

# Bar Charts and Frequency Distributions

Use to display the distribution of categorical (nominal or ordinal) variables. For the continuous (numeric) variables, see the page Histograms, Descriptive Stats and Stem and Leaf.

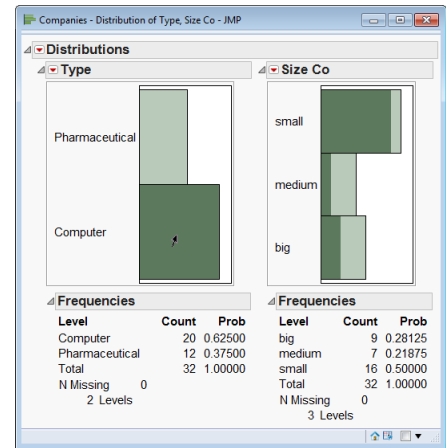
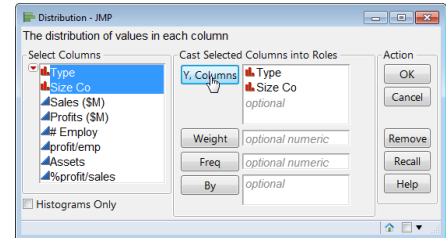
## Bar Charts and Frequency Distributions

1. From an open JMP data table, select **Analyze > Distribution**.
2. Click on one or more nominal or ordinal variables from **Select Columns**, and click **Y, Columns** (nominal variables have red bars, and ordinal variables have green bars).
3. If you have summarized data (a column with counts), enter the column into **Freq**.
4. Click **OK** to generate bar charts and frequency distributions for each variable.

### Tips:

- To change the display from vertical to horizontal, click on the top red triangle and select **Stack**.
- To change future output to horizontal, go to **Preferences > Platforms > Distribution**, click **Stack** and **Horizontal**, then click OK.
- To change the graphical display for a variable, or to select additional options, click on the **red triangle** for that variable.
- Click on bars in one graph to see the distribution the variable across other variables (dynamic linking).
- Categorical variables display in alphanumeric order. To change the display order, use the **Value Ordering** or **Row Order Levels** column property (right-click on the column, select **Column Info**, then **Column Properties**).

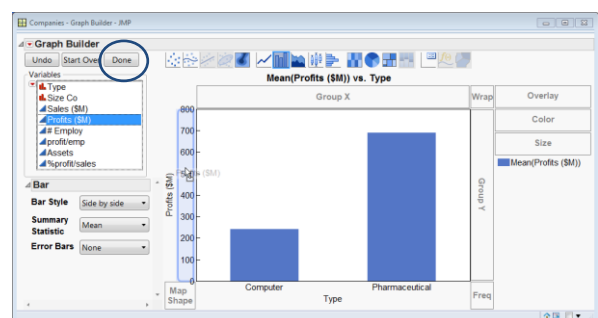
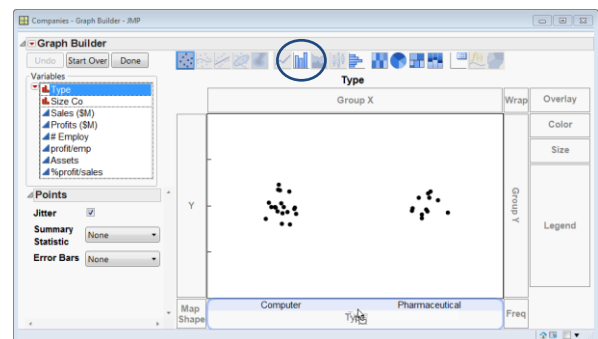
Example: Companies.jmp (Help > Sample Data)



## Bar Charts – Another Way

1. Select **Graph > Graph Builder**.
2. Click, then drag and drop a nominal variable from **Select Columns** to the X zone on the bottom of the graph.
3. Click on the bar chart icon above the graph.
4. Drag and drop a continuous weight variable from **Select Columns** to the Y zone on the left of the graph, or a drag and drop a count or frequency variable to the **Freq** field.
5. Select a statistic to be plotted from list of **Summary Statistics** (bottom left).
6. When finished, click **Done** (top left) to close the control panel.

Notes: Bar charts can also be created in the **Chart** platform (**Graph > Chart**). For more details on creating bar charts, see the book **Basic Analysis and Graphing** (under Help > Books).



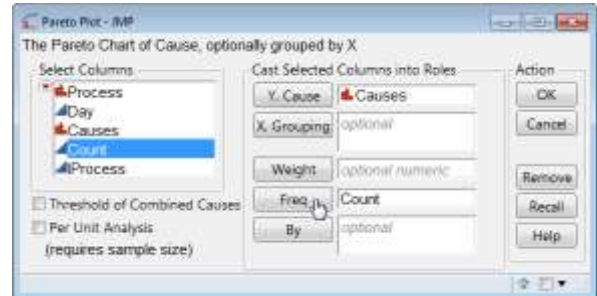
# Pareto Plots and Pie Charts

Use to display the distribution of categorical (nominal or ordinal) variables. Pareto plots sort in descending order of frequency of occurrence or weight (value).

## Pareto Plots

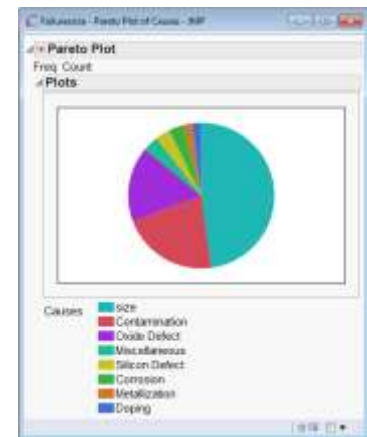
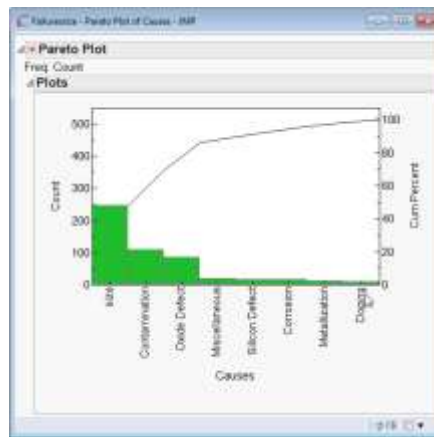
1. Select **Analyze > Quality and Process > Pareto Plot**.
2. Click on a nominal variable from **Select Columns**, and click **Y, Cause** (nominal variables have red bars, ordinal variables have green bars).
3. If you have summarized data, enter the Count column into **Freq**.
4. Click **OK** to generate the Pareto plot.

Example: Failuresize.jmp (Help > Sample Data)



## Tips:

- To change the display or select additional options, click on the **red triangle**.
- To change the display from a Pareto plot to a pie chart, click on the **red triangle** and select **Pie Chart**.
- To label a bar or slice of the pie, right-click on the category and select **Causes > Label**.



## Pie Charts – Another Way

1. Select **Graph > Chart**.
2. Click on a nominal variable from **Select Columns**, and click **Categories, X, Levels**.
3. If you have summarized data, click on the **blue triangle** next to **Additional Roles**, and enter the Count column into **Freq**.
4. Under **Options**, click on the **small black triangle** next to **Bar Chart** and select **Pie Chart**.
5. Click **OK** to generate the pie chart.
6. To change the display from a pie chart to a bar chart, click on the **red triangle** and select **Pie Chart**.



Notes: Bar charts can also be produced from **Analyze > Distribution** or **Graph > Graph Builder**. For more details on creating pie charts and Pareto plots, see the books *Basic Analysis and Graphing* and *Quality and Reliability Methods* (under **Help > Books**).

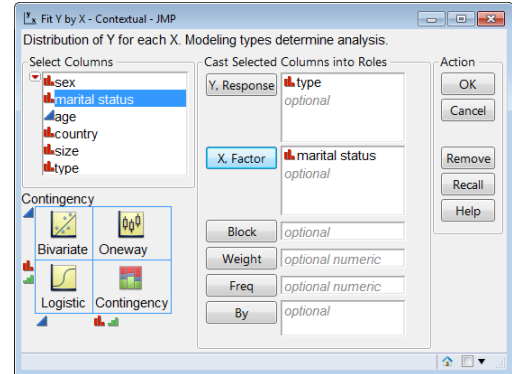
# Mosaic Plot and Contingency Table

Use to examine the relationship between two categorical variables. A contingency table shows the frequency distribution of the variables in a matrix format, while a mosaic plot graphically displays the information.

## The Contingency Table Analysis

1. Select **Analyze > Fit Y by X**.
2. Click on a categorical variable from **Select Columns**, and click **Y, Response** (categorical variables have red or green bars).
3. Click on another categorical variable and click **X, Factor**.
4. Click **OK**. The Contingency Analysis output will display.

Example: Car Poll.jmp (Help > Sample Data)

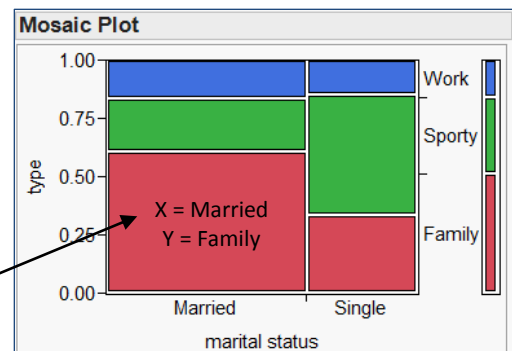


## Mosaic Plot

The mosaic plot is a side-by-side divided bar chart that allows you to visually compare proportions of levels of one variable across the levels of a second variable.

Interpretation:

1. The widths of horizontal bars represent the proportions of the levels of the X variable (in this example, marital status).
2. The heights of vertical bars on the far right represent the proportions of the levels of the Y variable (type).
3. The cells in the plot represent the proportions for every combination of category levels. In this example, Married and Family is the largest overall proportion.



## Contingency Table

The body of the contingency table displays:

- **Count** – the cell frequencies (counts).
- **Total %** - the cell's percentage of the total count.
- **Col %** - the cell's percentage of the count for the column. The column variable is the Y variable, type.
- **Row %** - the cell's percentage of the count for the row. The row variable is the X variable, marital status.

The borders of the contingency table display the column totals (across the bottom), row totals (on the right), and the grand total (lower right corner).

		type			
		Family	Sporty	Work	
marital status	Married	119 39.27 76.77 60.71	45 14.85 45.00 22.96	32 10.56 66.67 16.33	196 64.69
	Single	36 11.88 23.23 33.64	55 18.15 55.00 51.40	16 5.28 33.33 14.95	107 35.31
		155 51.16	100 33.00	48 15.84	303

Tips:

- Click on the **red triangle next to Contingency Table** to select or deselect display options.
- **Right-click** on the mosaic plot to change colors (**Set Colors**) or label cells (**Cell Labeling**).

Note: See the **Basic Analysis and Graphing** book (under **Help > Books**) for more details.

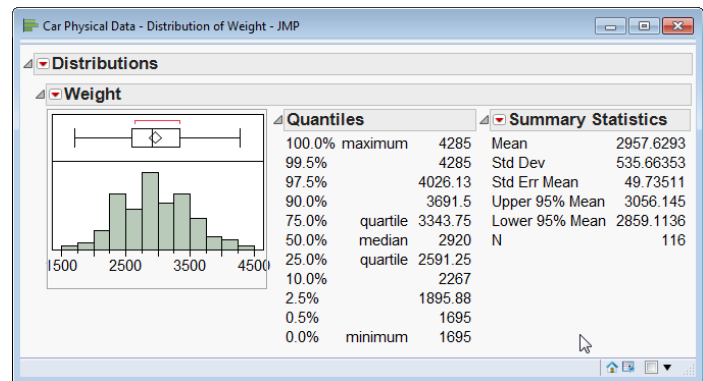
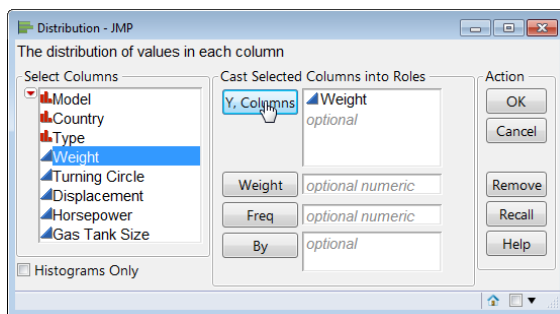
# Histograms, Descriptive Statistics, and Stem and Leaf

Use to display and describe the distribution of continuous (numeric) variables. Histograms and stem and leaf plots allow you to quickly assess the shape, centering and spread of a distribution. For categorical (nominal or ordinal) variables, see the page **Bar Charts and Frequency Distributions**.

## Histograms and Descriptive Statistics

1. From an open JMP® data table, select **Analyze > Distribution**.
2. Click on one or more continuous variables from **Select Columns**, and click **Y, Columns** (continuous variables have blue triangles).
3. Click **OK** to generate a histogram, outlier box plot and descriptive statistics.
  - The percentiles, including quartiles and the median, are listed under **Quantiles**.
  - The sample mean, standard deviation and other statistics are listed under **Summary Statistics**.

Example: Car Physical Data.jmp (Help > Sample Data)



### Tips:

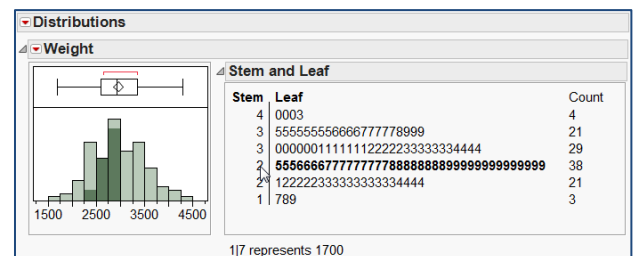
- To change the display from vertical to horizontal (as shown), click on the **top red triangle** and select **Stack**.
- To change the graphical display for a variable, or to select additional options, click on the **red triangle** for that variable.
- To display different summary statistics, use the **red triangle** next to **Summary Statistics**.
- To change all future output to horizontal, go to **Preferences > Platforms > Distribution**, click **Stack** and **Horizontal**, then click **OK**.

## Stem and Leaf Plot

To generate a stem and leaf plot, click on the **red triangle** for the variable and select **Stem and Leaf**.

### Tips:

- A key to interpret the values is at the bottom of the plot. The top value in this example is 4300, the bottom value is 1700 (values have been rounded to the nearest 100).
- Click on values in the stem and leaf plot to select observations in both the histogram and the data table. Or, select bars in the histogram to select values in the stem and leaf plot and data table.



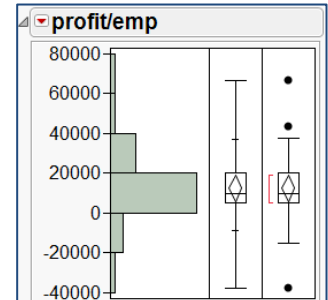
Note: For more information, see the book **Basic Analysis and Graphing** (under **Help > Books**).

# Box Plots

Use to display the distribution of continuous variables. They are also useful for comparing distributions.

## Box Plots – One Variable

1. From an open JMP® data table, select **Analyze > Distribution**.
2. Click on one or more continuous variables from **Select Columns**, and Click **Y, Columns** (continuous variables have blue triangles).
3. Click **OK**. An outlier box plot is displayed by default next to the histogram (or above if horizontal layout). To display a quantile box plot, select the option from the **red triangle** for the variable.



The lines on the Quantile Box Plot correspond to the quantiles in the distribution output.

Quantiles		
100.0%	maximum	66530.1
99.5%		66530.1
97.5%		66530.1
90.0%		36859.4
75.0%	quartile	20481.3
50.0%	median	9975.31
25.0%	quartile	5421.51
10.0%		-8428.6
2.5%		-37800
0.5%		-37800
0.0%	minimum	-37800

**Quantile Box Plot**

**Outlier Box Plot**

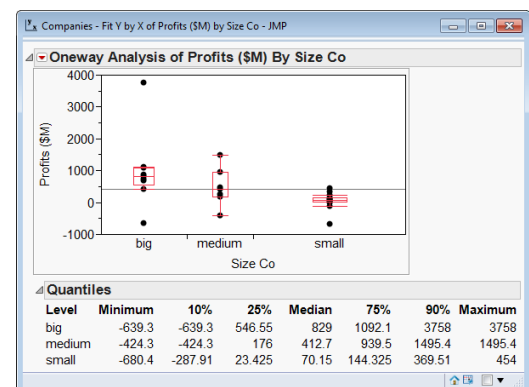
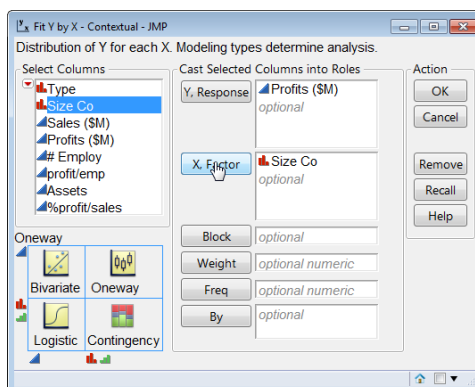
The Outlier Box Plot shows the box, plus:

- IQR = the 3<sup>rd</sup> quartile minus the 1<sup>st</sup> quartile.
- Whiskers drawn to the furthest point within 1.5 x IQR from the box.
- Potential outliers (disconnected points).
- A red bracket defining the shortest half of the data (the densest region).

## Box Plots – Two Variables

1. Select **Analyze > Fit Y by X**.
2. Click on a continuous variable from **Select Columns**, and Click **Y, Response**.
3. Click on a categorical variable and click **X, Factor** (categorical variables have red or green bars).
4. Click **OK**. The Oneway Analysis output window will display.
5. Click on the **red triangle**, and select **Display Options > Box Plots** to display quantile box plots, or select **Quantiles** to display both box plots and quantiles (shown right).

Example: Companies.jmp  
(Help > Sample Data)



Notes: Box plots for one or more variables can also be generated from **Graph > Graph Builder**. For more information on box plots, see the book *Basic Analysis and Graphing* (under **Help > Books**).

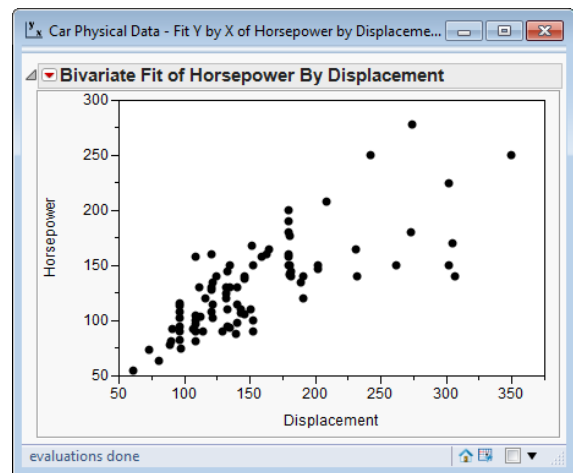
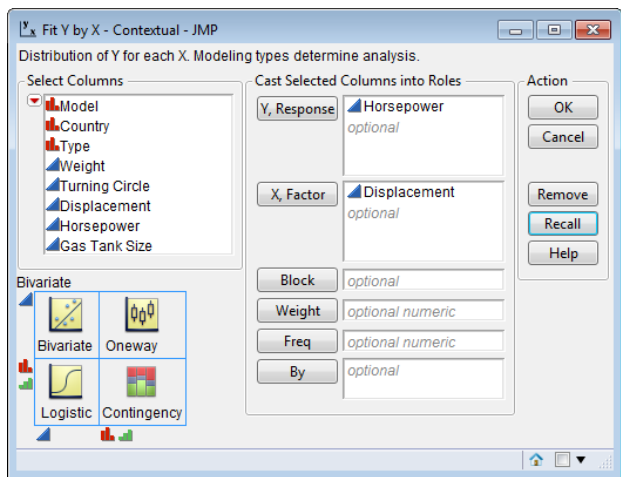
# Scatterplots

Use to display the relationship between two continuous variables. Continuous variables have blue triangles.

## Scatterplots – Two Variables

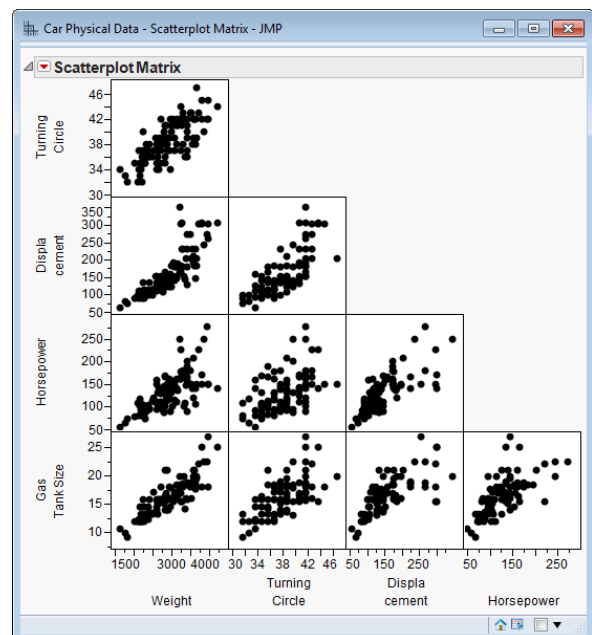
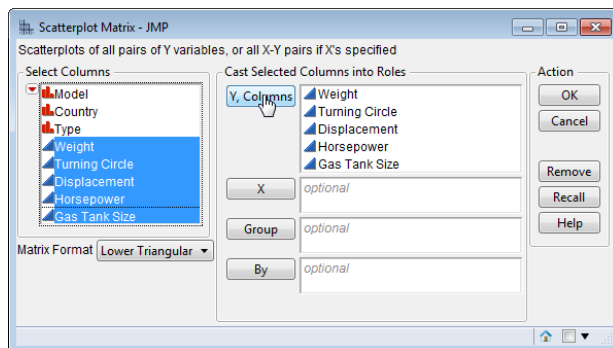
1. From an open JMP® data table, select **Analyze > Fit Y by X**.
2. Click on a continuous response (or dependent) variable in **Select Columns**, and Click **Y, Columns**.
3. Click on a continuous predictor (or independent) variable, and click **X, Factor**.
4. Click **OK** to generate a scatterplot.

Example: Car Physical Data.jmp (under Help > Sample Data)



## Scatterplots – More than Two Variables

1. Select **Graph > Scatterplot Matrix**.
2. Select all continuous responses of interest, and click **Y, Columns**.
3. Click **OK** to generate the scatterplot matrix.



Notes: Scatterplots and scatterplot matrices can also be generated from **Analyze > Multivariate Methods > Multivariate** and from **Graph > Graph Builder**. For more information, see the book *Basic Analysis and Graphing* (under **Help > Books**).

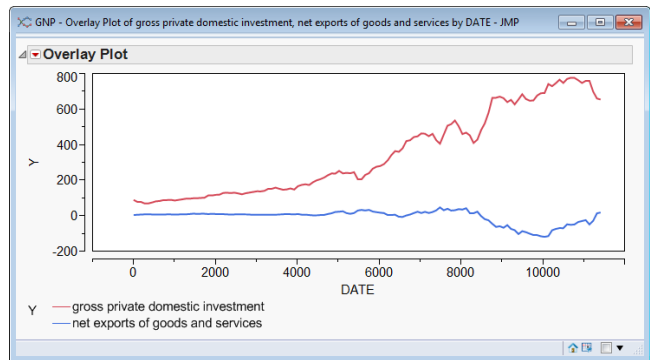
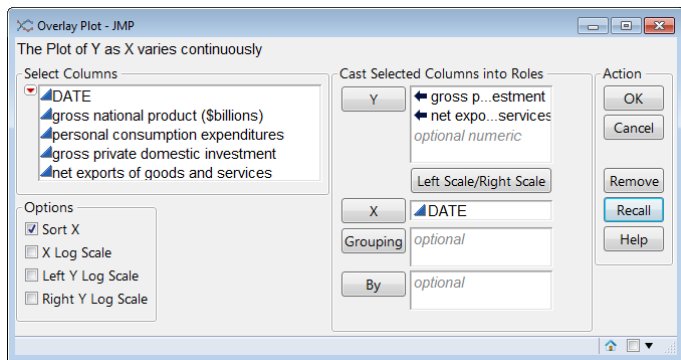
## Run Charts (Line Graphs)

Use to display continuous data in time sequence.

### Run Charts (Overlay Plot)

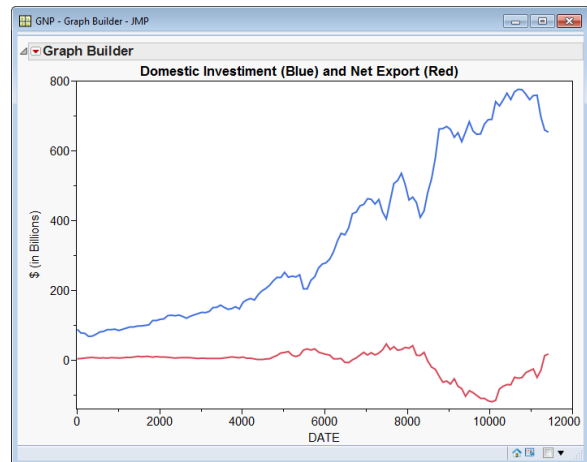
1. Select **Graph > Overlay Plot**.
2. Select one or more continuous variables from **Select Columns** and click **Y**.
3. If you have a column that indicates time ordering, enter the column into **X**, and click **OK**.
4. Click on the **red triangle** and select **Y Options > Connect Points** to draw a line through the points, and **Y Options > Show Points** to hide the points.
5. Right-click on the graph to change graph properties (select **Line Width Scale** to change the line thickness).

Example: GNP.jmp (under Help > Sample Data)



### Run Charts – Another Way (Graph Builder)

1. From an open JMP® data table, select **Graph > Graph Builder**.
2. Drag a variable (or multiple variables at once) from the **Variables** list and drop in the **Y zone**.
3. Drag and drop a variable indicating the time ordering in the **X zone**.
4. Click on the **Line icon** in the graph pallet (top middle).
5. Click **Done**, and fine tune as desired (see tips below).



Tips:

- Right-click on the graph and select **Graph** to change the line thickness or other graph properties.
- Click on the **graph title** or **axis labels** to change, or double-click on an axis to change the **scaling**.
- Click on the **red triangle** next to Graph Builder to re-open the control panel, hide the legend, and more.

Notes: Run charts can also be produced from the Control Chart platform (**Analyze > Quality and Process > Control Chart > Run Chart**). For more information on creating line graphs or run charts, see the books *Basic Analysis and Graphing* and *Quality and Reliability Methods* (under Help > Books).

# Interactive Graphing with Graph Builder

Use Graph Builder to interactively create graphs for one or more variables, including line plots, splines, box plots, bar charts, histograms, mosaic plots, maps and more.

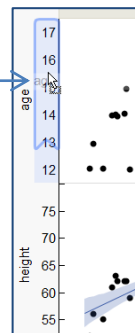
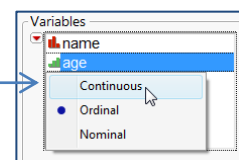
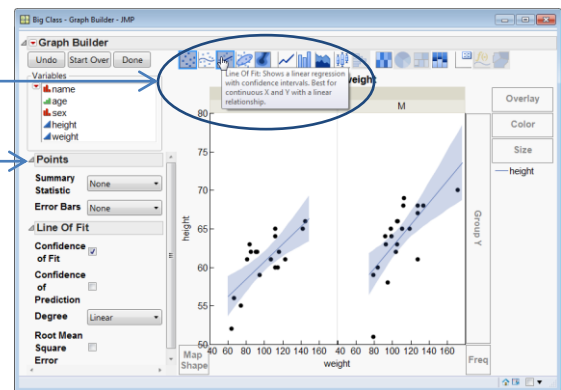
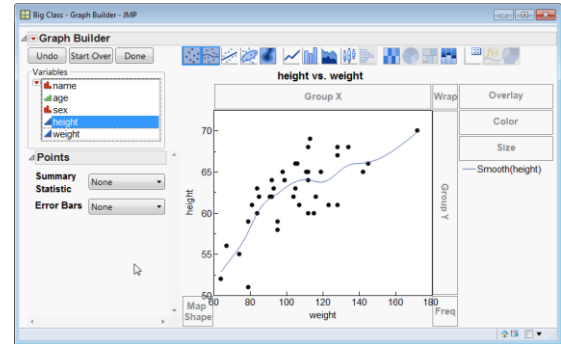
## Drag and Drop to Visualize Data

1. From an open JMP® data table select **Graph > Graph Builder**.
2. Drag a variable from the **Variables** list and drop it in the desired drop zone. In the examples (right), Weight is in the **Y** zone and Height is in the **X** zone.
3. To add a grouping variable, drag and drop a variable in the **Group X** or **Group Y** zone. In the example, Sex is in the **Group X** zone.
4. To change the graphical display, **click on a graph element icon**. Or, click and drag an icon onto a graph frame. Here, Line of Fit has been selected.
5. Change **Summary Statistics** and other display options for the selected graph elements.
6. Click the **Done** button (top left) when finished.

### Tips:

- Right-click in the graph to change graph properties.
- To replace a variable with a new variable, drag the new variable and drop it in the center of the drop zone.
- By default, Graph Builder displays data points. If continuous variables are in both the X and Y zones a smooth spline will display ( $\lambda = 0.05$ ).
- More than one variable can be assigned to an X or Y zone, or to a group zone. Drag a variable to either side of the existing variable in the zone – a blue ribbon will indicate where the new variable will be placed when dropped.
- To change the modeling type (to use different graph elements), right-click on the variable and select the new data type (if available).

Example: Big Class.jmp (under Help > Sample Data)



### Other Drop Zones:

- Drop a variable in **Wrap** to trellis the graph horizontally and vertically.
- Drop a variable in **Color** to create a legend and color by values of the variable.
- Drop a variable in **Overlay** to color and overlay graphs for each value of the variable on one graph.
- If data has been summarized (a frequency variable exists), drag the variable to the **Freq** zone.
- If a column defines a physical shape, drag the variable to **Shape** to create a map (shape files must exist).
- Drop a variable in **Size** to scale markers or map shapes according to the value of the size variable.

Note: Instructions also apply to the **iPad® Graph Builder Application** (see [jmp.com/iPad](http://jmp.com/iPad)). For more details on creating interactive graphics with the Graph Builder, see the book **Basic Analysis and Graphing** (under **Help > Books**) and other one-page guides (at [jmp.com/learn](http://jmp.com/learn)).



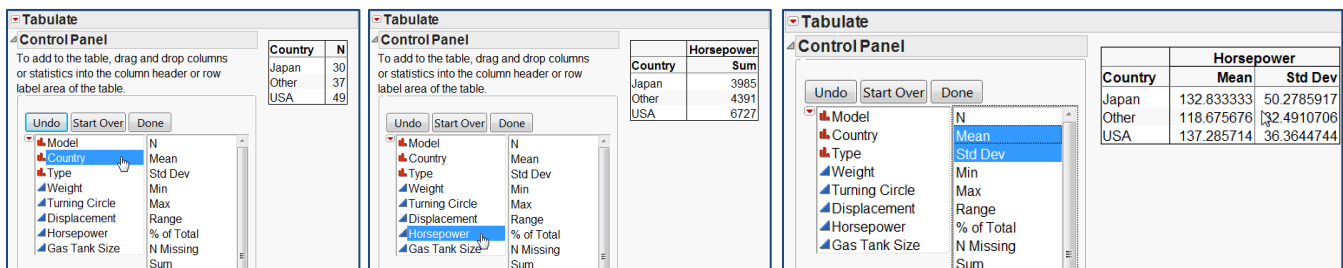
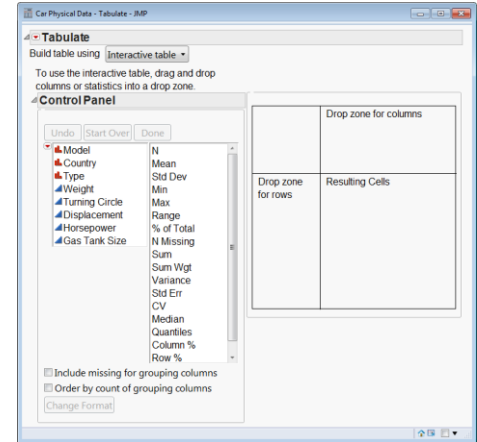
# Summarizing Data Using Tabulate

Use Tabulate to interactively summarize data and construct tables of descriptive statistics.

## Drag and Drop to Summarize Data

- From an open JMP® data table select **Tables > Tabulate**.
- Drag and drop variables from the column list to the drop zone for rows and columns.
  - Country** (below, left) is in the rows drop zone – the number of observations per country is displayed.
  - Horsepower** (middle) is in the columns drop zone as an analysis column – the sum for horsepower is displayed for each country.
- Drag and drop one or more summary statistics from the middle panel into the results area. **Mean** and **Std Dev** are displayed for each country (below, right).

Example: Car Physical Data.jmp (Help > Sample Data)



### Tips:

- Click **Undo** to reverse the last change, or use **Start Over** to clear the display.
- Click and drag variables in the table to rearrange, or right-click on a variable to delete or change the format.
- To change the numeric formats (i.e., decimal places), use **Change Format** at the bottom of the window and select the desired format.
- To add **new summary panels** to the table, drag and drop the new variable to the bottom or left of the table. Here, Type has been added to the bottom of the original table.
- To add **additional row or column variables**, drag and drop a new variable on either side of the current variable in the table. Here, Type has been added next to Country and Horsepower has been added next to Weight.
- To create a data table, click **Done**, then select **Make Into Data Table** from the **top red triangle**.

Country	Horsepower	
	Mean	Std Dev
Japan	132.83	50.28
Other	118.68	32.49
USA	137.29	36.36
Type		
Compact	124.86	21.63
Large	139.76	26.25
Medium	152.90	43.54
Small	88.82	16.62
Sporty	137.56	42.86

Country	Type	Weight		Horsepower	
		Mean	Std Dev	Mean	Std Dev
Japan	Compact	2925.00	182.55	127.33	22.03
	Large	3506.25	256.66	125.25	22.20
	Medium	3559.17	334.64	199.33	52.24
	Small	2196.43	337.17	87.14	23.98
Other	Sporty	2690.00	444.43	129.60	36.81
	Compact	2855.00	137.86	130.50	20.49
	Large	3460.00	.	90.00	.
	Medium	3159.38	248.98	143.63	34.77
USA	Small	2243.75	141.29	87.33	12.43
	Sporty	2635.00	263.63	134.50	31.37
	Compact	2701.43	178.65	114.14	22.49
	Large	3724.17	301.01	148.75	21.86
	Medium	3282.19	303.74	140.13	33.29
	Small	2401.67	138.95	98.67	12.50
	Sporty	2988.64	226.15	145.91	52.44

Note: For more details, see the book *Using JMP* (under **Help > Books**).

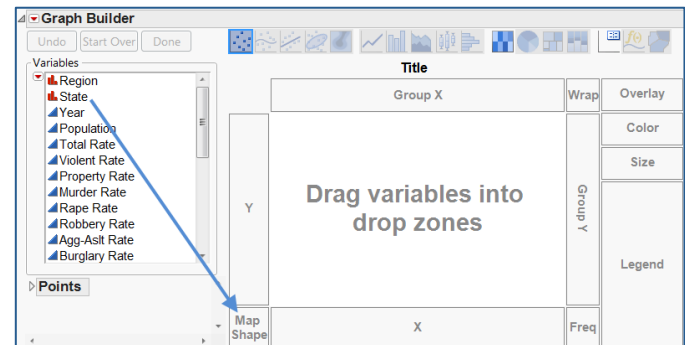
# Mapping in Graph Builder

Use the Graph Builder to create interactive maps of U.S. states, U.S. counties, and worldwide countries and provinces. JMP® ships with these shape files, and you can use other shape files (for example ESRI) or create your own custom maps. See the page **Interactive Graphing with Graph Builder** for general information on using the Graph Builder.

## Basic Mapping

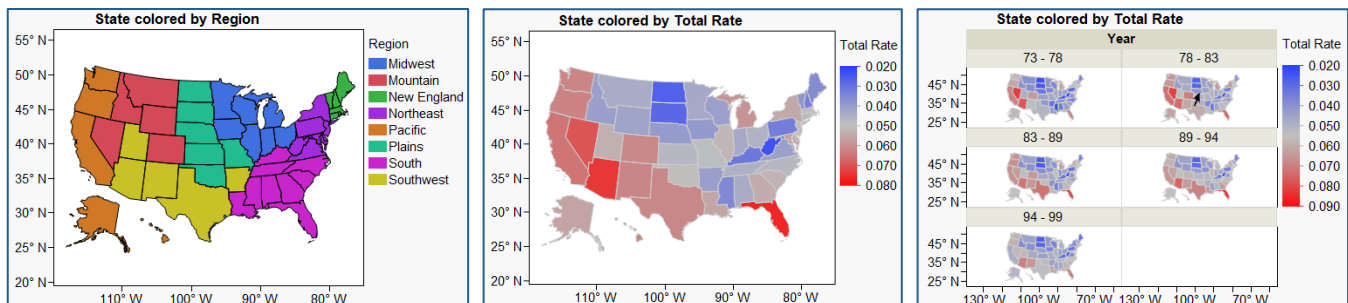
1. From an open data table, select **Graph > Graph Builder**.
2. Drag a shape variable from the **Variables** list (for example, State) to the map shape drop zone.
3. Drag variables into other drop zones until the desired map is produced.
4. Use the **Undo** and **Start Over** buttons to try several options. Click **Done** when finished.

Example: CrimeData.jmp (Help > Sample Data)



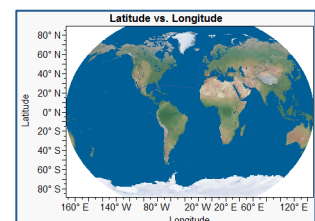
The resulting display depends on the modeling type of the variables and the drop zone(s) used. Examples:

- Left: Region (Nominal) was dropped in the Color zone.
- Middle: Total Rate (Continuous) was dropped in the Color zone.
- Right: Total Rate was dropped in the Color zone, and Year (Continuous) was dropped in the Wrap zone.



### Tips:

- Right-click on the legend to change the color gradient or transparency.
- Use the **Data Filter** or **Local Data Filter** to dynamically select, show and include values of selected variables. The Data Filter, under the Rows menu, is a global filter (selections apply to the data table and all open windows). The Local Data Filter applies to only the active window (from the window red triangle, select **Script > Local Data Filter**). See “data filter” in JMP Help for additional information.
- If your data set contains latitudinal and longitudinal data, you can add a background map or image. Drag these variables to the X and Y zones, right-click on the graph, select **Graph > Background Map** and choose the desired image. Double-click on the axes to change the scale to geodesic, add grid lines or make other changes.



Notes: To draw a map, shape files must exist for the shape variable selected. For more information on mapping, such as creating custom maps, using other shape files or working with background maps, search for “creating maps” in JMP Help or in the book **Basic Analysis and Graphing** (under **Help > Books**).