



SAS® FORUM
BELUX 2015

Integrating R in a SAS environment

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Introduction

R and SAS have advantages and inconvenients. Why not enjoy the advantages of both? R can be integrated in SAS via:

- SAS IML Studio
- SAS Model Manager
- **SAS Enterprise Miner**

Let's focus on the integration of R in SAS Enterprise Miner.

The Open Source Code node allows us to enjoy the **advantages** of both SAS and R in **integrated environment**.

Key benefits of using R in SAS Enterprise Miner

Data access and data preparation

Benefits of the data preparation nodes from SAS Enterprise Miner:

- Data partition
- Filtering
- Variable selection



Key benefits of using R in SAS Enterprise Miner

Model assessment

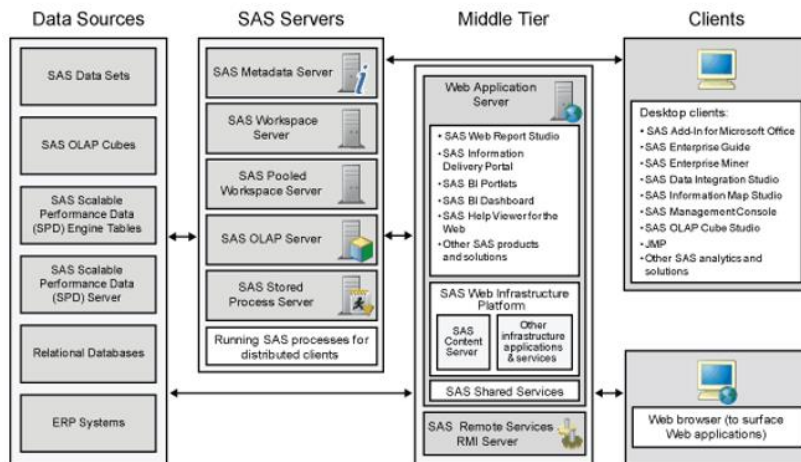
Certain R models/packages allow the PMML (predictive modeling markup language) option in SAS Enterprise Miner.

The other packages, which don't allow the PMML option, are followed by the Model Import node.

More details later on...

Key benefits of using R in SAS Enterprise Miner Collaboration

- R enjoys the SAS Architecture as well as the multi-user side of the platform.



- Graphics and visualization
- Documentation

Characteristics of the Open Source Integration Node

Technical overview

- Use a 64-bit R installation
- Add the -RLANG option in your sasv9.cfg file
- The R packages should be installed in R, not in the Open Source Code node.
- The function *install.packages()* used in SAS will cause errors.
- The node relies on SAS/IML so the R packages need to be installed where SAS/IML can access them (in the root folder of the R installation).
- The verified R version is the 64-bit R.3.0.1., and needs to be installed on the same machine as the SAS Enterprise Miner Server

Characteristics of the Open Source Integration Node

Analytical overview

3 Output Modes:

- PMML (Predictive Modeling Markup Language):
 - Direct way to integrate R into SAS
 - Limited list of supported R packages:
 - Linear Models (lm)
 - Multinomial Log-Linear Models (multinom (nnet))
 - Generalized Linear Models (glm (stats))
 - Decision Trees (rpart)
 - Neural Networks (nnet)
 - k-means clustering (k-means (stats))

Characteristics of the Open Source Integration Node

Analytical overview

- Merge
 - Nearly any R supervised or unsupervised model can be used, as well as data transformation within SAS Enterprise Miner
 - BUT more user input needed:
 - Models need to be imported and assessed with the Model Import node
 - Models can't be registered into the SAS Metadata Server
 - Generated columns (predicted responses, \\ probabilities, ...) need to be created by the user.
- None
 - Debugging purposes: taking a look at the imported or exported data, and/or at R code syntax
 - Executing R code on SAS Enterprise Miner data sources: data exploration, graphics, simulation, ...

Characteristics of the Open Source Integration Node

Analytical overview

2 Training Modes:

- Supervised

SAS Enterprise Miner needs predicted columns from a supervised model in R (automatically created if the Output Mode is set to PMML, and user created if the Output Mode is set to Merge).

- Unsupervised

Generated columns are Segment variables when the Output Mode is set to PMML. The user created columns when the Output Mode is set to Merge are used as Inputs variables or next nodes.

Characteristics of the Open Source Integration Node

Analytical overview

Output Mode	Training Mode	Comments
PMML	Supervised	<ul style="list-style-type: none">- generated columns are predictions- data step scoring code created- resulting model assessed automatically
	Unsupervised	<ul style="list-style-type: none">- generated columns are Segment and Distance- assessed with the Segment Profile node
Merge	Supervised	<ul style="list-style-type: none">- generated columns are predictions- data step scoring code- model assessment is done through the Model Import node
	Unsupervised	<ul style="list-style-type: none">- generated columns are Inputs- columns are not assessed

Characteristics of the Open Source Integration Node

Analytical overview

Let's now see what it looks like in SAS Enterprise Miner...



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Any question ?

Thank you for your time !



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