTERVAL_INPUT

Columns: ☐ Label ☐ Mining ☐ Basic

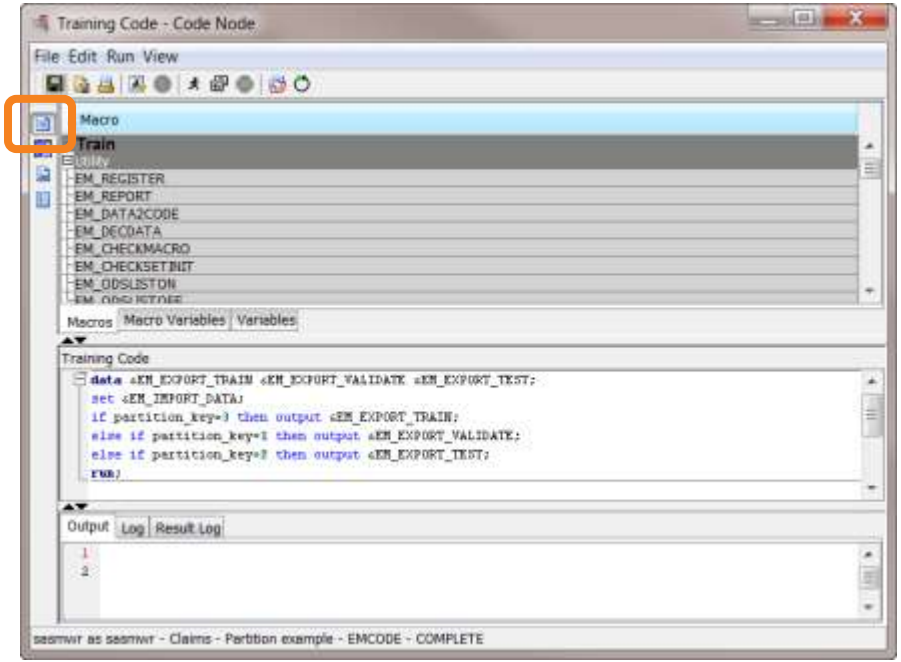
Name	Use	Report	Role	Level
BAD	**Default**	**No**	Target	Binary
CLAGE	**Default**	**No**	Input	Interval
CLNO	**Default**	**No**	Input	Interval
DEBTINC	**Default**	**No**	Input	Interval
DELINQ	**Default**	**No**	Input	Nominal
DEROG	**Default**	**No**	Input	Nominal
JOB	**Default**	**No**	Input	Nominal
LOAN	**Default**	**No**	Input	Interval
MORTDUE	**Default**	**No**	Input	Interval
NINQ	**Default**	**No**	Input	Nominal
REASON	**Default**	**No**	Input	Binary
VALUE	**Default**	**No**	Input	Interval
YOJ	**Default**	**No**	Input	Interval
dataobs	**Default**	**No**	ID	Interval

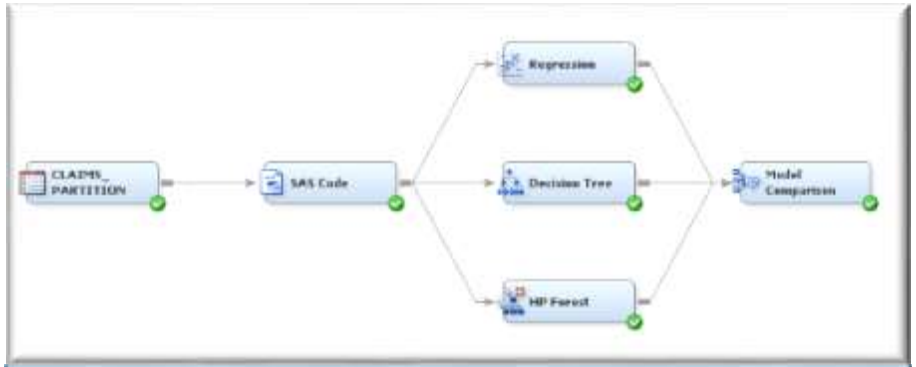
Macros | Macro Variables | Variables

Imports	
EM_IMPORT_DATA	EMWS1.Part_TRAIN
EM_IMPORT_DATA_EMINFO	&EM_LIB..Ids_EMINFO
EM_IMPORT_DATA_CMETA	&EM_LIB..Part_CMeta_TRAIN
EM_IMPORT_VALIDATE	EMWS1.Part_VALIDATE
EM_IMPORT_VALIDATE_CMETA	&EM_LIB..Part_CMeta_TRAIN
EM_IMPORT_TEST	EMWS1.Part_TEST
EM_IMPORT_TEST_CMETA	&EM_LIB..Part_CMeta_TRAIN
EM_IMPORT_SCORE	

Can I do this in Enterprise Miner node

SAS Code Node - Using a column to define your Training, Validation and Test Datasets






```
data &EM_EXPORT_TRAIN &EM_EXPORT_VALIDATE
      &EM_EXPORT_TEST;
set &EM_IMPORT_DATA;
   if partition_key=1 then output &EM_EXPORT_TRAIN;
   else if partition_key=2 then output &EM_EXPORT_VALIDATE;
   else if partition_key=3 then output &EM_EXPORT_TEST;
run;
```

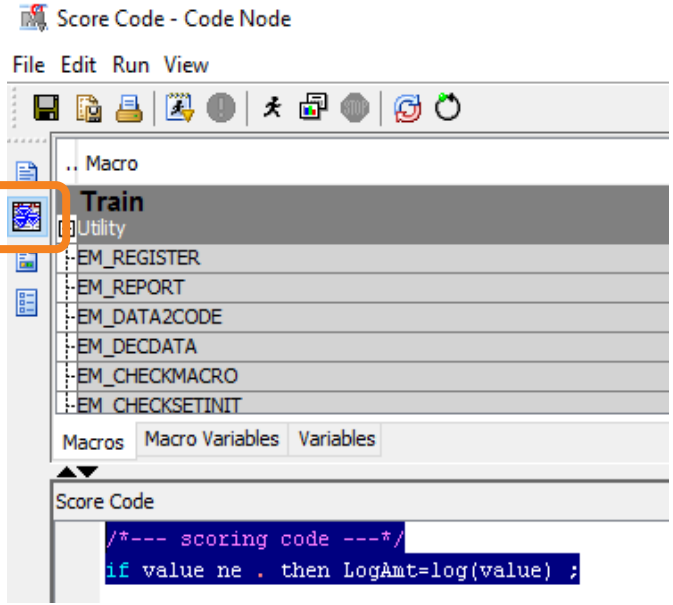
Can I do this in Enterprise Miner node

Develop generic SAS Code to use in SAS Code node

```
PROC REG DATA=&EM_IMPORT_DATA;
MODEL  %EM_INTERVAL_TARGET=%EM_INTERVAL_INPUT /VIF COLLIN
    COLLINOINT INFLUENCE;
RUN;

PROC LOGISTIC DATA=&EM_IMPORT_DATA;
CLASS %EM_NOMINAL_INPUT;
MODEL  %EM_BINARY_TARGET=%EM_INTERVAL_INPUT
    %EM_NOMINAL_INPUT /DETAILS LACKFIT;
RUN;
```

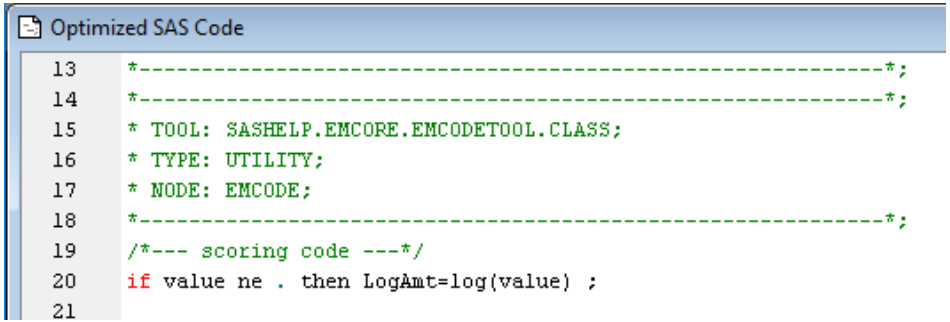
Can I do this in Enterprise Miner node

Add to Score Code



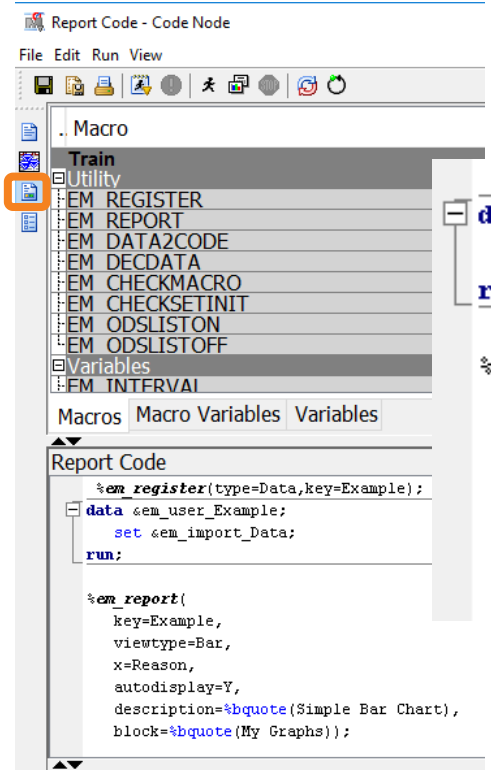
Complete example of score code:

```
/*--- scoring code ---*/

if value ne . then LogAmt=log(value);

/* nothing else required */
```

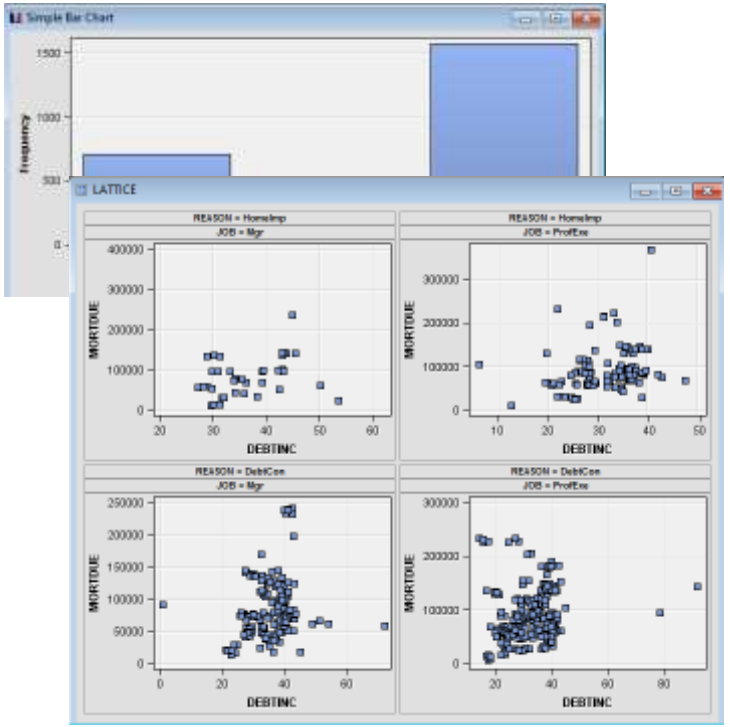


Can I do this in Enterprise Miner node

Create any SAS Graph you want using %em_report




```
%em_register(type=Data,key=Example);
data &em_user_Example;
   set &em_import_Data;
run;

%em_report(
   key=Example,
   viewtype=Bar,
   x=Reason,
   autodisplay=Y,
   description=%bquote(Simple Bar Chart),
   block=%bquote(My Graphs));
```



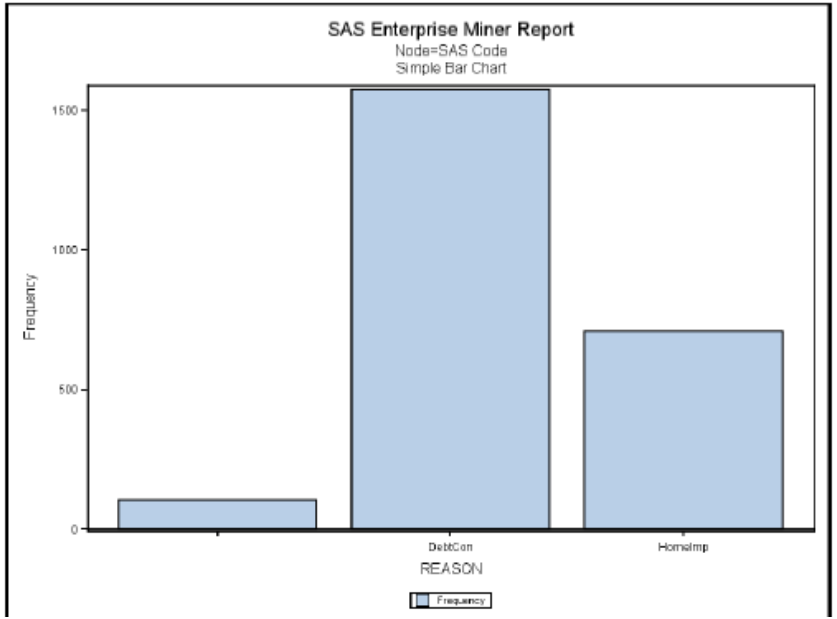
Look under Help → Node Reference → SAS Code Node for examples

Can I do this in Enterprise Miner node

Combine SAS Code output with Reporter Node using %em_report

- Graphical output becomes a section in the report generated in the Reporter Node

SAS Enterprise Miner Report
Node=SAS Code
Simple Bar Chart



Reporter Node & SAS Code Node

Demonstration

The 2 most versatile nodes

The 2 most versatile nodes

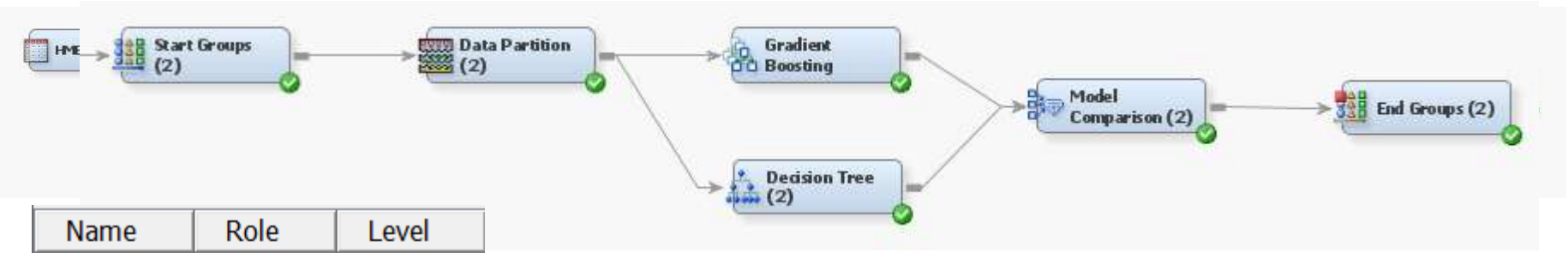
Start Groups and End Groups

- Multiple BY group support
- Multiple target variable support
- Multiple samples support (eg: bootstraps)
- Supports most tools in EM
  - Any tool that produces simple data step scorecode
  - Including model selection
  - Including user written tools
- Generate thousands of models in one job

The Power of the Group Processing Facility in SAS•Enterprise Miner™

The 2 most versatile nodes

Dynamic segmentation modeling

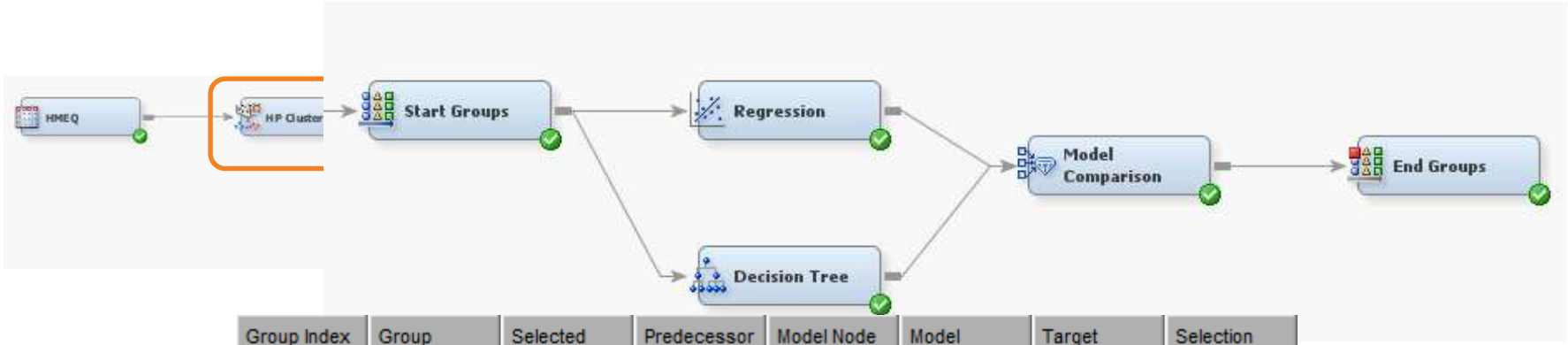


Name	Role	Level
BAD	Target	Binary
CLAGE	Input	Interval
CLNO	Input	Interval
DEBTINC	Input	Interval
DELINQ	Input	Nominal
DEROG	Input	Nominal
JOB	Input	Nominal
LOAN	Input	Interval
MORTDUE	Input	Interval
NINQ	Input	Nominal
REASON	Segment	Binary
VALUE	Input	Interval
YOJ	Input	Interval

Group Index ▲	Group	Selected Model	Predecessor Node	Model Node	Model Description	Target Variable	Selection Criterion: Valid: Misclassification Rate
1	REASON =	Y	Tree2	Tree2	Decision Tr...	BAD	0.092105
1	REASON =		Boost	Boost	Gradient Bo...	BAD	0.092105
2	REASON =DebtCon	Y	Tree2	Tree2	Decision Tr...	BAD	0.139831
2	REASON =DebtCon		Boost	Boost	Gradient Bo...	BAD	0.179661
3	REASON =HomeImp	Y	Tree2	Tree2	Decision Tr...	BAD	0.152985
3	REASON =HomeImp		Boost	Boost	Gradient Bo...	BAD	0.173507

The 2 most versatile nodes

Dynamic segmentation modeling



Group Index	Group	Selected Model	Predecessor Node	Model Node	Model Description	Target Variable	Selection Criterion: Valid: Misclassification Rate
1	_CLUSTER...	Y	Tree	Tree	Decision Tr...	BAD	0.109848
1	_CLUSTER...		Reg	Reg	Regression	BAD	0.136364
2	_CLUSTER...	Y	Tree	Tree	Decision Tr...	BAD	0.112397
2	_CLUSTER...		Reg	Reg	Regression	BAD	0.186777
3	_CLUSTER...	Y	Reg	Reg	Regression	BAD	0.09434
3	_CLUSTER...		Tree	Tree	Decision Tr...	BAD	0.113208
4	_CLUSTER...	Y	Tree	Tree	Decision Tr...	BAD	0.150115
4	_CLUSTER...		Reg	Reg	Regression	BAD	0.21709

The 2 most versatile nodes

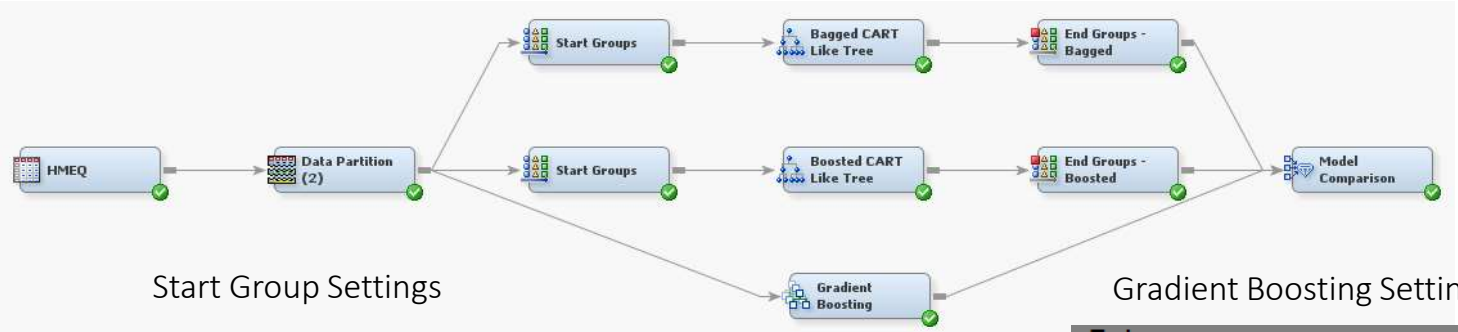
Bagging and Boosting

- **Bagging** *(or bootstrap aggregation)* take multiple samples of size n with replacement. Run separate models on each sample. Results are aggregated to create final model

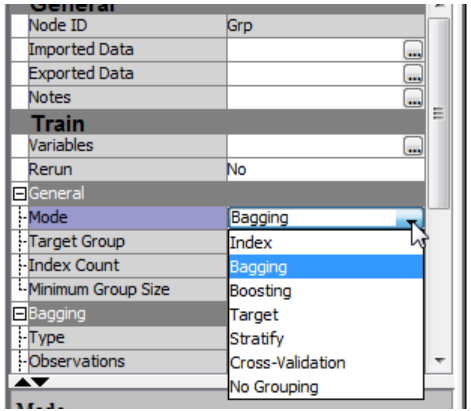
- **Boosting** - assign each observation an equal weight. Run model, apply weights to the observations in inverse proportion to the accuracy of the classification. Repeat x times with new weights. Combine predictions from models.

The 2 most versatile nodes

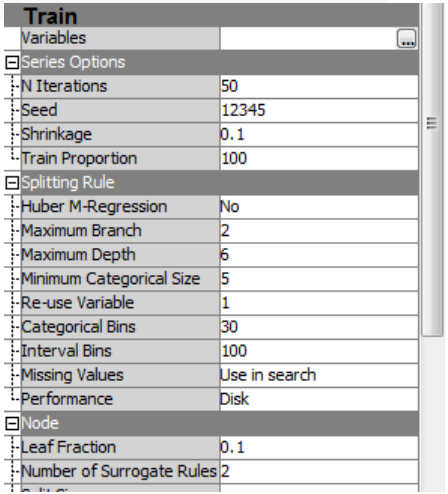
Bagging and Boosting Example



Start Group Settings

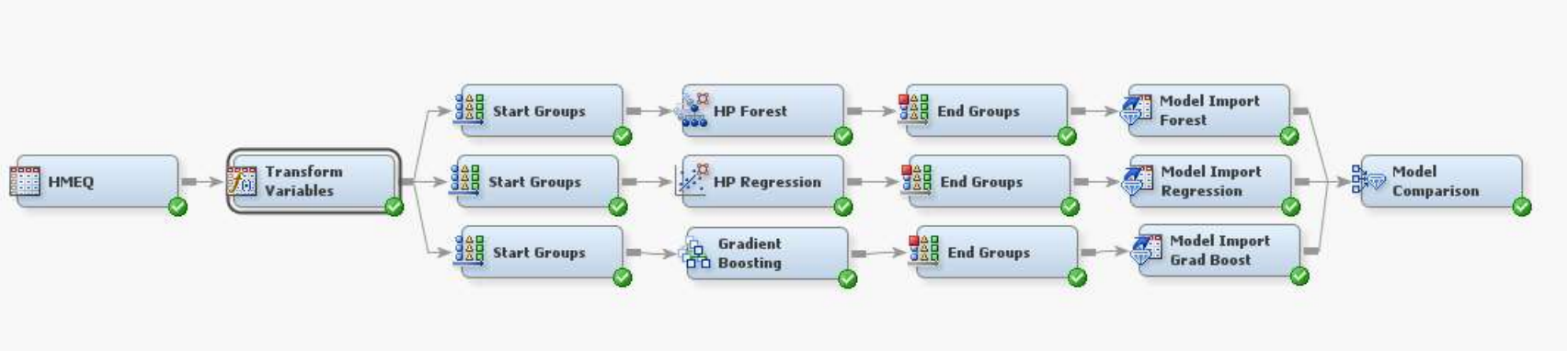


Gradient Boosting Settings



The 2 most versatile nodes

Cross Validation



- How to calculate cross validation error using the Start and End Groups nodes in SAS
- Assessing Models by using k-fold Cross Validation in SAS® Enterprise Miner ™

Train: Target Variable	Model Description	Selection Criterion: Train: Average Squared Error
BAD	Model Import Forest	0.068425
BAD	Model Import Grad Boost	0.090712
BAD	Model Import Regression	0.16335

Start and End Node

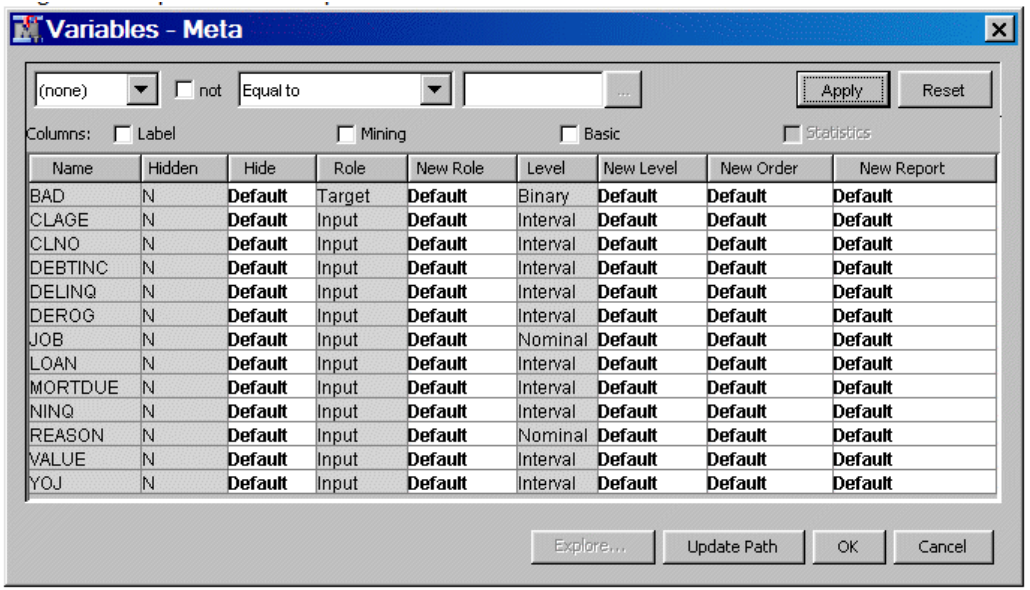
Demonstration

The node that changes everything

The node that changes everything

Metadata Node

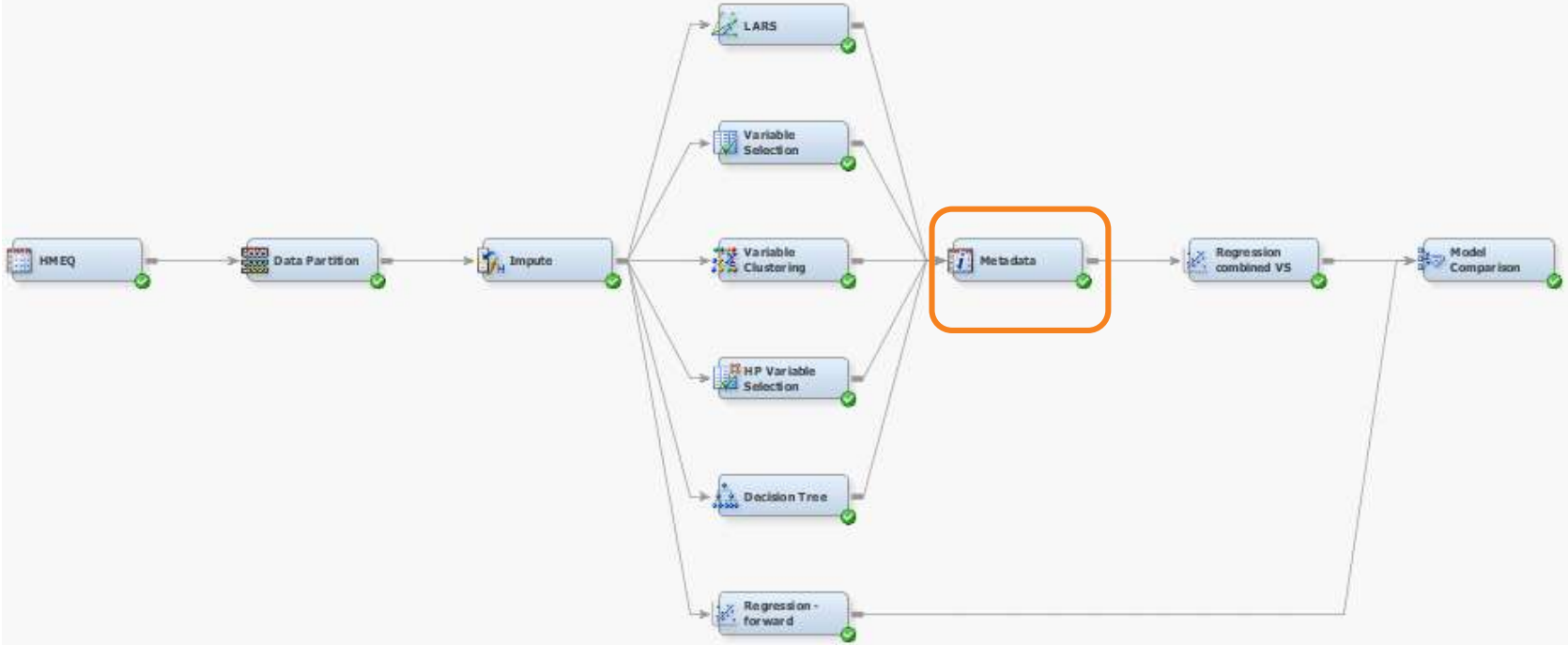
- Use to modify metadata information in your process flow diagram.
- You can modify attributes such as variable roles, measurement levels, and order.
- You can also merge predecessor variables and modify data role and multiple roles in the Metadata node.
- Under Utility Tab



Name	Hidden	Hide	Role	New Role	Level	New Level	New Order	New Report
BAD	N	Default	Target	Default	Binary	Default	Default	Default
CLAGE	N	Default	Input	Default	Interval	Default	Default	Default
CLNO	N	Default	Input	Default	Interval	Default	Default	Default
DEBTINC	N	Default	Input	Default	Interval	Default	Default	Default
DELINQ	N	Default	Input	Default	Interval	Default	Default	Default
DEROG	N	Default	Input	Default	Interval	Default	Default	Default
JOB	N	Default	Input	Default	Nominal	Default	Default	Default
LOAN	N	Default	Input	Default	Interval	Default	Default	Default
MORTDUE	N	Default	Input	Default	Interval	Default	Default	Default
NINQ	N	Default	Input	Default	Interval	Default	Default	Default
REASON	N	Default	Input	Default	Nominal	Default	Default	Default
VALUE	N	Default	Input	Default	Interval	Default	Default	Default
YOJ	N	Default	Input	Default	Interval	Default	Default	Default

The node that changes everything

Use Metadata Node to combine variable selection results from multiple nodes



Community Tip

The node that changes everything

Use Metadata Node to combine variable selection results from multiple nodes

Property	Value
General	
Node ID	Meta
Imported Data	
Exported Data	
Notes	
Train	
Import Selection	
Summarize	No
Advanced Advisor	No
Rejected Variables	
Hide Rejected Variable	No
Combine Rule	Majority
Variables	
Train	
Transaction	
Validate	
Test	

None
Any
All
Majority

None — The role of input and rejected variables is based on the active metadata.

Any — A variable is set to Rejected if it is rejected in at least one of the incoming metadata sources.

All — A variable is rejected only if it is rejected in all of the incoming metadata sources.

Majority — A variable is rejected if it is rejected in the majority of the incoming metadata sources. If there is a tie, the rejection is based on the active metadata source.

The node that changes everything

Use Decision Tree Node to see what variables are important in a Neural Network

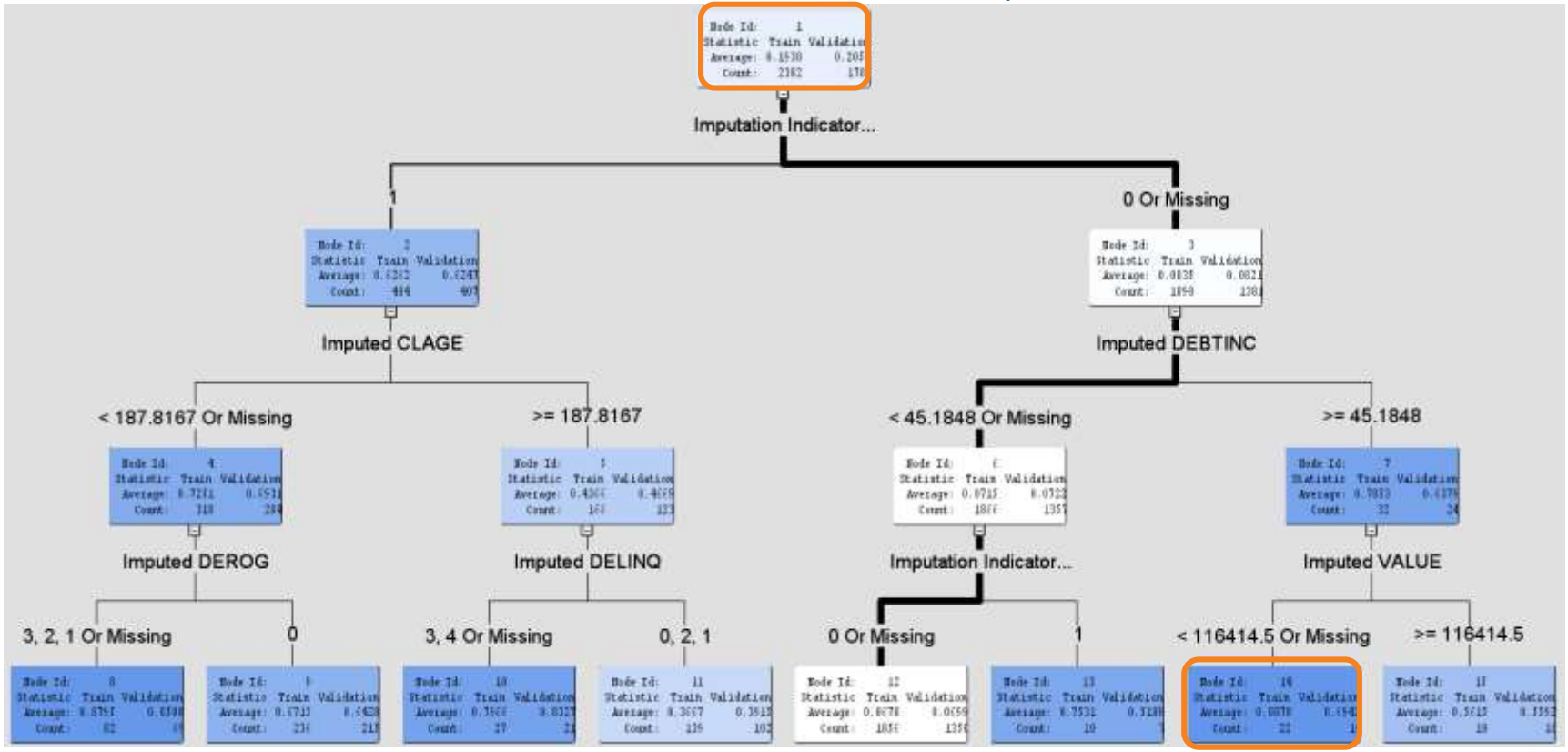
In the Metadata Node

General	
Node ID	Meta2
Imported Data	
Exported Data	
Notes	
Train	
Import Selection	
Summarize	No
Advanced Advisor	No
Rejected Variables	
Hide Rejected Variables	No
Combine Rule	None
Variables	
Train	
Transaction	
Validate	
Test	
Score	

P_BAD1	N	**Default**	Prediction	**Target**
BAD	N	**Default**	Target	**Rejected**
DEBTINC	Y	**Default**	Rejected	**Default**
CLAGE	Y	**Default**	Rejected	**Default**
CLNO	Y	**Default**	Rejected	**Default**
DELINQ	Y	**Default**	Rejected	**Default**
DEROG	Y	**Default**	Rejected	**Default**
IMP_CLNO	N	**Default**	Input	**Default**
F_BAD	N	**Default**	Classification	**Default**
IMP_CLAGE	N	**Default**	Input	**Default**
IMP_DEBTINC	N	**Default**	Input	**Default**

The node that changes everything

Use Decision Tree Node to see what variables are important in a Neural Network



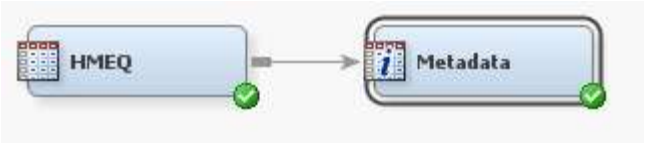
Tip from Community

Always use a Metadata Node

Using a Metadata Node allows you to capture any settings and apply to new data or to data in a different diagram.

How

- Use basic settings in Data Source Wizard
- Create a diagram
  - Add your data source
  - Add a Metadata Node
    - Set up all your roles and levels
    - Copy and paste for another dataset



Community Tip

Node Tips

Modifying Metadata programmatically

This is done by specifying DATA step statements that Enterprise Miner uses to change the metadata exported by the node. The macro variable, &EM_ FILE _CDELTA_TRAIN, resolves to the filename containing the code. For example, you might want to reject an input variable.

```
filename x “&EM_FILE_CDELTA_TRAIN;
data _null_;
file x;
put ‘if upcase(NAME) = “variable-name” then ROLE=”REJECTED”;’;
run;
```

The code above is writing a SAS DATA step to the file specified by &EM_FILE_CDELTA. You can also use the %EM_METACHANGE macro to perform the same action.

```
%EM_METACHANGE(name=variable-name, role=REJECTED);
```

%EM_METACHANGE writes SAS DATA step statements to the same file. You can also modify other attributes such as ROLE, LEVEL, ORDER, COMMENT, LOWERLIMIT, UPPERLIMIT, or DELETE.

Modifying Metadata

The newest node you should know about

High Performance Nodes

Enterprise Miner

HP BN Classifier
HP Cluster
HP Data Partition
HP Explore
HP Forest
HP GLM
HP Impute
HP Neural
HP Principal Components
HP Regression
HP SVM
HP Text Miner
HP Transform
HP Tree
HP Variable Selection

The newest node you should know about

SAS Open Source Node

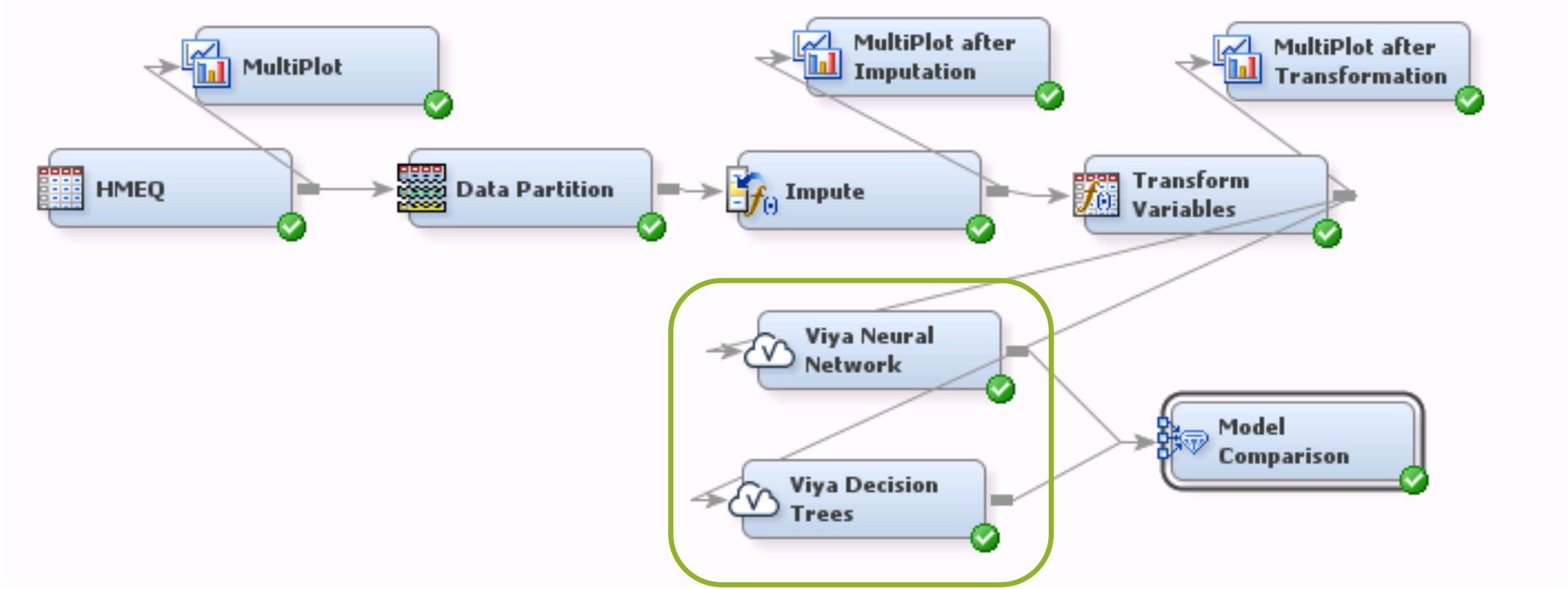
- Enables the execution of R code within an Enterprise Miner flow
  - Facilitates multitasking in R
  - Generates text and graphical output from R
  - Integrates both supervised and unsupervised learning tasks
- Transfers data, metadata, and results automatically between Enterprise Miner and R

```
library(rpart)
&EMR_MODEL <- rpart(
&EMR_CLASS_TARGET ~ &EMR_CLASS_INPUT +
        &EMR_NUM_INPUT,
        data=&EMR_IMPORT_DATA,method ="class")
```

Available in 13.1

The newest node you should know about

SAS Viya Node

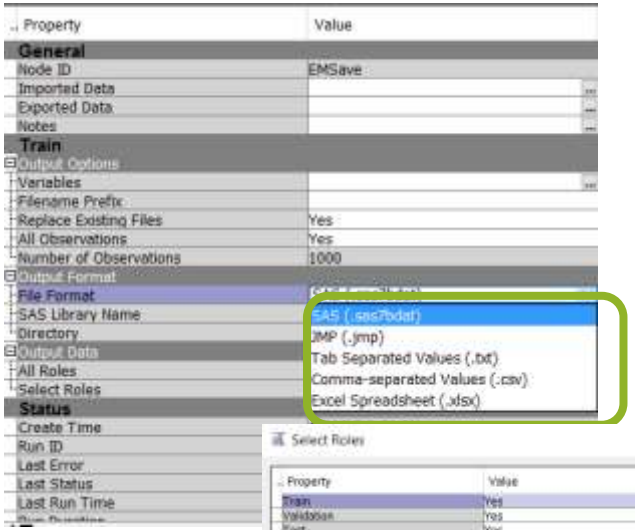


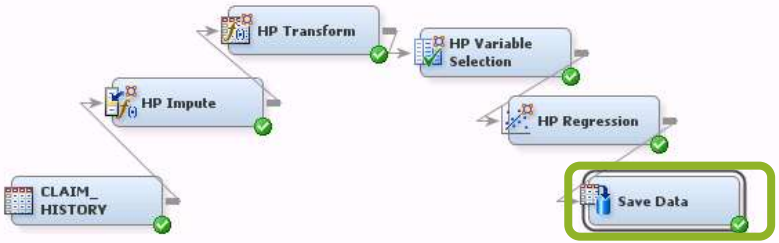
Available in 14.2

The newest node you should know about

Save Data Node

- Enables you to export data as a SAS data set, JMP table, Excel spreadsheet, CSV file, or tab-delimited file
- The Save Data node can be connected to any node in a SAS Enterprise Miner process flow diagram that exports training, validation, test, score, or transaction data.
- Under Utility Tab



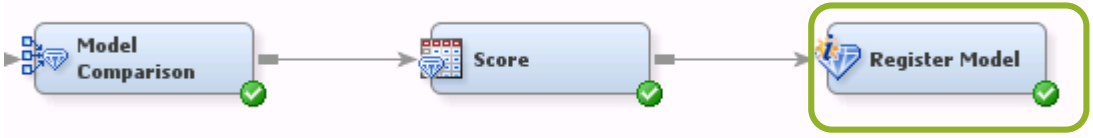


Available in 13.1

The newest node you should know about

Register Model Node

- Enables users to register segmentation, classification, or prediction models to the SAS Metadata Server.
- Models registered in metadata can then be accessed by Model Manager, Enterprise Miner, Web Services, etc…
- Information about inputs, outputs, targets and SAS score code is registered to metadata.



Train	
Repository Path	...
Model Name	Propensity Model
Model Description	...
Mining Function	Classification

Available in 13.1

More Tips from the SAS Communities

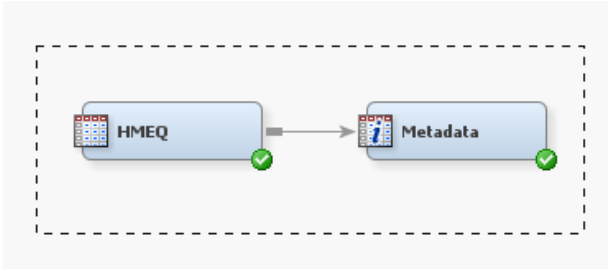
Data Mining and Machine Learning

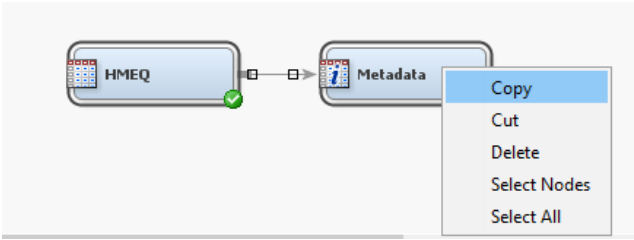
SAS Data Mining Community

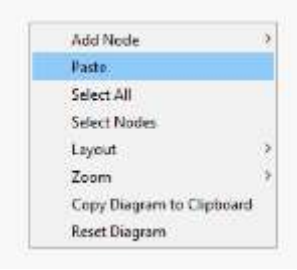
Clone a Process Flow

Did you know?

1. Highlight the process flow you want to copy by dragging your mouse across the diagram.
2. Right Mouse Click → Copy or CTRL+C to copy
3. Right Mouse Click → Paste or Use CTRL+V to paste it where you want to e.g. new diagram







Community Tip

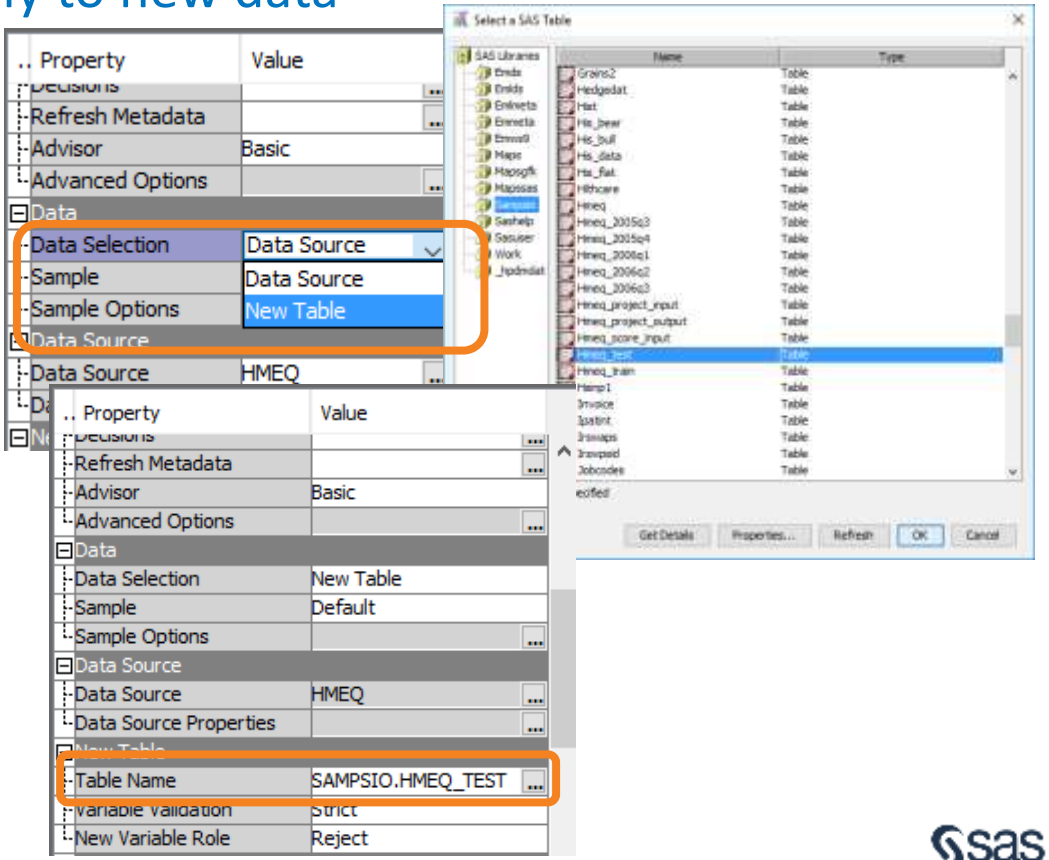
Reuse Metadata Settings from Data Source

Apply to new data

Follow these steps to use the same Data Source metadata definition but on a different table – particularly useful if your data source is large with a lot of variables or non-default specifications to configure:

1. Drag and drop your Data Source into the diagram.
2. Go into the Input Data Source node in the diagram.
3. Change "Data Source" to "New Table" and specify the 2-level name of the table you want to use.

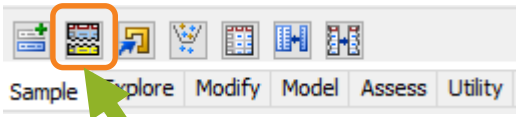
[Community Tip]



Show all properties for a node

Just double click

- Here's an easy way to see what properties are available for each of your nodes in SAS Enterprise Miner. Just double click a node in the toolbar and you'll see the list.



Double Click on Data Partition

Data Partition

Description: Partitions data into separate tables.
Component: Partition
Group: Sample

View	Property	Batch Name	Description	Type	Editable	Valid Values	Initial Value
General	Node ID	NODEID	Node Identifier	String	No		
	Imported Data	ImportSet	Set of tables imported by this node.	String	Yes		
	Exported Data	ExportSet	Set of tables exported by this node.	String	Yes		
	Notes	NotesFile	Enter notes for this node.	String	Yes		
	Variables	VariableSet	Variable Properties	String	Yes		
	Output Type	OutputType	Indicates if the node should create data set(s) or DATA step view(s).	String	Yes	Data, View	Data

Community Tip

SAS Enterprise Miner Scoring Column Definitions

Same for SAS Rapid Predictive Modeler

Communities SAS Communities Library

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actual target value minus the predicted value.

Only if decision processing is specified will variables with prefixes like D_, EL_, or EP_* be calculated. The formula for D_targetname varies with the data mining model. There are too many formulas to list here and they should be identifiable in the score code.

From Nodes

In some cases it is desirable to have an output variable have the same name regardless of the target name. The EM Score node by default provides variables with fixed names for a variety of output variables.

Fixed Output Name	Label	Description
EM_PREDICTION	Prediction for vnm	The prediction variable for an interval target.
EM_PROBABILITY	Probability of Classification	Posterior probability associated with the predicted classification. That is, it corresponds the maximum of the posterior probabilities, max(P1, P2, ..., Pk).
EM_EVENTPROBABILITY	Probability for level n of vnm	Posterior probability associated with target event.
EM_DECISION	Recommended Decision for vnm	Maps to D_targetname variables.
EM_PROFIT	Expected Profit for vnm	Expected profit predicted for a target variable set from EP_targetname
EM_LOSS	Expect Loss for vnm	Expected loss predicted for a target variable set from EL_targetname
EM_CLASSIFICATION	Prediction for v	
EM_SEGMENT	Node or Segm	

If there is a situation where a different valu about anything to the EM_Outcome variabl

Some of the Modify nodes in EM can produce output variables with identifying prefixes on the variable name.

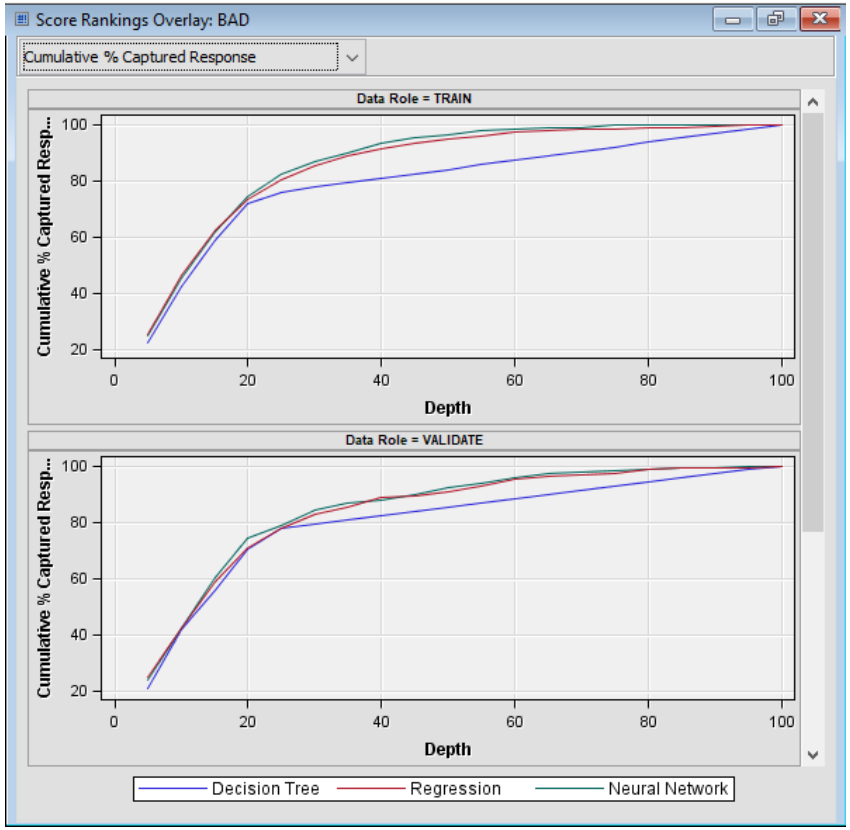
Prefix	Node	Description
IMP_	Impute	Original variable's value or if missing an imputed value
GRP_	Interactive Binning	Group number based on the original variable's value
REP_	Replacement	Replacement values for the variable's class and interval levels

Community Tip

Wish I had known

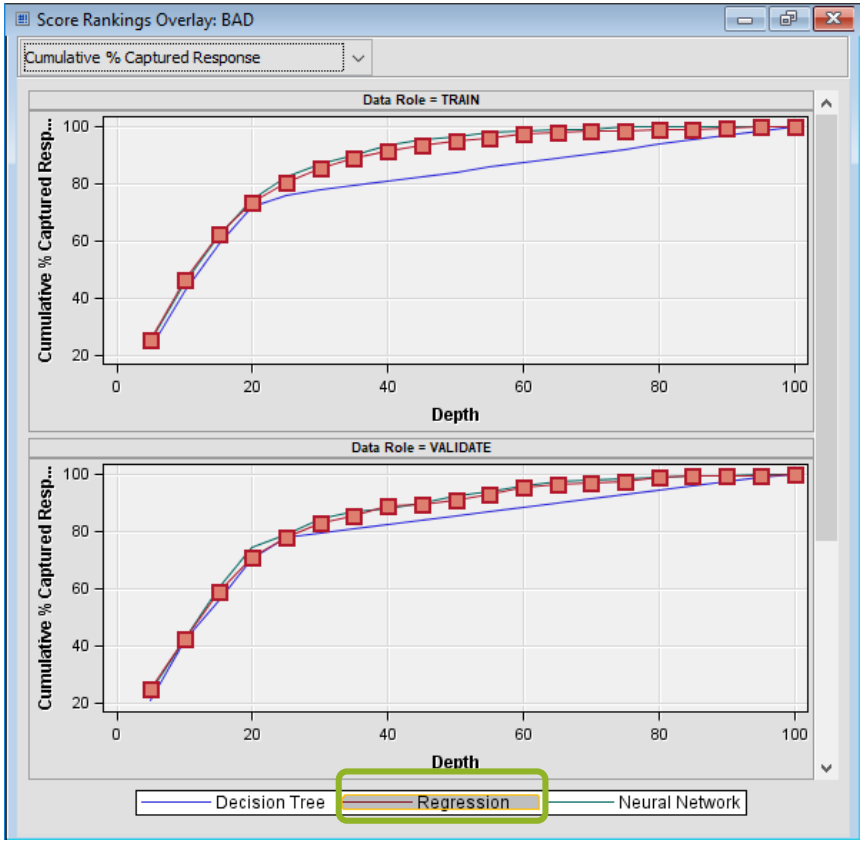
Clear Vision

How to see which model is preforming better?



Clear Vision

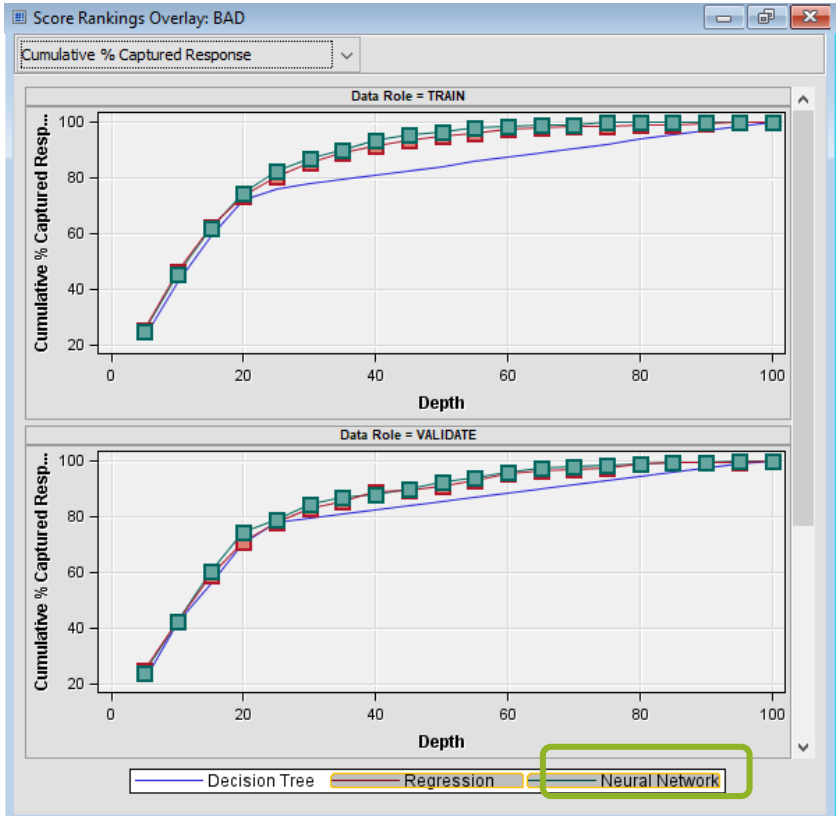
How to see which model is preforming better?



Click on model of interest

Clear Vision

How to see which model is preforming better?

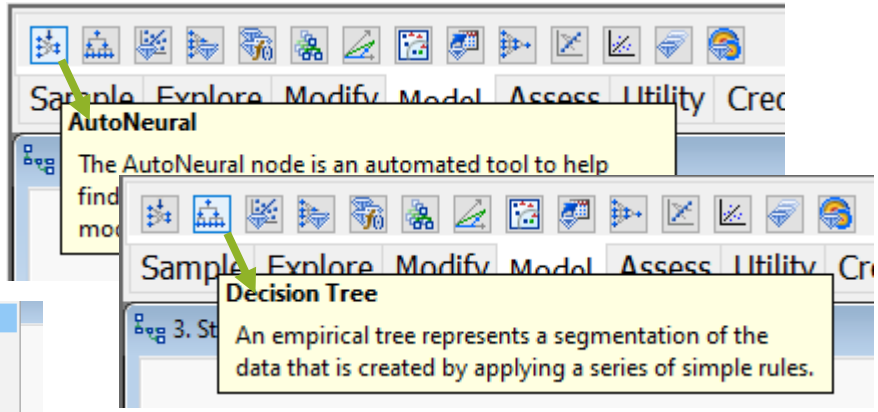


Control - Click on additional models of interest

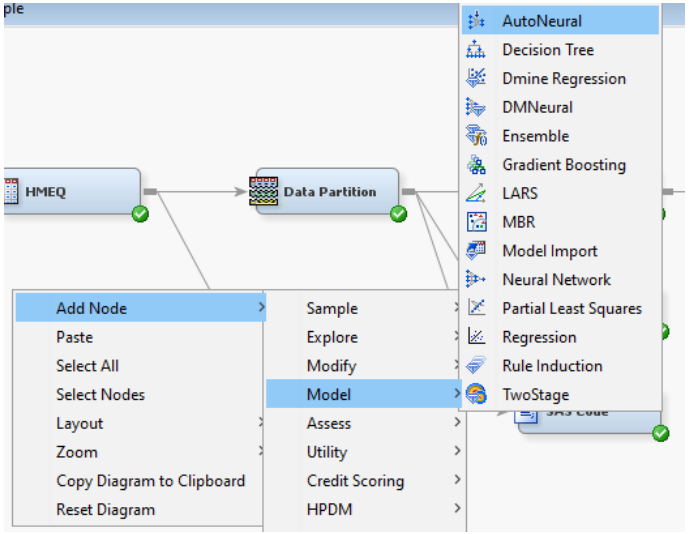
Node Icon

How do I find what I'm looking for?

- Node icons under the tabs are listed alphabetically

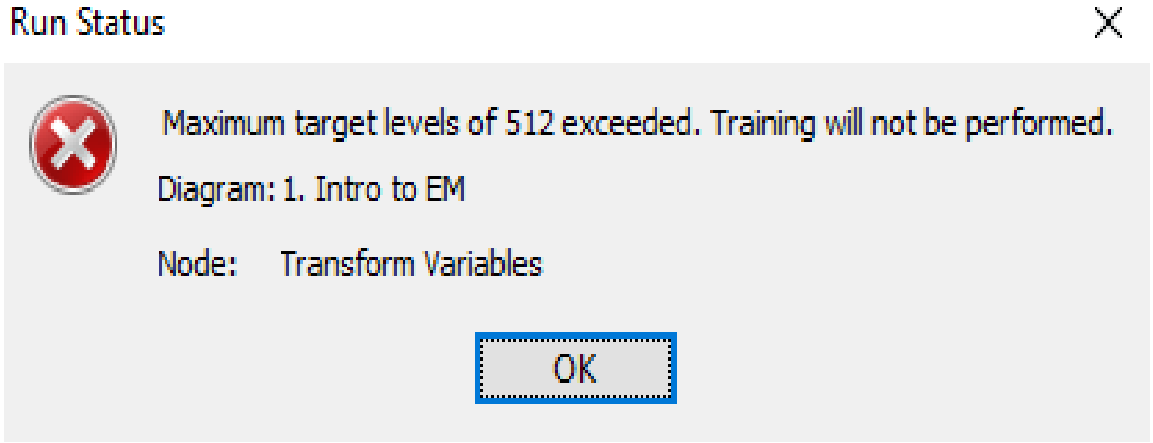


- Right mouse click in diagram to add nodes



HELP, I HAVE MORE THAN 512 LEVELS

What can I do?

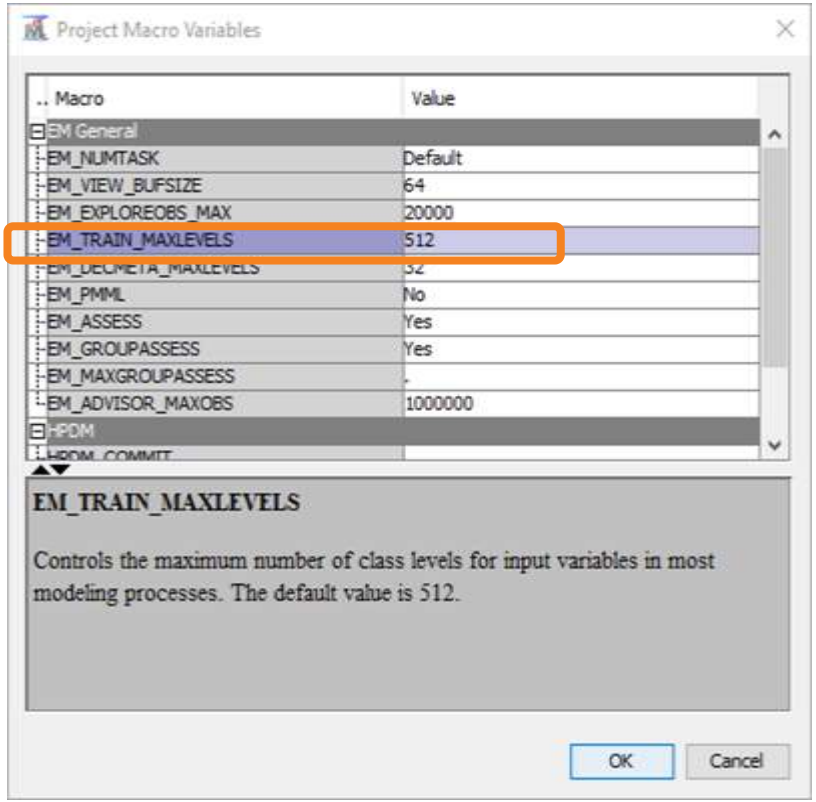


HELP, I HAVE MORE THAN 512 LEVELS

What can I do?

Property	Value
Name	Tips for EM
Project Start Code	
Project Macro Variables	
Created	9/20/17 9:15 AM
Server	
Grid Available	No
Path	C:\EMProjects\Tips for E
Metadata Folder Path	
Max. Concurrent Tasks	Default

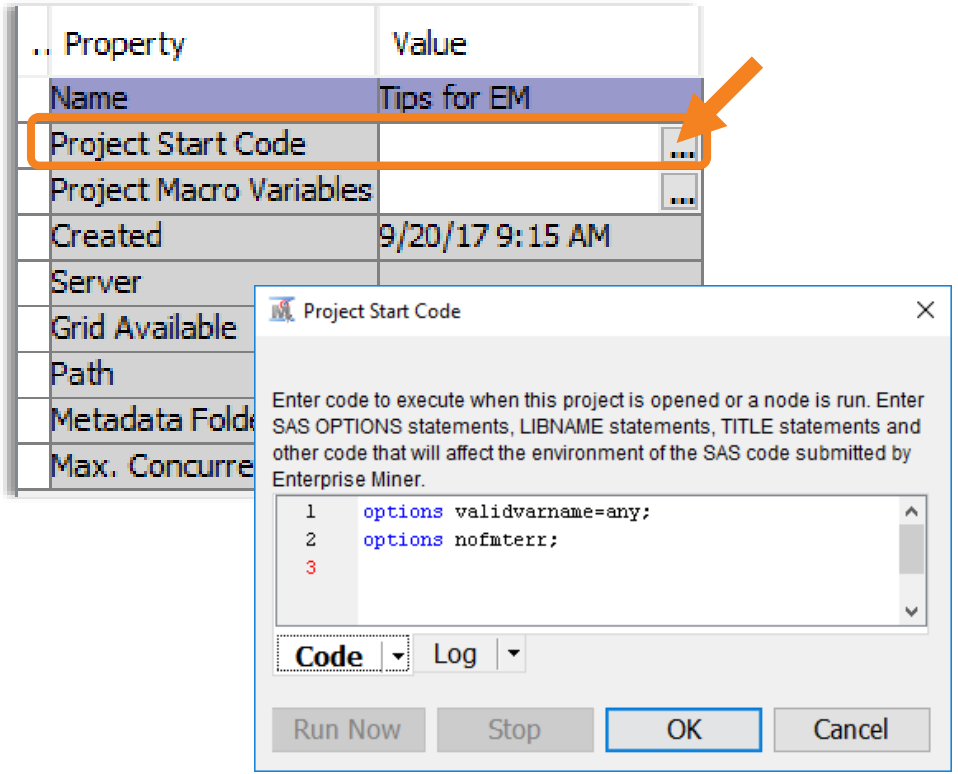
```
%let EM_TRAIN_MAXLEVELS = MYVALUE;
```



Add to project start-up code

Useful Options

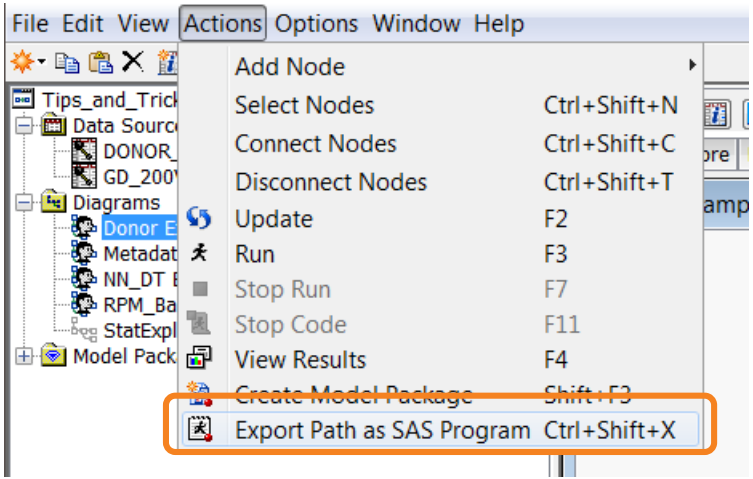
- options validvarname=any;
  - allows the use of column names that contain embedded spaces and special characters.
- options nofmterr;
  - Replaces missing formats with w. or $w. default format, issues a note, and continues processing

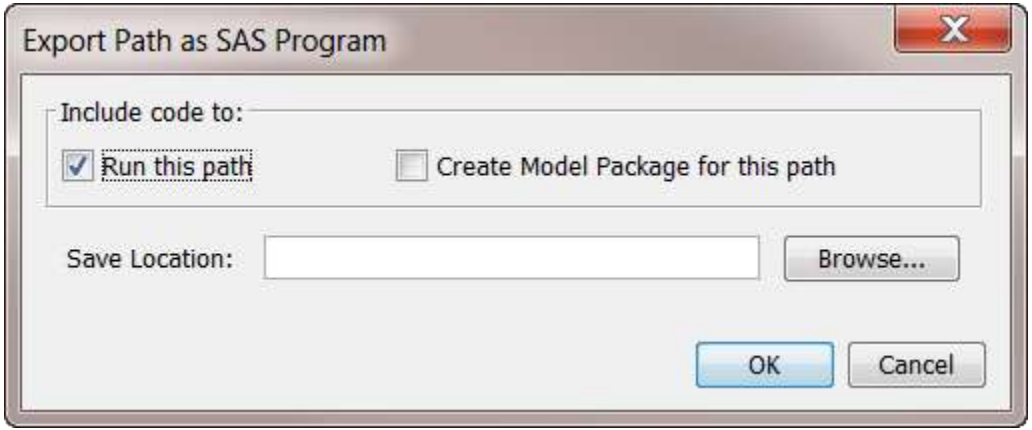


Save Diagram as Batch Code

Save entire project

1. Click on last node you want to capture in the code
2. Go to Actions →Export Path as SAS Program





Productivity Tips

SAS Batch Code

Actions→ Export Path as SAS Program

Create Batch Code for entire Diagram

- Three Easy Steps
  1. Create an EM process flow diagram
  2. Save as Batch Code
  3. Run outside of EM GUI
- Benefits
  - Saves the entire diagram as parameterized SAS program
  - Can be applied to new data to run any analysis built in EM
  - Can be scheduled to run at regular times
  - Can be scheduled to run on event triggers
  - Creates or Updates an Enterprise Miner Project
  - So you can open the results in the GUI
  - Or you can save the results in a package file and send by email
  - Or use your own SAS code to process the results
  - Anything else you can think of
- All due to the flexibility of the SAS Language

Wish I had knownTips

Demonstration

Productivity Tip

A reference is now available for diagnosing SAS Enterprise Miner issues

- Usage Note 41211: Techniques for testing, solving, or reporting problems that occur when using SAS® Enterprise Miner(tm)
- http://support.sas.com/kb/41/211.html

Usage Note *41211*: Techniques for testing, solving, or reporting problems that occur when using SAS® Enterprise Miner(tm)

Details | About | Rate It

When you experience a problem using SAS Enterprise Miner, you can often resolve the problem by following the techniques in this note. These are the same techniques that are used by SAS Technical Support team members. If you follow the techniques, then you can probably solve the problem. Even when you cannot solve the problem, the techniques help organize information so that SAS Technical Support staff can assist you more quickly.

Most SAS Enterprise Miner problems generally fall into these categories:

- Projects or diagrams do not open, or you cannot create them
- A data source cannot be opened or accessed
- A node in a diagram gives an error or unexpected result

A first step to solving an unexpected problem is to search the SAS Technical Support website for existing notes about your problem.

KNOWLEDGE BASE / SAMPLES & SAS NOTES
Samples & SAS Notes
support.sas.com/notes/

In the Search only Samples and SAS Notes area, enter some of the words from the error message or symptom that you encountered. Use "miner" as the first word. Notes are given titles that match the symptom of the problem. Look for titles that approximate your problem.

Sometimes solutions are found by examining additional SAS Enterprise Miner documentation.

KNOWLEDGE BASE / PRODUCT DOCUMENTATION
SAS Enterprise Miner
support.sas.com/documentation/onlinedoc/miner/index.html

If you need to contact SAS Technical Support online about your problem, then use the form on this web page:

SAS Enterprise Miner

Virtual Lab Time

- Customers can purchase 15 hours of access to SAS Enterprise Miner on AWS for $75. They'll have access for 90 days and can use it to:
- Practice along with their SAS Enterprise Miner e-Learning
- Prepare for the Predictive Modeling Certification exam along with the predictive modeling practice exam
- Practice after attending a classroom or Live Web SAS Enterprise Miner offering
- Try SAS Enterprise Miner out in the decide phase

Purchase Virtual Lab Time

Online. Everyday.

"I always learn something new when I post in this forum. Just what I needed…"

SAS Online Community

Communities.sas.com/data-mining

Questions?

Thank you for your time and attention!

Connect with me:
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Twitter: @Melodie_Rush

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