JMP®'s Visualization Analysis of SESUG Conference Attendance from 2008-2018

Melvin Alexander – Independent Consultant

ABSTRACT

This presentation applies JMP®'s visualization tools to answer some of the key questions raised in SESUG 2018 Information and Visualization competition. Contestants used creative, clever SAS® Visualization tools to describe the attendees of past conference years from 2008-2017. Although the competition was open to JMP® users, there were no JMP® submissions. The tools featured include:

• Displaying SESUG attendance by Industry for each Conference year with image logos from JMP®'s Expressions columns;

• Animating how state and industry representation of attendees changed over time using JMP®'s Local Data Filter;

• Using Distribution Analysis of the Industries SESUG conference attendees came from so that committee planners can identify topics of interest for attendees.

The data used in this presentation covered the same past conference years, including 2018. JMP®'s local data filters, dynamic and interactive visualization functionality allows analysts to show off data in interesting and exciting ways.

INTRODUCTION

This presentation will show creative ways to use JMP® Visualization tools to describe SESUG conference attendees from 2008 to 2018. This application drew from the Data Visualization Competition of SESUG 2018 that took place in St Pete's Beach, FL. Each year SESUG conference has approximately 350 attendees. The data for the 2018 competition consisted of attendee registration information for six conference years with repeat locations: 2008 (St Pete's Beach, FL), 2010 (Savannah, GA), 2012 (Durham, NC), 2013 (St Pete Beach), 2015(Savannah, GA), and 2017(Cary, NC). The present data set included the 2018 (St Pete Beach, FL) conference year. Attendee information was anonymized and was provided as a SAS Data Set with a supporting data dictionary that can be found on the
SESUG 2018 home page by visiting http://www.sesug.org/SESUG2018/ImportantDates.php.

One example uses expressions columns to help planners of SESUG conferences study the industries attendees came from.

BACKGROUND

SESUG 2018 held its second Information Visualization Competition to attendees registered for the conference that took place in St. Pete, FL. The data consisted of registration information for six conference years (2008, 2010, 2013, 2015, 2017, and 2018) with repeat locations of St. Pete, FL, Savannah, GA, Cary and Durham, NC.

Attendee information was anonymized and the data were made available as a SAS Data Set with a supporting data dictionary document in Appendix 1. Participants could submit entries that used the dataset provided; create visualizations using SAS or JMP; include the SAS or JMP JSL code with their submissions; and agree to include their entries in the SESUG 2018 proceedings. Some of the questions visualizations were to answer include:

- How does state and industry representation change for each of the different locations?
- What are the peak times of registration?
- How has state or industry representation changed over time?
- What do we know about participants who have attended multiple years (although ID is anonymous, it is unique to an individual attendee)?

The judging criteria was 'entrant blind' so that unintentional biases in the competition were avoided. The judging for each submission was based on the following evaluation areas:

- Creativity
- Clear presentation of information
- Overall appearance

The winning prizes were: First prize - $100, Second prize - $25, and Third prize- $25.

EXAMPLES

Table 1 shows SAS dataset brought into a JMP data table which include data from the 2018 conference which had 2436 rows and 11 columns.

**Table 1. SAS SESUG 2018 dataset as a JMP data table**

The Script to open SAS data set into JMP was done using the following JSL Open() command:

```
Open("C:\Users\Melvin\Downloads\sesug2018_datavisupdate.sas7bdat",Use Labels For Var
Names( 0 ) ) ;
```

Figure 1 shows the winning visualization by David Mintz of the US. Environmental Protection Agency.

Figure 1. The 2018 Winning Visualization – David Mintz, U.S. Environmental Protection Agency
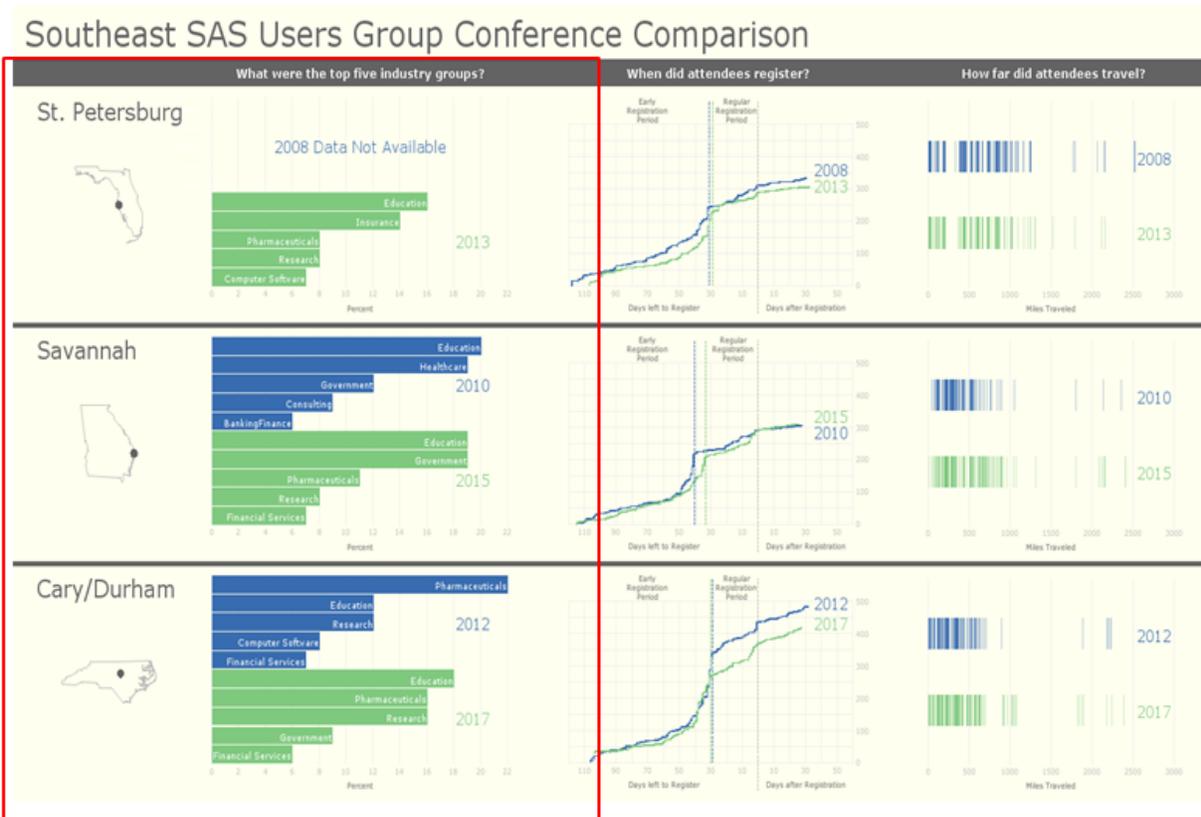
The red rectangle of the left panels showed a map of the meeting sites and bar charts of the top five industries attendees came from for the two conference years of the three meeting sites.

Figure 2 shows the Frequency Counts Data Table of SESUG Attendees by Industry for each Conference Year with Expression Column Image logo.

Figure 2: Frequency Counts Data Table of SESUG Attendees by Industry for each Conference Year with Expression Column Image logo .

SESUG logo images used as a label and marker.
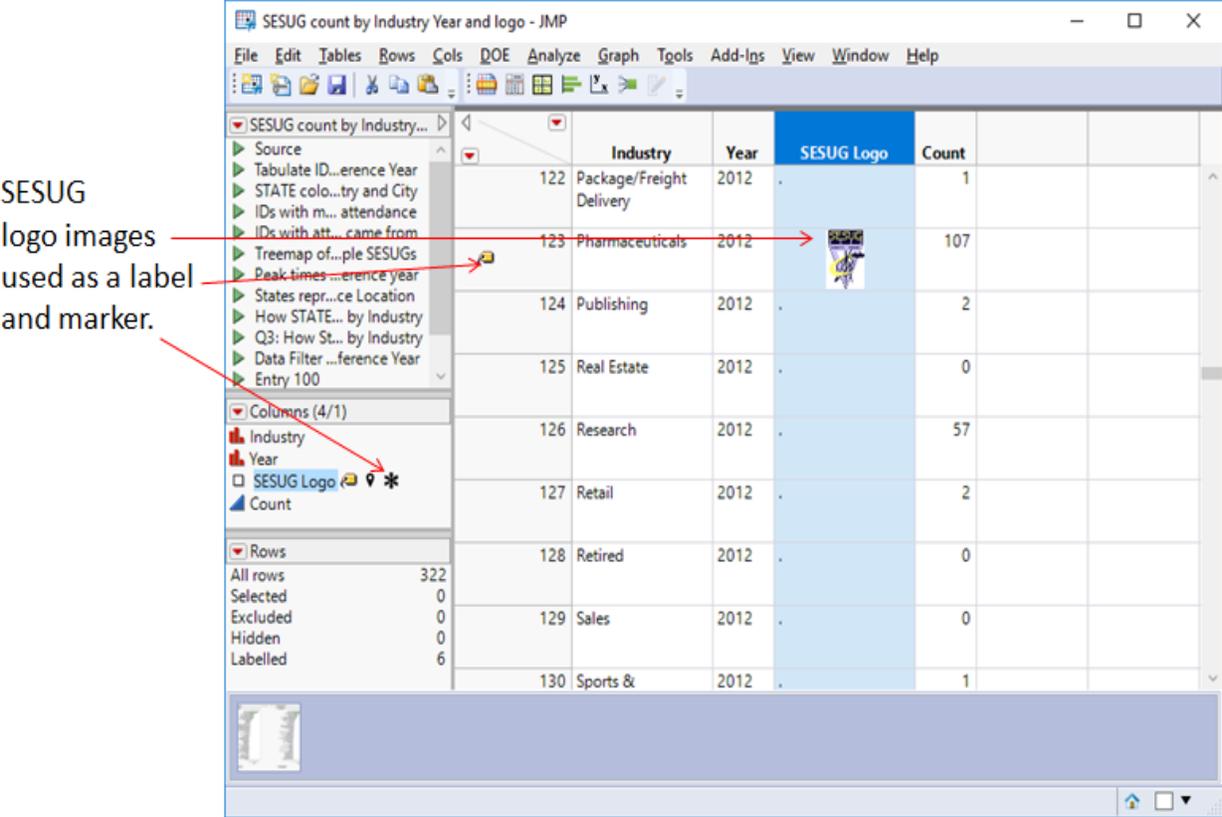
Image logos for each conference year were dragged and placed as Images into the **SESUG Logo** Expression column cells of the "SESUG count by Industry Year and logo.jmp" data table. Right-clicking the **SESUG Logo** column and selecting **Label** displays the images on graphs and reports. Right-Clicking the **SESUG Logo** from the Columns panel and selecting **Use for Marker** sets each image as markers on graphs. This feature in JMP version 14 prevented the need to look at a marker color and refer to the legend for its meaning, which is particularly helpful with data that contain many levels.

Figure 3a shows the Top Industries from 2010,12: Education, Healthcare, Pharmaceutical, Government, Computer Science.

Figure 3a. Industry Groups SESUG Attendees came from for each Conference Year and City
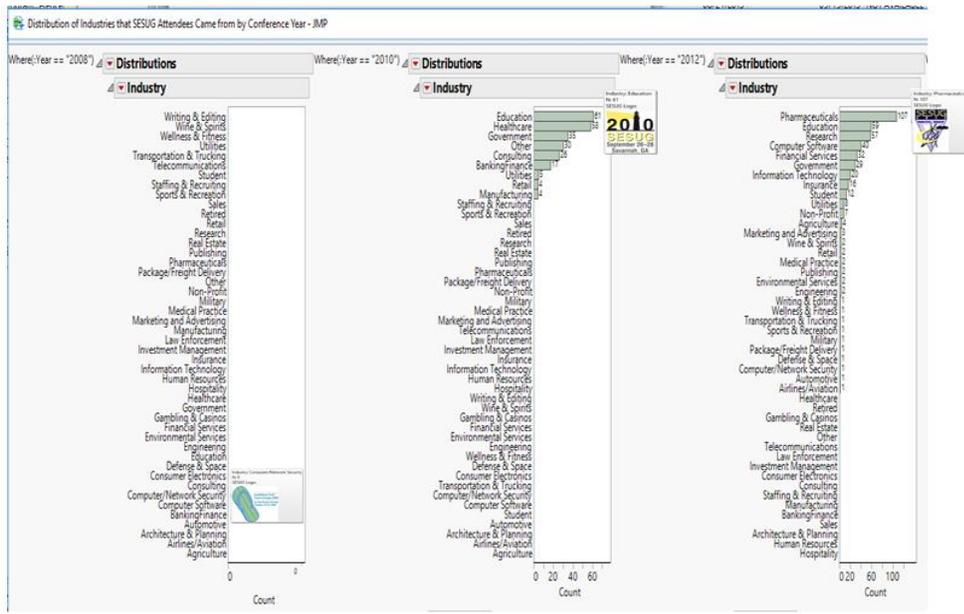
As the pointer or cursor is placed over the largest bar for each conference year, the data point's information and logo marker's image appears as a hover label.

Right-clicking the hover label and selecting Pin (or click the Pin icon in the top right corner of the hover label) saves the Pin's hover label into the plot.

Figure 3b shows the top Industries from 2013,15,17: Education, Pharmaceuticals, Research, Insurance, Government, Financial Services

Figure 3b. Industry Groups SESUG Attendees came from for each Conference Year and City (cont.)
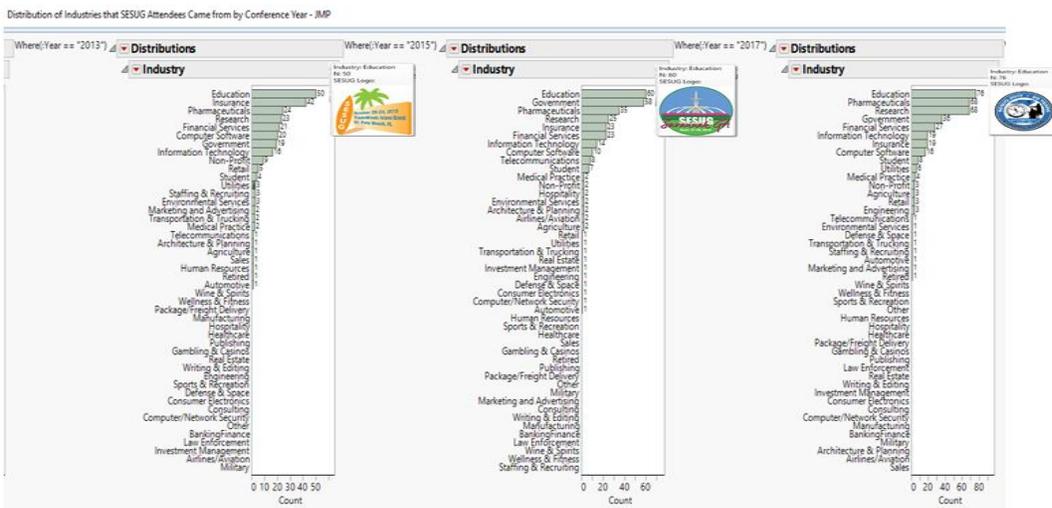
Figure 3c. Industry Groups SESUG Attendees came from for each Conference Year and City (cont.)
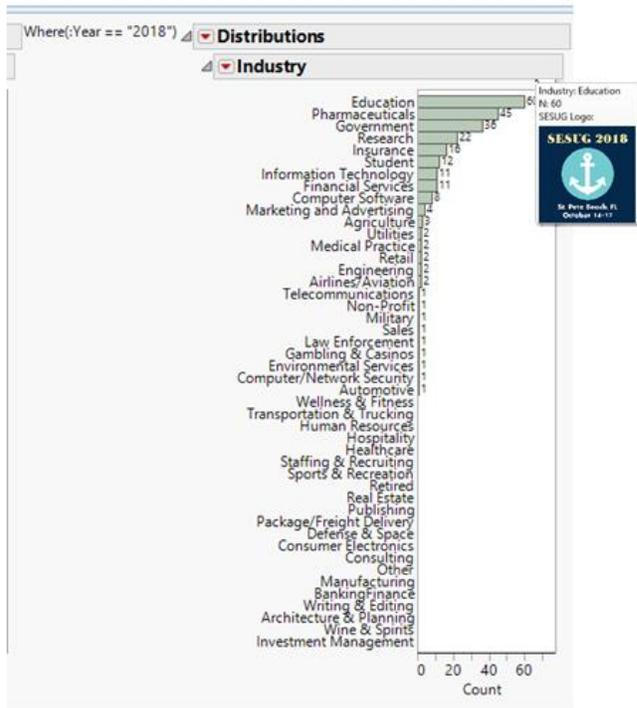
Top 5 Industries in 2018, Education Pharmaceuticals, Government, Research, Insurance, are shown in Figure 3c.

Figure 4a shows that the 309 attendees represented 28 different industries from 25 states in 2015.

Figure 4a. Local Data Filter Map of Industries SESUG Attendees represented for 2015 Conference Year
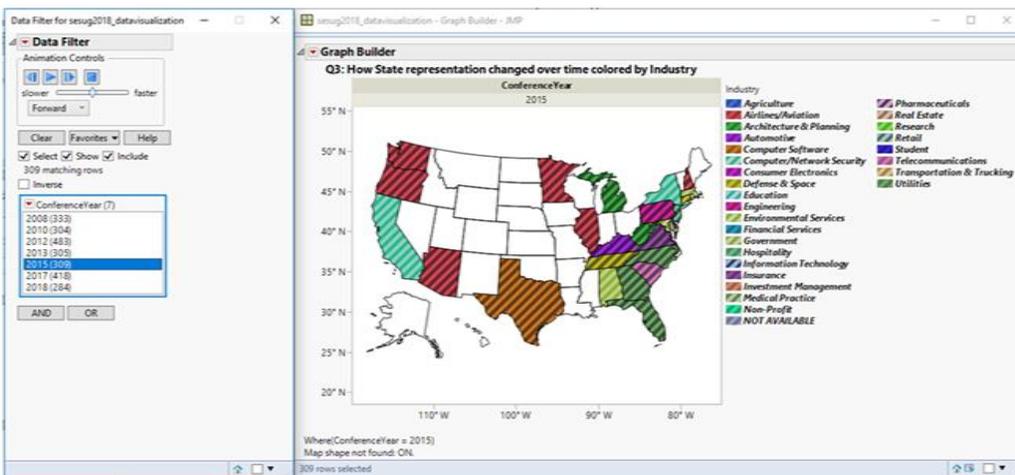
The JSL script that produced Figures 4a is as follows:

```
/* JSL script to Open Local Data Filter  with Animation for each conference
year */
dt=Data Table( "sesug2018_datavisualization" ) ;
dt  << Data Filter( Location( {146, 146} ),   Mode( Show( 1 ), Include( 1 ) ),
        Add Filter( columns( :ConferenceYear ), Where( :ConferenceYear == "2015" ),
            Display( :ConferenceYear, Size( 160, 90 ), List Display )  ),
        Animation( Animate Column( :ConferenceYear ) ) );

dt << Graph Builder( Size( 534, 490 ), Show Control Panel( 0 ),
        Variables( Wrap( :ConferenceYear ), Color( :Industry ), Shape( :STATE ) ),
        Elements( Map Shapes( Legend( 7 ), Summary Statistic( "N" ),
                    Show Missing Shapes( 1 )  )       ),
        SendToReport( Dispatch(    {}, "graph title",  TextEditBox,
        {Set Text("Q3: How State representation changed over time colored by Industry"
                    )} ) ) );
```

In 2017, the 418 attendees represented 24 industries from 25 states is shown in Figure 4b.

Figure 4b. Local Data Filter Map of Industries SESUG Attendees represented for 2017 Conference Year
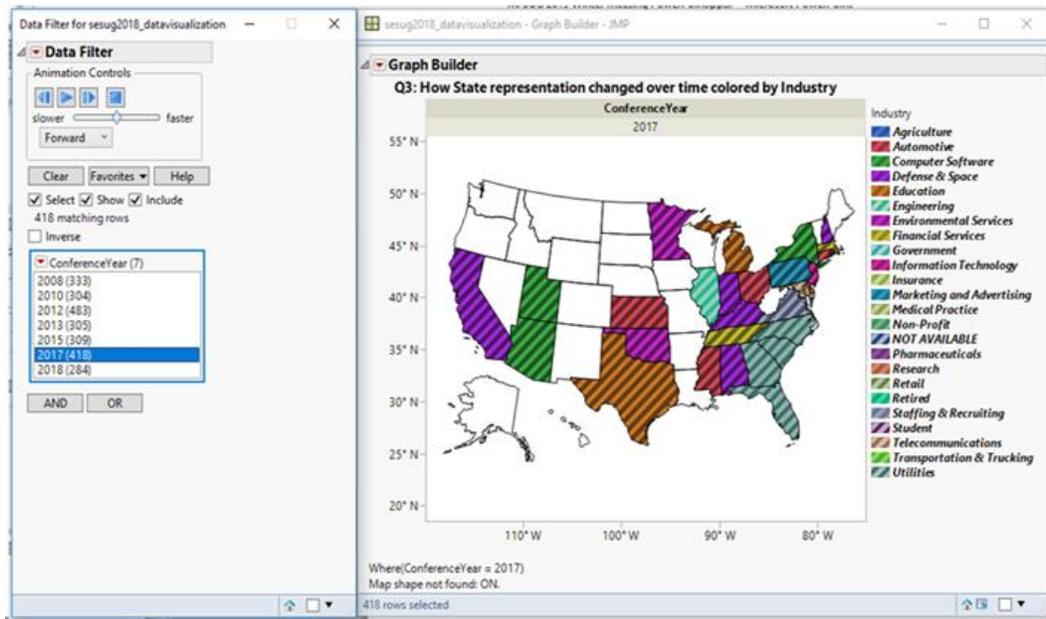
Figure 4c shows for 2018, 284 attendees came from 25 States and 26 industries.

Figure 4c. Local Data Filter Map of Industries SESUG Attendees represented for 2018 Conference Year
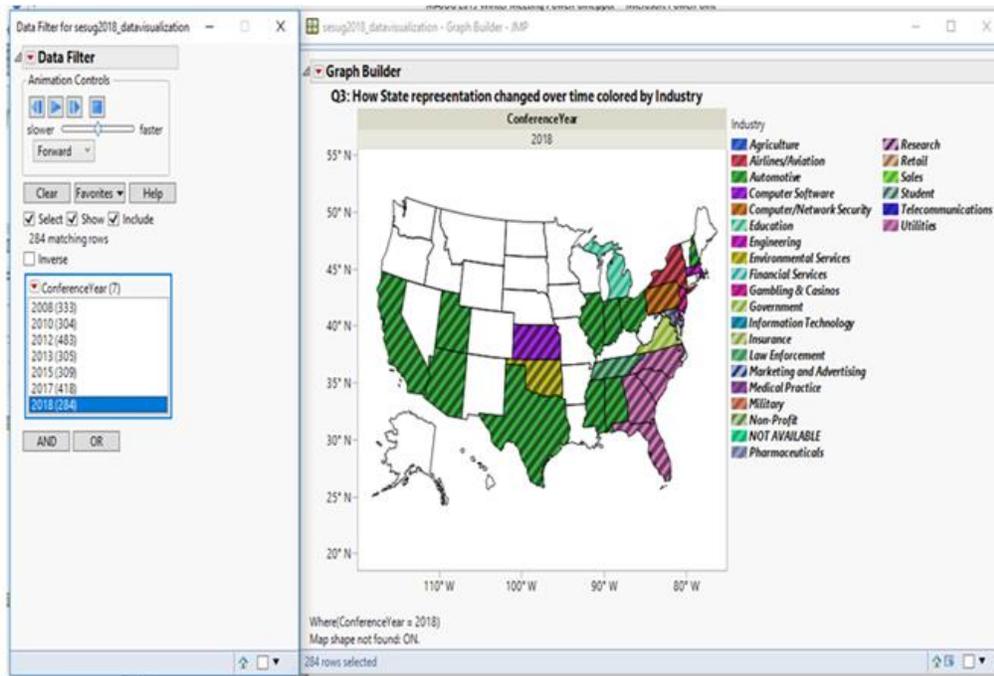
To help learn about participants who attended multiple years, Figure 5 shows a treemap comparing attendees of multiple years by the industries they worked. Attendees for the two conference years of 2012-2018 (104 rows) and 2017-2018 (84 rows) were from Manufacturing, Marketing, and Advertising industries. For the two conference years 2008-2018, 64 attendees came from the Medical Practice and Military industries. Attendees of the 2010, 2012, 2015, and 2017 (4 rows) conferences came from the Engineering industry. Appendix 2 lists the JSL code that produced Figure 5.

Figure 5.Treemap of Participants Attending Multiple Years of SESUG Conferences by the Industries They Came From
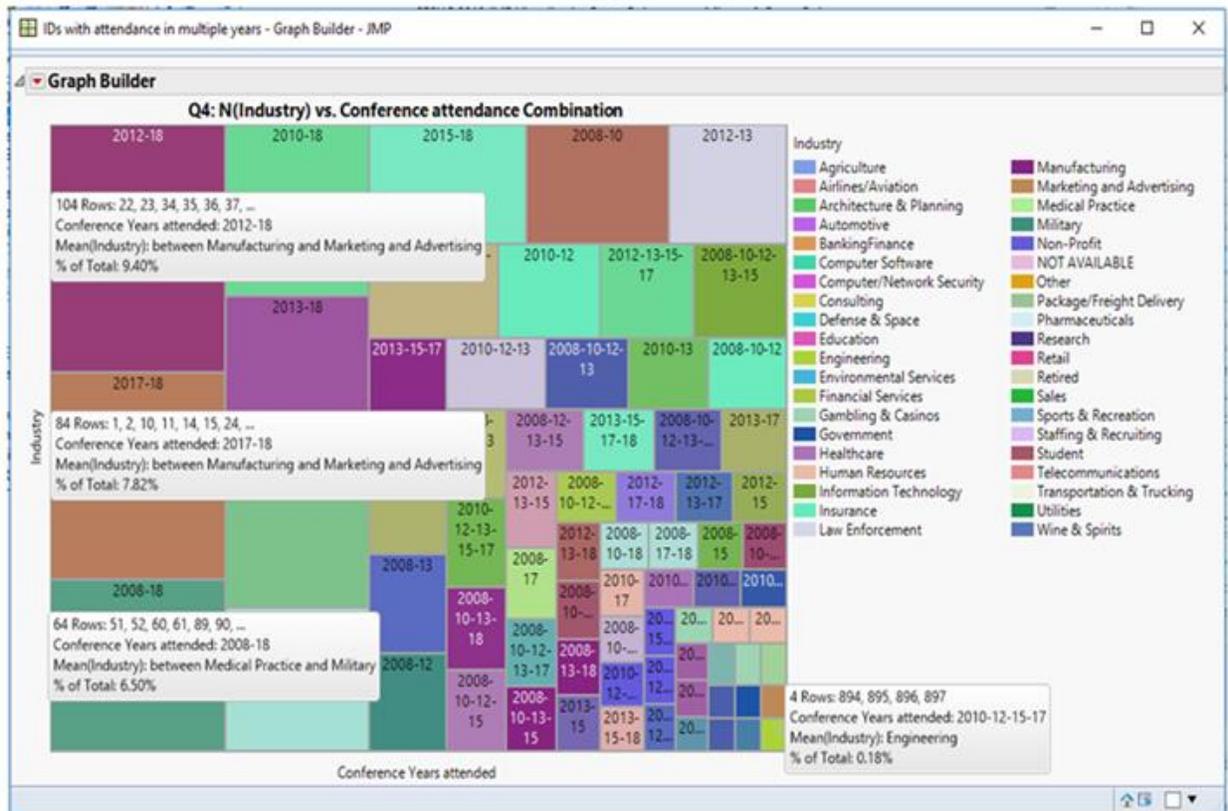
The Mean(Industry) arranged the rectangles according to the values of the summary statistic, sorted in descending order. This placed the largest rectangles in the top left corner of the plot and the smallest in the bottom right corner. Mean(Industry) summary statistic arranged the sizes of the rectangles according to the mean values within each industry. According to this criterion, the attendees of 2012 and 2018 conferences had the largest rectangles placed in the top left corner of the plot. Attendees of the 2010, 2012, 2015, and 2017 conferences had the smallest rectangles placed in the bottom right corner of the treemap. The rectangle sizes for the conference years attended also show their relative sizes in terms of the industries where they worked.

The CDF curves in Figure 6 shows that for St Pete Beach tended to be lower in 2018 versus 2008 and 2013. Therefore Days left to register increased for 2008 and 2013. The Savannah GA conference had higher proportions of registrations in 2015 than in 2010. The CDF curves for the Cary (2017) and Durham (2012) conferences were close together between 31 and 93 days of registration.

Figure 6. Cumulative Distribution Plots of Attendees Days Left to Register for the SESUG Conference Cities and Years
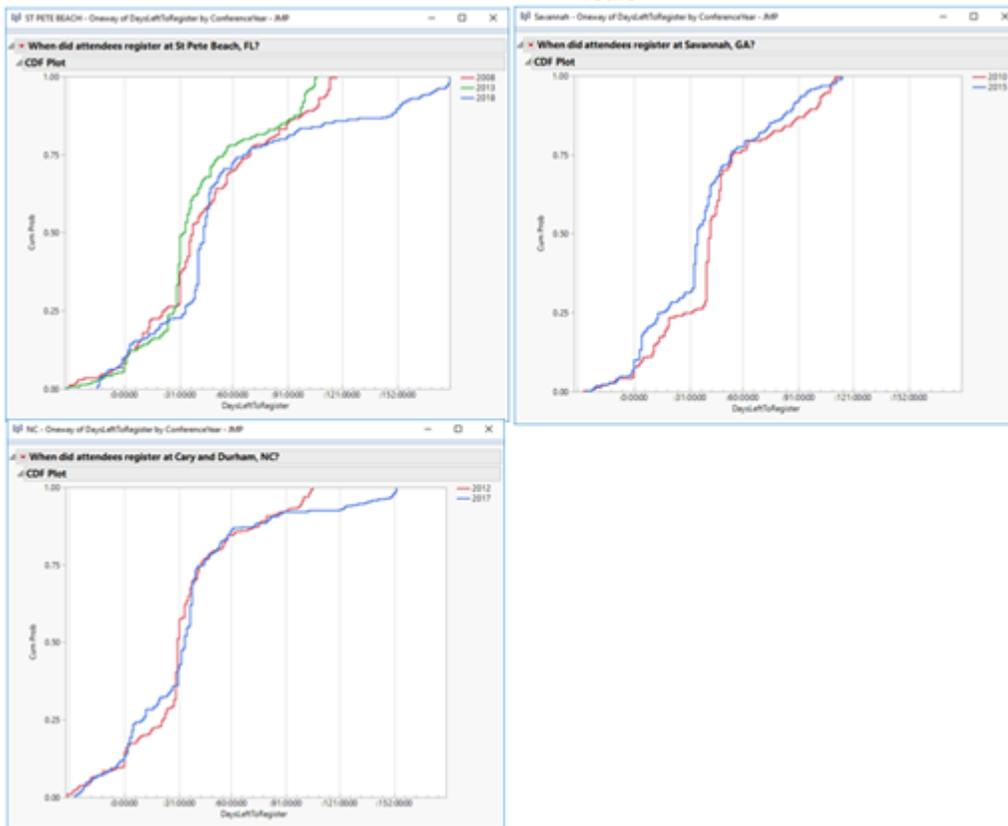
Figure 6 helps to answer question 2 comparing the times attendees registered for each conference site and year.

Below is the JSL to create CDF Plot for St Pete Beach :

```
/* modify the select where (:ConferenceCity) clause to choose the other conference
cities */
/********************************************
dt << select where (:ConferenceCity == "Savannah, GA") ;
dt << Subset( Output Table Name( "Savannah" ) );
dt << select where (:ConferenceCity == "Durham, NC" | :ConferenceCity == "Cary, NC") ;
dt << Subset( Output Table Name( "NC" ) );
Change the Set Title name for the other cities in the OutlineBox of the Oneway
analysis
{Set Title("When did attendees register at Conference City name?")}
*********************************************/
dt = Data Table ("sesug2018_datavisualization") ;
dt << select where (:ConferenceCity == "St. Petersburg, FL") ;
dt << Subset( Output Table Name( "ST PETE BEACH" ) );
dtsp = Data Table( "ST PETE BEACH" );
MyTitle = "When did attendees register?";
dtsp << Oneway( Y( :DaysLeftToRegister ), X( :ConferenceYear ),
All Graphs( 0 ), CDF Plot( 1 ), Points( 0 ), X Axis Proportional( 0 ),
Grand Mean( 0 ),SendToReport( Dispatch(
```

```
{}, "Oneway Analysis of DaysLeftToRegister By ConferenceYear",
OutlineBox, {Set Title( "When did attendees register at St Pete Beach, FL?") } ),
Dispatch( {}, "CDF Plot", OutlineBox, {SetHorizontal( 1 )} ),
Dispatch({"CDF Plot"}, "1",ScaleBox,
{Min( -2851200 ), Max( 15638400 ), Interval( "Month" ), Inc( 1 ),
Minor Ticks( 4 ), Label Row( {Automatic Tick Marks( 1 ), Inside Ticks( 1 ), Show Major
Grid( 1 )} )} ),
Dispatch( {"CDF Plot"}, "Oneway CDF", FrameBox, {Frame Size( 568, 463 )} ) ) );
```

SUMMARY AND CONCLUSIONS

Expressions columns, introduced in JMP version 12, are special case properties that allows pictures, lists, matrices, and other objects to be added to data tables. The additional capabilities available in JMP®'s local data filters, dynamic and interactive visualization functionality revealed valuable insights about attendees that were useful in planning future SESUG conferences.

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CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

Melvin Alexander

811 Milford Mill Road

Baltimore, MD 21208-4633

Phone: (410) 458-7129

E-mail: Melvin.Alexander@verizon.net

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ACKNOWLEDGMENTS

APPENDIX 1: Data Dictionary for SESUG 2018 SAS Dataset and Column Variables added using JMP Formulas

Data Dictionary for SESUG2018_DATAVISUALIZATION (Opened in JMP®)

Data collected through the SESUG conference registration system.

Variable	Type	Len	Format	Informat	Label	Comments
AttendeeRegistrationDate	Num	8	MMDDYY10.		Attendee Date of Registration	
ConferenceCity	Char	18			Conference City	
ConferenceYear	Char	4			Conference Year	
EarlyRegistrationEnd	Num	8	MMDDYY10.		End of Early Registration Period	
ID	Char	11			Attendee ID	Unique ID that may be duplicated across years.
IHUG	Char	15			Member of In-House User Group?	"NOT AVAILABLE" indicates a registrant did not specify on the registration form (missing).
Industry	Char	25	$25	$25.00	Industry of Attendee	"NOT AVAILABLE" indicates a registrant did not specify on the registration form (missing).
LUG	Char	15			Member of Local User Group?	"NOT AVAILABLE" indicates a registrant did not specify on the registration form (missing).
RegularRegistrationEnd	Num	8	MMDDYY10.		End of Regular Registration Period	
STATE	Char	2			Attendee State	
ZIPCODE	Char	5			Attendee ZIP Code	
DaysLeftToRegister	Num	14	day:hr:m	day:hr:m	Days Left To Register	:RegularRegistrationEnd - :AttendeeRegistrationDate
EarlyReg	Num	14	day:hr:m	day:hr:m	Early Registratyion	:RegularRegistrationEnd - :EarlyRegistrationEnd

APPENDIX 2: JSL Code to produce Figure 5

```
New Table( "Attendees of SESUGs for multiple years",          Add Rows( 484 ),
        New Script("Source",        Data Table( "Untitled 10" ) <<
Subset(   Output Table( "Attendees of SESUGs for multiple years" ),
              Rows(                       [2, 4, 5, 8, 17, 21, 25, 27, 33, 35, 36, 41, 43, 44, 45, 48, 49, 51,
                                    53, 54, 59, 61, 65, 67, 69, 70, 71, 77, 79, 82, 83, 86, 89, 91, 96,
```

```
                    98, 115, 119, 120, 122, 126, 128, 130, 137, 138, 139, 144, 146, 150,
                    151, 153, 155, 162, 164, 165, 174, 177, 185, 186, 193, 197, 204, 210,
                    215, 220, 224, 225, 227, 237, 240, 245, 246, 252, 256, 259, 261, 266,
                    271, 273, 276, 281, 286, 289, 292, 293, 295, 298, 304, 307, 316, 317,
                    320, 322, 324, 327, 328, 329, 330, 332, 333, 334, 338, 340, 352, 354,
                    356, 361, 364, 367, 369, 371, 372, 373, 375, 376, 387, 392, 396, 397,
                    399, 402, 408, 409, 411, 412, 413, 422, 429, 431, 432, 433, 435, 439,
                    440, 448, 460, 469, 475, 480, 483, 486, 487, 488, 493, 495, 509, 510,
                    523, 527, 532, 535, 537, 543, 546, 549, 551, 552, 557, 559, 563, 566,
                    567, 569, 576, 578, 580, 581, 596, 602, 604, 611, 617, 629, 632, 633,
                    635, 636, 640, 644, 646, 647, 650, 655, 660, 662, 669, 673, 675, 682,
                    685, 689, 692, 694, 697, 702, 704, 708, 713, 715, 717, 718, 719, 722,
                    728, 730, 732, 733, 740, 743, 749, 752, 756, 758, 759, 762, 763, 769,
                    770, 771, 773, 774, 776, 779, 780, 782, 793, 796, 798, 799, 802, 804,
                    809, 810, 811, 814, 815, 820, 827, 828, 833, 834, 835, 836, 844, 848,
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                    1020, 1021, 1022, 1024, 1026, 1027, 1034, 1035, 1040, 1048, 1057,
                    1059, 1063, 1065, 1067, 1068, 1070, 1073, 1075, 1082, 1084, 1085,
                    1086, 1087, 1101, 1102, 1106, 1117, 1119, 1123, 1124, 1125, 1129,
                    1132, 1136, 1137, 1138, 1142, 1143, 1147, 1152, 1153, 1155, 1156,
                    1157, 1160, 1164, 1166, 1169, 1171, 1172, 1173, 1177, 1186, 1189,
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                    1258, 1259, 1261, 1262, 1265, 1266, 1270, 1288, 1290, 1294, 1301,
                    1302, 1307, 1313, 1316, 1318, 1320, 1324, 1325, 1328, 1329, 1330,
                    1341, 1350, 1351, 1355, 1358, 1360, 1363, 1370, 1371, 1379, 1380,
                    1383, 1388, 1391, 1393, 1397, 1403, 1404, 1409, 1418, 1420, 1421,
                    1426, 1428, 1434, 1436, 1440, 1442, 1448, 1449, 1451, 1464, 1467,
                    1470, 1471, 1472, 1475, 1476, 1481, 1483, 1484, 1496, 1499, 1508,
                    1509, 1523, 1531, 1539, 1542, 1543, 1546, 1554, 1558, 1561, 1568,
                    1571, 1574, 1575, 1583, 1585, 1588, 1589, 1593, 1594, 1596, 1600,
                    1603, 1604, 1606, 1607, 1611, 1617, 1618, 1626, 1627, 1631, 1640,
                    1641, 1642, 1648, 1649, 1653, 1654, 1658, 1663, 1667, 1668, 1670,
                    1672, 1673, 1682, 1685, 1686, 1691, 1695, 1704, 1708, 1709, 1711,
                    1713]     ),
                Selected columns only( 0 )  )  ),
New Column( "ID", Character, "Nominal",
        Set Values({"0002", "0004", "0005", "0008", "0017", "0021", "0025", "0027", "0033",
                "0035", "0036", "0041", "0043", "0044", "0045", "0048", "0049", "0051",
                "0053", "0054", "0059", "0061", "0065", "0067", "0069", "0070", "0071",
                "0077", "0079", "0082", "0083", "0086", "0089", "0091", "0096", "0098",
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                "0793", "0796", "0798", "0799", "0802", "0804", "0809", "0810", "0811",
                "0814", "0815", "0820", "0827", "0828", "0833", "0834", "0835", "0836",
                "0844", "0848", "0861", "0864", "0865", "0877", "0885", "0886", "0888",
                "0891", "0895", "0896", "0903", "0906", "0921", "0924", "0925", "0931",
                "0938", "0939", "0949", "0956", "0959", "0963", "0964", "0966", "0969",
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                "0999", "1001", "1011", "1013", "1016", "1018", "1020", "1021", "1022",
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                2, 3, 2, 2]
        )
    ),
New Column( "Conference Years attended", Character, "Nominal",
        Formula(
                Char( :Name( "2008, St. Petersburg, FL" ) ) || "-" ||
                Char( :Name( "2010, Savannah, GA" ) ) || "-" ||
                Char( :Name( "2012, Durham, NC" ) ) || "-" ||
```

```
                    Char( :Name( "2013, St. Petersburg, FL" ) ) || "-" ||
                    Char( :Name( "2015, Savannah, GA" ) ) || "-" ||
                    Char( :Name( "2017, Cary, NC" ) ) || "-" ||
                    Char( :Name( "2018, St. Petersburg, FL" ) )
            ),
            Value Labels(
                    {"0-0-0-0-0-1-1" = "2017-18", "0-0-0-0-1-0-1" = "2015-18",
                    "0-0-0-0-1-1-0" = "2015-17", "0-0-0-0-1-1-1" = "2015-17-18",
                    "0-0-0-1-0-0-1" = "2013-18", "0-0-0-1-0-1-0" = "2013-17",
                    "0-0-0-1-0-1-1" = "2013-17-18", "0-0-0-1-1-0-0" = "2013-15",
                    "0-0-0-1-1-0-1" = "2013-15-18", "0-0-0-1-1-1-0" = "2013-15-17",
                    "0-0-0-1-1-1-1" = "2013-15-17-18", "0-0-1-0-0-0-1" = "2012-18",
                    "0-0-1-0-0-1-0" = "2012-17", "0-0-1-0-0-1-1" = "2012-17-18",
                    "0-0-1-0-1-0-0" = "2012-15", "0-0-1-1-0-0-0" = "2012-13",
                    "0-0-1-1-0-0-1" = "2012-13-18", "0-0-1-1-0-1-0" = "2012-13-17",
                    "0-0-1-1-1-0-0" = "2012-13-15", "0-0-1-1-1-1-0" = "2012-13-15-17",
                    "0-0-2-0-0-0-0" = "2012-12", "0-1-0-0-0-0-1" = "2010-18",
                    "0-1-0-0-0-1-0" = "2010-17", "0-1-0-0-0-1-1" = "2010-17-18",
                    "0-1-0-0-1-0-0" = "2010-15", "0-1-0-0-1-1-0" = "2010-15-17",
                    "0-1-0-1-0-0-0" = "2010-13", "0-1-0-1-0-0-1" = "2010-13-18",
                    "0-1-0-1-0-1-0" = "2010-13-17", "0-1-0-1-1-0-1" = "2010-13-15-18",
                    "0-1-0-1-1-1-0" = "2010-13-15-17", "0-1-1-0-0-0-0" = "2010-12",
                    "0-1-1-0-0-0-1" = "2010-12-18", "0-1-1-0-0-1-0" = "2010-12-17",
                    "0-1-1-0-1-1-0" = "2010-12-15-17", "0-1-1-1-0-0-0" = "2010-12-13",
                    "0-1-1-1-0-0-1" = "2010-12-13-18", "0-1-1-1-1-1-0" = "2010-12-13-15-17",
                    "1-0-0-0-0-0-1" = "2008-18", "1-0-0-0-0-1-0" = "2008-17",
                    "1-0-0-0-0-1-1" = "2008-17-18", "1-0-0-0-1-0-0" = "2008-15",
                    "1-0-0-0-1-1-1" = "2008-15-17-18", "1-0-0-1-0-0-0" = "2008-13",
                    "1-0-0-1-0-0-1" = "2008-13-18", "1-0-0-1-0-1-0" = "2008-15-17",
                    "1-0-0-1-0-1-1" = "2008-13-17-18", "1-0-1-0-0-0-0" = "2008-12",
                    "1-0-1-0-0-0-1" = "2008-12-18", "1-0-1-0-1-0-0" = "2008-12-15",
                    "1-0-1-1-0-0-0" = "2008-12-13", "1-0-1-1-1-0-0" = "2008-12-13-15",
                    "1-1-0-0-0-0-0" = "2008-10", "1-1-0-0-0-0-1" = "2008-10-18",
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                    "1-1-0-1-0-0-0" = "2008-10-13", "1-1-0-1-0-0-1" = "2008-10-13-18",
                    "1-1-0-1-0-1-2" = "2008-10-15-17-18-18", "1-1-0-1-1-0-0" =
                    "2008-10-13-15", "1-1-1-0-0-0-0" = "2008-10-12", "1-1-1-0-0-0-1" =
                    "2008-10-12-18", "1-1-1-0-1-0-0" = "2008-10-12-15", "1-1-1-0-1-1-0" =
                    "2008-10-12-15-17", "1-1-1-1-0-0-0" = "2008-10-12-13", "1-1-1-1-0-0-1"
                     = "2008-10-12-13-18", "1-1-1-1-0-1-0" = "2008-10-12-13-17",
                    "1-1-1-1-1-0-0" = "2008-10-12-13-15", "1-1-1-1-1-1-0" =
                    "2008-10-12-13-15-17", "1-1-1-1-1-1-1" = "2008-10-12-13-15-17-18",
                    "1-1-2-0-0-0-0" = "2008-10-12-12"}
            ),
            Use Value Labels( 1 )
        )
    )
)
;


Data Table( "Attendees of SESUGs for multiple years" ) <<
```

```
Join(
        With( Data Table( "sesug2018_datavisualization" ) ),
        Select( :ID, :N, :Conference Years attended ),
        SelectWith( :STATE, :Industry ),
        By Matching Columns( :ID = :ID ),
        Drop multiples( 0, 0 ),
        Include Nonmatches( 1, 0 ),
        Preserve main table order( 1 ),
        Output Table( "IDs with attendance in multiple years" )
);
Data  Table( "IDs with attendance in multiple years" )
<<
Graph Builder(
        Variables( X( :Conference Years attended ), Y( :Industry ), Color( :Industry ) ),
        Elements(
         Treemap(
           X,
           Y,
           Legend( 24 ), Layout( "Squarify" ) ) ),
        SendToReport(
                Dispatch(
                        {},
                        "graph title",
                        TextEditBox,
                        {Set Text( "Q4: N(Industry) vs. Conference attendance Combination" )}
                )
        )
);
```