SAS Studio Exercise 08

Two-Way ANOVA

(7/23/2020)

**Sources**

Steve Nolan, Ron Freeze, Elizabeth Keiffer, Michael Gibbs, Jorge Moreda

Enterprise Systems, Sam M. Walton College of Business, University of Arkansas, Fayetteville

SAS® Studio. Release 5.2

SAS® VIYA® release V.03.05

Copyright © 2018 *For educational uses only - adapted from sources with permission. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise, without the prior written permission from the author/presenter.*

# Use Case – Two-Way ANOVA

Razorback Stores is a local department store serving a metropolitan area. As a department store, they offer a wide variety of items and services and track sales through a point of sale system. Over the past several months, Razorback Stores performed a marketing campaign designed to promote and incentivize a loyalty program.

As a recent hire, your boss has asked you to analyze the following:

* Are **Net Sales** significantly different between Types of Customers (Promotional and Regular) who pay with different Methods of Payment (RazorCard, Proprietary, MasterCard, and Visa)?

## Step 0: Navigate to SAS Studio/Activate CAS Session

Before jumping into the ***Two-Way ANOVA*** task, please refer back to***SAS Studio 01 – Logging into the System*** to understand how to navigate to SAS Studio, activate a CAS Session, and manage your data.

We will be using the Razorback Storesdataset which will be provided by your instructor and/or is available on blackboard. Once you have this dataset loaded on SAS Viya, following ***SAS Studio 01 – Logging into the System*** tutorial*,* load this dataset into memory in your personal userfolder.

## Step 1: Tasks

In order to access the **Two-Way ANOVA** task within SAS Studio:

1. Click on the **Tasks** icon located on the left-panel
2. Expand the **SAS Tasks** folder
3. Expand the **Statistics** folder
4. Expand the **Linear Models** folder
5. Find **N-Way ANOVA** and double click on it

## Step 2: Select Data

Next, you need to select your data. In this case, we will be choosing **Razorback Stores** which can be found in our **User** folder. Under **DATA**,

1. Click on the folder icon located at the right of the current dataset in place

A new **Choose a Table** window will open,

1. Click on **Libraries**

A list of all the folders available to you will be displayed.

1. Click on **MYCASLIB** which references your **User** folder

All the different datasets found in your **User** folder will display.

1. Click on **RAZORBACK\_STORES**
2. Click **OK**

## Step 3: Select Variables

Once you have **Razorback Stores** dataset selected, we need to select the variables we want to work with. Notice the red font color text at the bottom. It requires you to select **exactly one Dependent variable and 2 Factors**. Under **ROLES**, notice you have two subtitles:

* 1. **Dependent variable**: what your dependent variable is. For this tutorial: **Net Sales**
	2. **Factors**: what your independent variables are. For this tutorial: **Type of Customer** and **Method of Payment**

­­­Under **Dependent variable:**,

1. Click on the **+** sign

A new window will open,

1. Select **Net Sales**
2. Click **OK**

Under **Factors:**,

1. Click on the **+** sign

In the new window that opened,

1. Click to checkmark the boxes to the left of **Type of Customer** and **Method of Payment**
2. Click **OK**

Note that once you have set both dependent variable and categorical variables, there is still one red text at the very bottom that asks you to **add one or more effects to the model**.

## Step 4: Modify Settings

Once you have selected your dataset and variables, you can move to the **Model** tab where you will **add one or more effects to the model**.

1. Click on the **MODEL** tab

1. Click on **Edit**, located to the right of **Model Effects**

A new window will open called **Model Effects Builder**.

On the left side, under **Classification**,

1. Click to checkmark the boxes to the left of **Type of Customer** and **Method of Payment**

Under **Standard Models**,

1. Click on **Full Factorial**

Under Model effects in the right pane you should now see the previous variables added as well as a **Type of Customer\*Method of Payment** effect.

1. Click **OK**

Notice that as we have selected a dataset, variables, and checked/unchecked settings, there is a code area on the right side of the screen that has been updating as we modified these.

1. Click **Run**


## Step 5: Results

Once the task has executed, you will have your **Two-Way ANOVA** results view in the right most pane.

In order to better visualize the results, locate the three dots at the very right end of the screen under the current date and time.

1. Click on these three dots and,
2. Click on **Open in a browser tab**
3. Click on **Results**
4. Alternatively, you can click on the **Maximize preview** icon

Under **Results**, notice that you have a folder labeled **The GLM Procedure**, and three folders under it named **Data, Analysis of Variance**,and **Least Squares Means**, where you can find subfolders within.

1. Expand all the folders
2. Click on the files inside

You will notice that as you click on these files, the tables and plots on the right window will change.

When clicking on any of these sections, SAS Studio will take you to the table/graph to which that section references in the right.

For the analysis we will be looking at the 5 files that figure in the **Analysis of Variance 🡪 Net Sales** folder (circled in red).

Overall ANOVA:

Fit Statistics:

Type I Model ANOVA:

Type III Model ANOVA:

Interaction Plot:

Under the **Results** section, we can see the t value, p-value, and distribution of our variable. From here, we can accept or reject our null hypothesis.

Congratulations, you have successfully performed a Two-Way ANOVA on SAS Studio!