

Data Visualization and Iconographics

Microsoft Excel 2010

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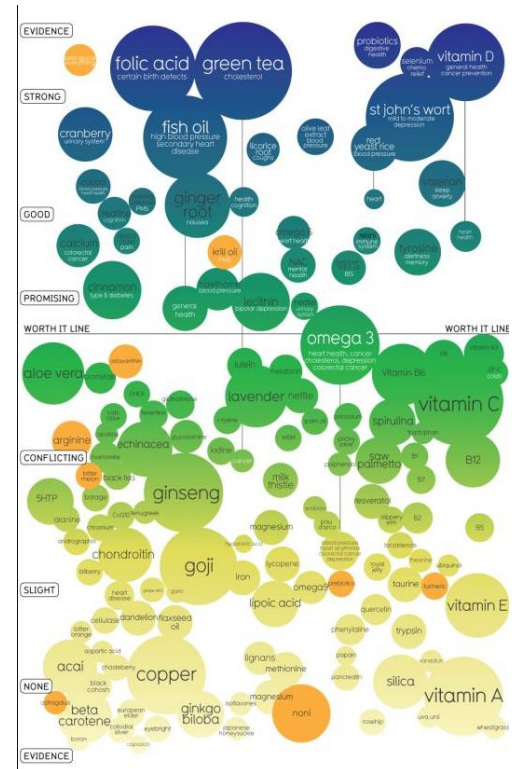
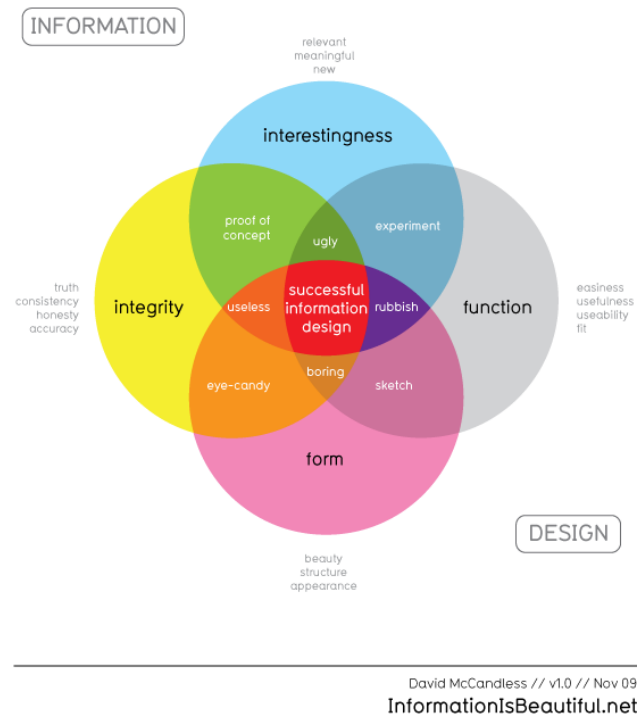
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Data Visualization and Iconographics

For good data visualization, it must be both be interesting (meaningful & relevant) and have integrity (accuracy and consistency).

What Makes Good Information Design?



Things to consider for the right type of visualization:

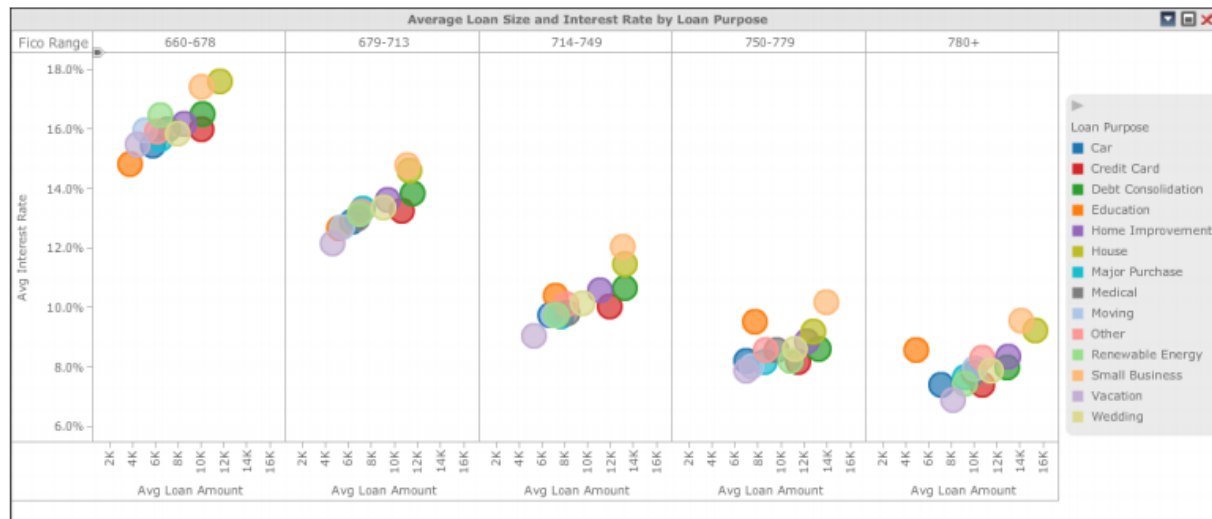
- What kind of relationship are you exploring?
- How many variables?
- What can you simplify?
- Compare your data to similar visualizations

Why We Visualize

Good Visualizations Should Make Data Actionable

Data Visualization and Iconographics

	A	B	C	D	E	F	G	H	I	J	K
1	Fico Range	660-678		679-713		714-749		750-779		780+	
2	Loan Purpose	Avg Loan Amount	Avg Interest Rate	Avg Loan Amount	Avg Interest Rate	Avg Loan Amount	Avg Interest Rate	Avg Loan Amount	Avg Interest Rate	Avg Loan Amount	Avg Interest Rate
3	Car	\$5,826	15.4%	\$6,334	12.9%	\$6,761	9.7%	\$7,020	8.2%	\$7,131	7.4%
4	Credit Card	\$10,073	16.0%	\$10,636	13.2%	\$11,937	10.0%	\$11,464	8.2%	\$10,670	7.4%
5	Debt Consolidation	\$10,143	16.5%	\$11,557	13.8%	\$13,211	10.6%	\$13,276	8.6%	\$12,899	8.0%
6	Education	\$3,784	14.8%	\$5,153	12.7%	\$7,185	10.4%	\$7,689	9.5%	\$4,913	8.6%
7	Home Improvement	\$8,551	16.2%	\$9,434	13.6%	\$11,039	10.6%	\$12,206	8.9%	\$12,974	8.4%
8	House	\$11,665	17.6%	\$11,297	14.6%	\$13,300	11.4%	\$12,778	9.2%	\$15,334	9.2%
9	Major Purchase	\$6,442	15.7%	\$7,273	13.3%	\$7,663	9.7%	\$8,536	8.1%	\$9,228	7.6%
10	Medical	\$7,115	16.0%	\$6,825	13.0%	\$8,281	9.8%	\$9,585	8.6%	\$9,925	7.8%
11	Moving	\$5,124	16.0%	\$5,492	12.7%	\$6,999	9.7%	\$7,477	8.0%	\$10,009	7.9%
12	Other	\$6,151	15.9%	\$7,082	13.2%	\$8,125	10.1%	\$8,711	8.6%	\$10,725	8.3%
13	Renewable Energy	\$6,472	16.5%	\$6,995	13.1%	\$7,296	9.7%	\$10,840	8.2%	\$9,202	7.4%
14	Small Business	\$10,071	17.4%	\$11,091	14.8%	\$13,108	12.0%	\$13,898	10.2%	\$14,099	9.6%
15	Vacation	\$4,458	15.5%	\$4,644	12.1%	\$5,324	9.1%	\$6,969	7.9%	\$8,178	6.9%
16	Wedding	\$8,002	15.9%	\$9,028	13.4%	\$9,589	10.1%	\$11,219	8.6%	\$11,414	7.9%



Which is better, all the numbers or the graphics? What story does this tell?

Types of Data

Qualitative (Attributes)

- Nominal
- Ordinal

Quantitative (Metrics)

- Numeric

Nominal Attributes

Data that be counted, but not ordered or aggregated (grouped into classes or clusters).

Examples:

- Products – Books, Movies, Music
- Gender – Male, Female
- State – Virginia, Nevada, California

What are some for your data?

Ordinal Attributes

Data that can be counted and ordered, but not aggregated

Examples:

- Date – 1/1/2014, 1/2/2014...
- Grades – A, B, C...
- Ranks – Like, Neutral, Dislike

What are some for your data?

Metrics

Quantitative data that can be counted, ordered, and aggregated.

Examples:

- Revenue, Cost, Profit
- Number of Customers
- Temperature
- Time

What are some for your data?

Ordinal Attributes and Metrics

Some data can be used as either attributes or metrics. Their classification is dependent on usage.

Examples:

- Age
- Scores

What are some for your data?

Visualizations

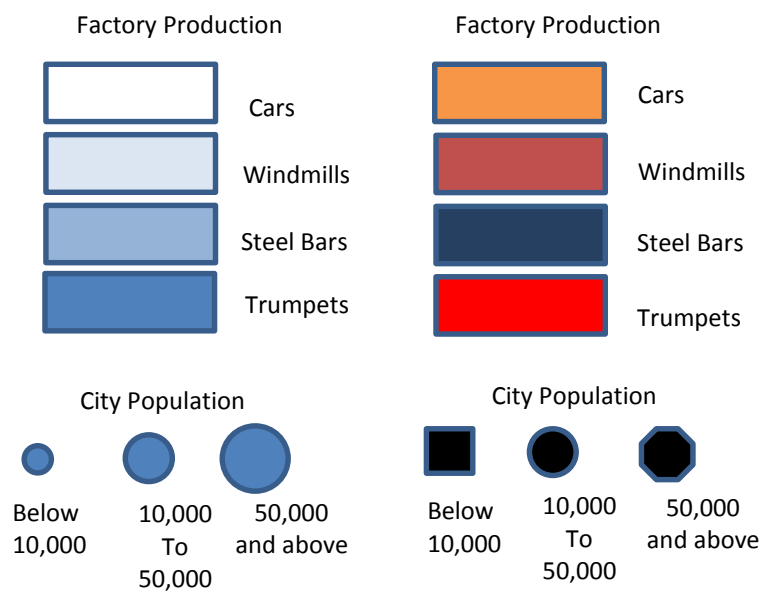
	Metric	Attribute (Ordinal)
Attribute (Nominal)	Bar Heatmap	Line (with Groups) Bar (with Groups)
Attribute (Ordinal)	Column Line	Scatter Grid
Metric	Scatter/ Bubble	

Data Visualization and Iconographics

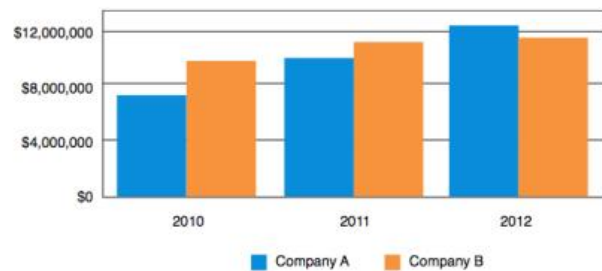
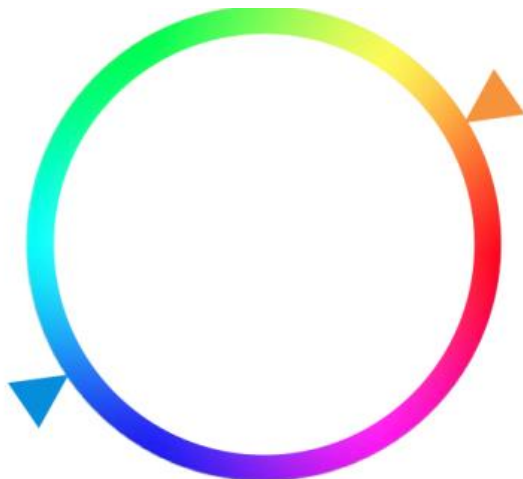
Appropriate Visual Enhancements

	Attribute (Nominal)	Attribute (Ordinal)	Metric
Color Hue	X	X	X
Color Saturation		X	X
Size		X	X

Use the right color scheme and icons for the right situation. Which icons or colors are better in the graphics below:

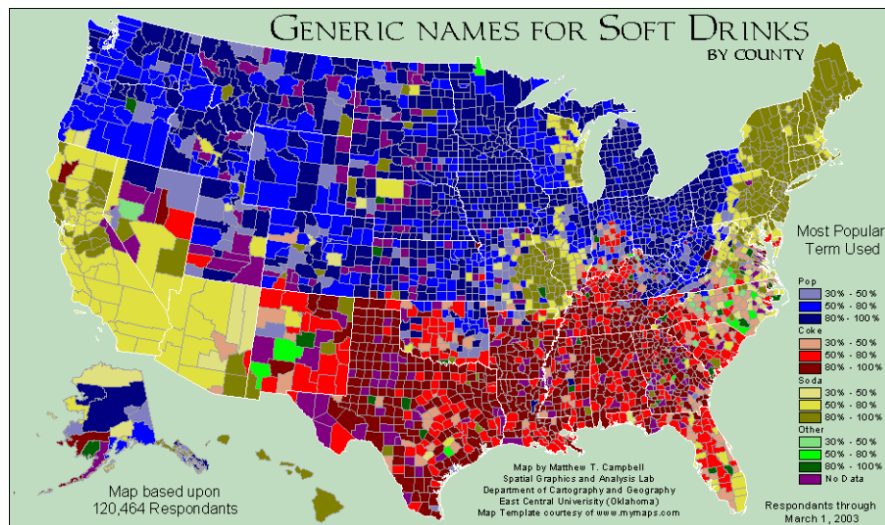


Use Opposing Colors for Comparisons



Data Visualization and Iconographics

A combination of shading and different colors



Building Blocks of Design

- Visual Elements – Create a focal point
- Typography -- Avoid defaults, but keep it simple
- Space – Use negative space (around the edges of design)

Work with natural reading habits.

- Design flow: top to bottom, left to right
- Use font/graphic size/weight to indicate importance
- Use colors/bolding strategically

Limit the number of competing elements

- 2-3 typefaces – derive variety within these typefaces (for you, it will be one!)

Places to go for Data Visualization:

- Google Public Data Explorer

What different types of graphs and where to use them

To paraphrase Scotty from Star Trek, “The right graph for the right application”. Picking the right graph for the situation will do miles of work for you. What are you trying to accomplish? Showing growth? Showing a trend? Showing magnitude? There are graphs for that!

Bar Graphs

The bars’ heights are scaled according to their values and the bars can be compared to each other. Bar graphs can be drawn in a 3-dimensional way and compiled for data comparison about the same thing or location. So that more important categories are emphasized, bars in a bar graphs are arranged in order of frequency.

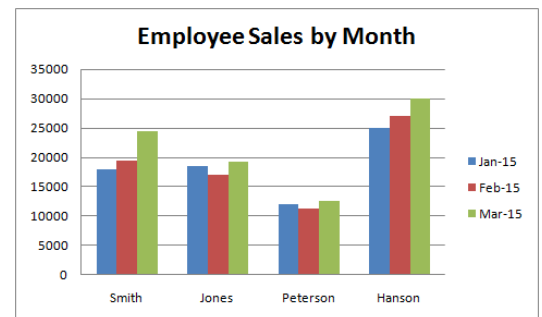


Create your own Bar Graph

In this first exercise, we would like to see the magnitude of sales by date.

- 1.) Open the file Bar Charts
- 2.) Select from A2:D6
- 3.) Go to Insert->Insert Column Chart->2D Clustered Column

Boom! We have a chart. That was easy... But, my instructors always said a chart without a title is a graph. Add a chart title by selecting the Chart Layout with a Title on Top. Name the chart “Employee Sales by Month”

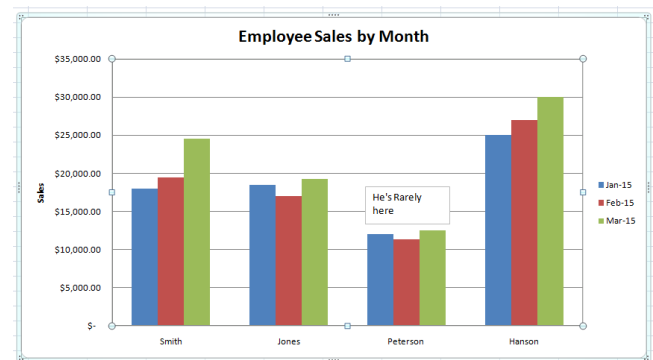


Now, it may be obvious what the y-axis is (money), but perhaps we should label it and use currency.

- 1.) Select the data that makes up the graph
- 2.) Go to the Home tab
- 3.) Select the \$ for money

To add a title on the axis:

- 1.) Select the Chart
- 2.) Select Layout under the Chart
- 3.) Select on Axis Titles
- 4.) Select Vertical
- 5.) Put in “Sales”



Now, this graph is minimal – meaning the minimal we can get away with. Let’s make it better. Let’s annotate why Peterson’s numbers are so low, “He’s rarely here”

- 1.) Select the text box under insert
- 2.) Draw out a box to put text
- 3.) Put in the text, “He’s Rarely Here”

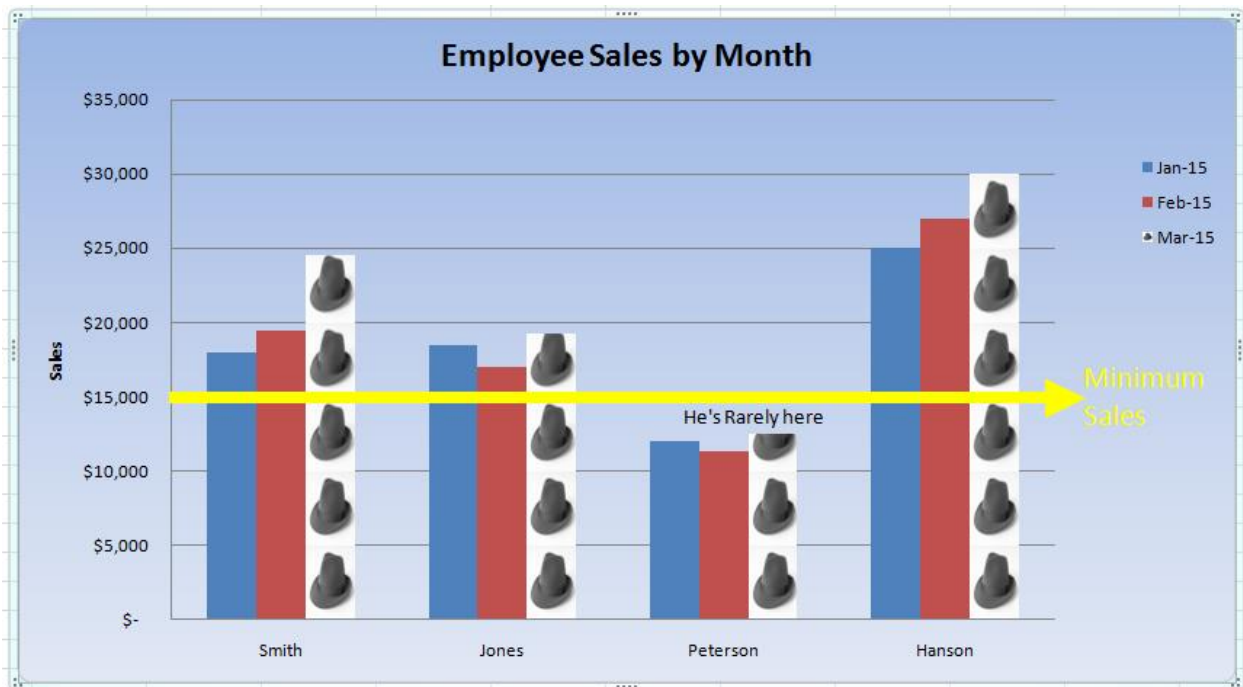
Data Visualization and Iconographics

What if for every 5,000 sales, the sales people get a hat. We can put the hat every 5,000 sales.

- 1.) Select a data series (like March)
- 2.) Right-click and select Format Data Series
- 3.) Select Fill
- 4.) Select Picture or texture fill
- 5.) Insert a picture from File
- 6.) Select the hat
- 7.) Select Stack and Scale with 5000 units/ picture

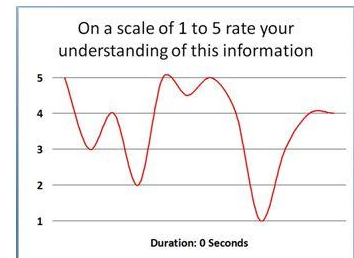
Other things to do:

- 1.) Remove Decimals from Sales
- 2.) Put a color or picture in for the background of the chart
- 3.) Put a line through the item showing minimum sales



Line Graphs

Used to display comparisons between 2 variables, line graphs involve an x-axis horizontally and a y-axis vertically on a grid. Dot-connected and grid-plotted lines are what comprise a line graph. These lines monitor and compare various data sets. Usually, the x-axis represents time measurements while the y-axis is a representative of measure or percentage of quantity. For this reason, a line graph is used often for tracking variables of one or more subjects in time.



Create your own Line Graph

Line Graphs are great for showing trends in data. Is the item you are looking at going up or down? Is it staying consistent?

Let's show the stock prices of Apple and Microsoft from Jan 1, 2000 to Jan 1, 2015 (weekly) against the Dow Jones Industrial Average

Open the file: Stock Prices.xls

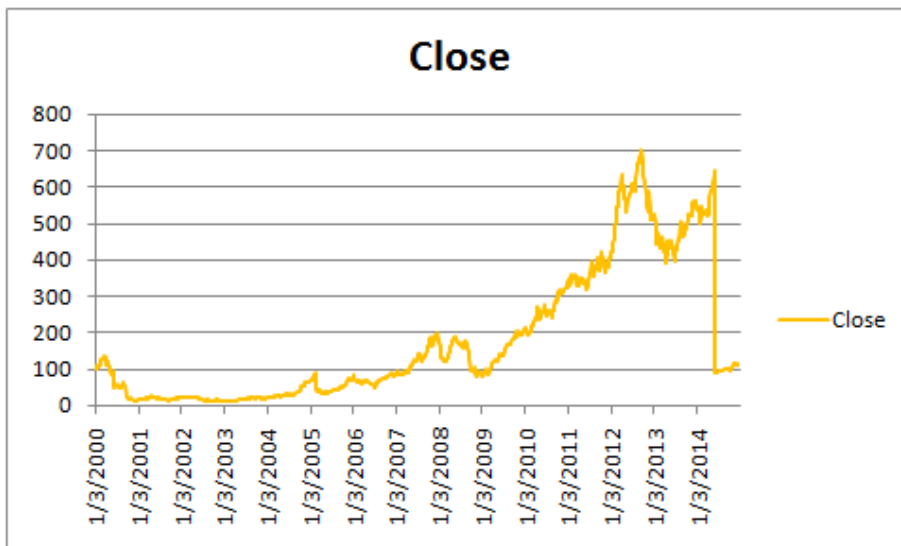
Wow! That's a lot of data. Let's hide everything except the closing data for all items.

- 1.) Select the column that we want to hide (e.g. column B)
- 2.) Right click on the selection giving you a context sensitive menu
- 3.) Select hide

Voilia! Repeat until it looks like this:

	A	E	N	C
1		Apple	Microsoft	
2	Date	Close	Close	
3	12/29/2014	110.38	46.45	
4	12/22/2014	113.99	47.88	
5	12/15/2014	111.78	47.66	
6	12/8/2014	109.73	46.95	
7	12/1/2014	115	48.42	
8	11/24/2014	118.93	47.81	
9	11/17/2014	116.47	47.98	
10	11/10/2014	114.18	49.58	
11	11/3/2014	109.01	48.68	
12	10/27/2014	108	46.95	
13	10/20/2014	105.22	46.13	
14	10/13/2014	97.67	43.63	
15	10/6/2014	100.73	44.03	
16	9/29/2014	99.62	46.09	
17	9/22/2014	100.75	46.41	

Now, to graph, select the date and the Apple close. We will add Microsoft close later in the exercise. Use the CTRL+Shift+Down Arrow to grab everything quickly!

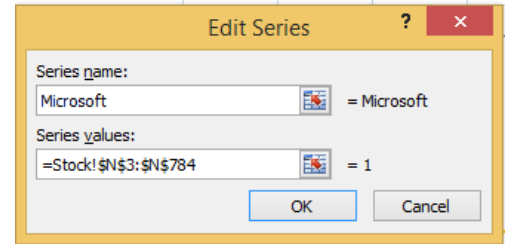


Data Visualization and Iconographics

While selected, Insert->Graph->Line 2-D

Wow! That was easy! Let's add Microsoft.

- 1.) Select the chart
- 2.) Go to Chart Tools->Design-> And in the data section, choose Select Data.
- 3.) Click the Add button on the Legend Entries
- 4.) Type Microsoft into the Series name and select the series values



Awesome. Perhaps we should Title the chart and annotate some big dates:

Title: Microsoft vs. Apple

Dates:

iphone release: June 29, 2007

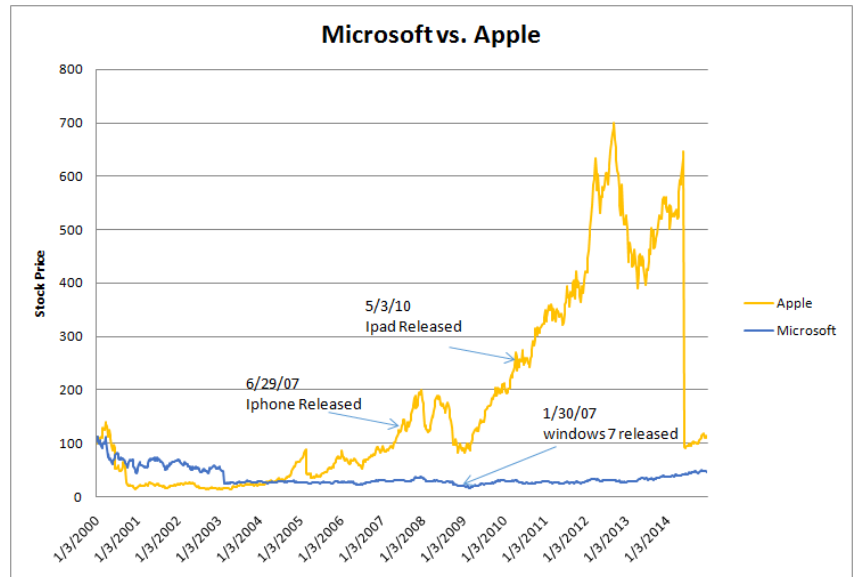
ipad release: April 3, 2010

windows 7 release: July 22, 2009

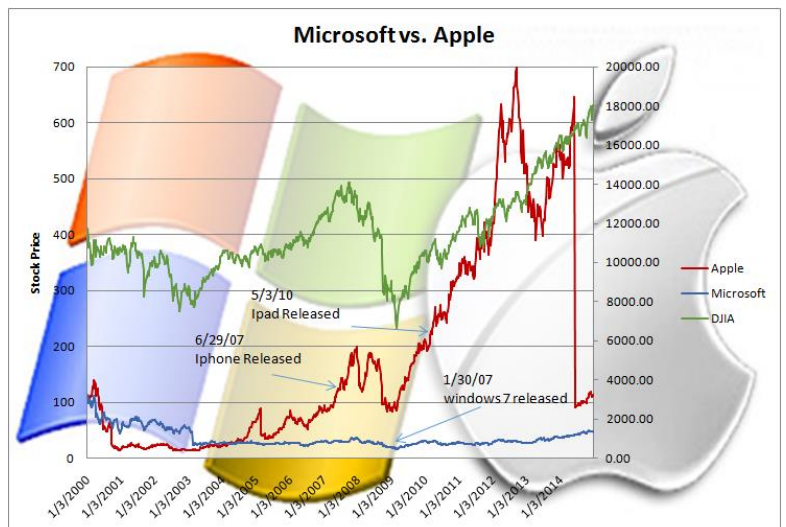
Not bad, I would call this a minimum chart.

Perhaps there is too much white space on top – tell the vertical axis to only go to 700.

- 1.) Click the Axis
- 2.) Right-click and select Format Axis...
- 3.) Change maximum to 700



Now, let's add the DJIA information. When we do that, notice that everything is messed up. We are less than 100 for Microsoft and over 17,000 for the DJIA. So, let's put the DJIA on the secondary access. Some cleanup may be necessary.



Pie Charts

These charts represent the parts of a whole. Each 'section' or 'slice of the pie is a data percentage. From biggest to smallest, segments are arranged in a clockwise formation. This way, the pie chart features easy-to-compare subjects presented in a neat, easy-to-understand way.

Create your own Pie Chart

- 1.) Open the file pie chart.
- 2.) Select the names in column B
- 3.) Using your CTRL key, select the gross pay in column E
- 4.) To insert the graph, select insert pie, 2D



Again, not too hard. But, I don't like the color scheme. You can change that using the Gallery's selection on the top of the page.

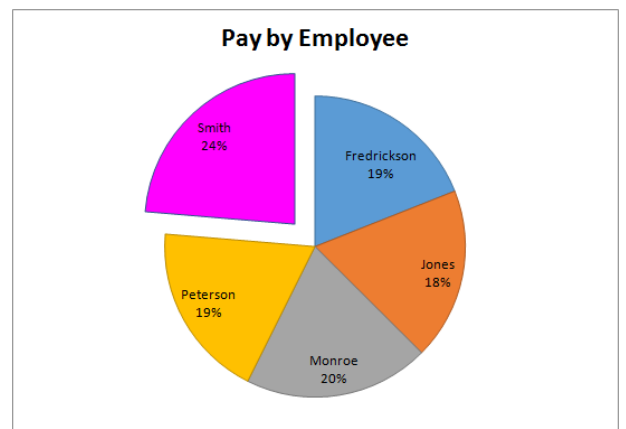
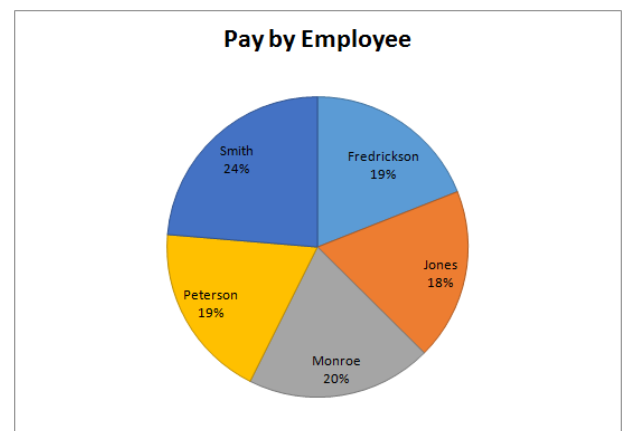
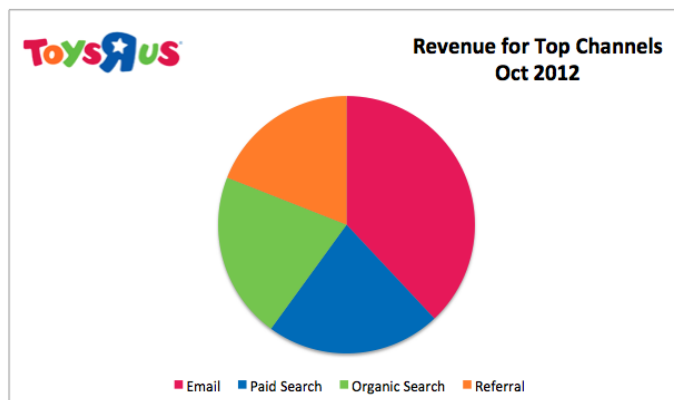
Also, let's put the series name over the top of the pie pieces to make it easier to read along with their percentages.

OK, again I would call this the minimum acceptable chart. Perhaps we should draw our eyes to Smith since he is getting paid so much more than the rest of us. To do this:

- 1.) Click once on Smith's pie piece. They are now all selected
- 2.) Click again on Smith's pie piece. Now only Smith is selected.
- 3.) Drag Smith's pie piece out
- 4.) Re-color the pie piece to hot pink.

This time, let's leave the background white

A graph I found incorporating the colors and logo of Toys R Us.



Pie or Bar Graph?

Remember this simple rule when deciding to use a pie chart or a bar graph:

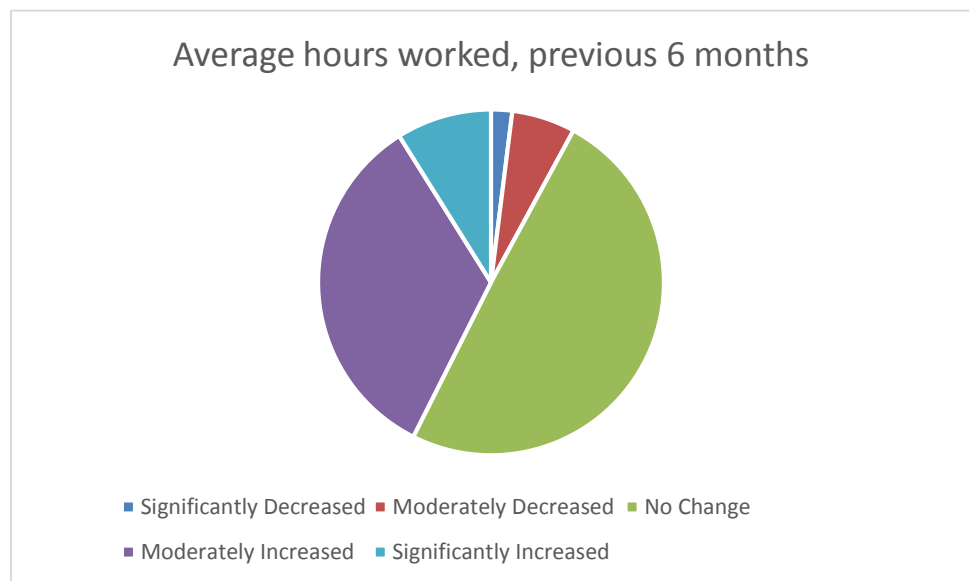
- If you are comparing a percentage of a piece of the whole segment, use a pie chart.
- If you are comparing a fixed numbers or a trend over time, use a bar graph.

Consider the main point you are trying to convey. Your chart or graph should make one point, vividly.

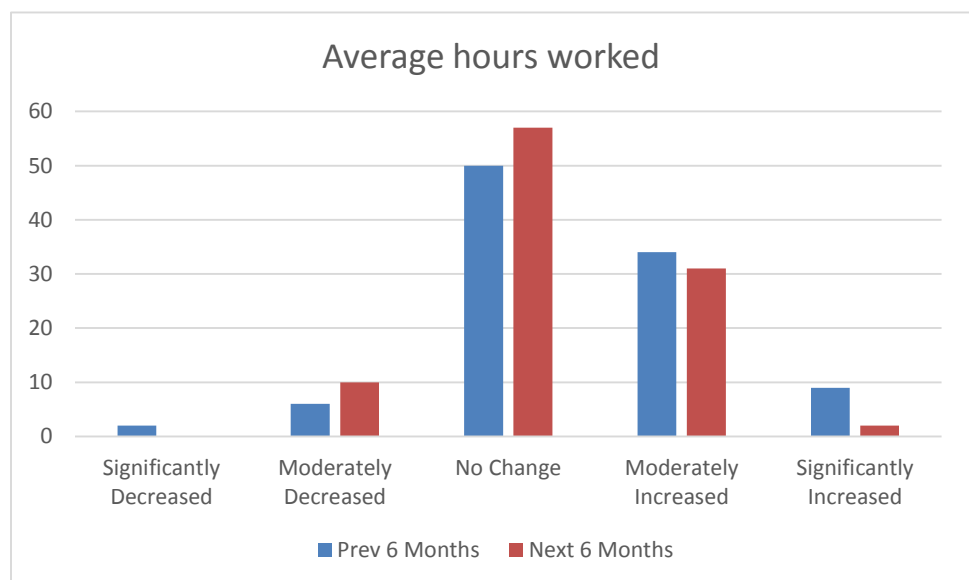
Pie Charts #2

Let's create some pie charts using the **Business Indicators** from the last report.

Using the BI from the previous 6 months, let's create a graph over the average hours worked:



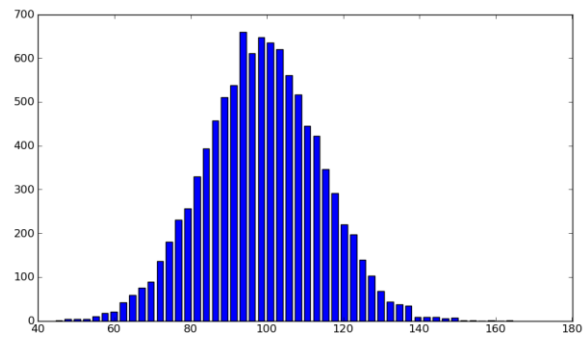
Now, let's create a trend chart on how the average number of hours work will change:



What does this tell us?

Histograms

When quantitative data is what you have, a histogram would be used to show it. This is a kind of graph that also uses bars. Ranges of values are listed at the bottom and these are called 'classes.' Taller bars represent the classes with greater frequencies.



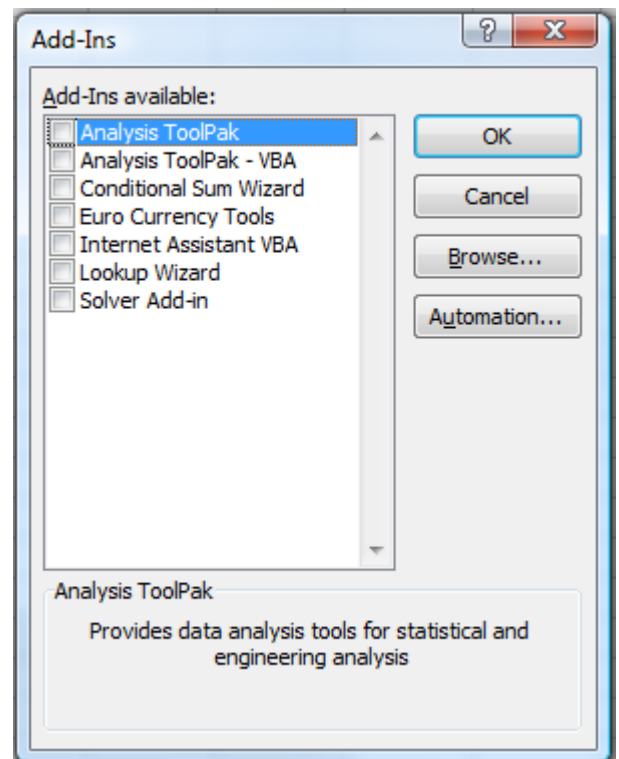
Create your own Histogram

Even though it seems that the makers of Excel put the kitchen sink in and ready to go – not everything is visible. There is another statistical package that is an Add-In if you want to go even further.

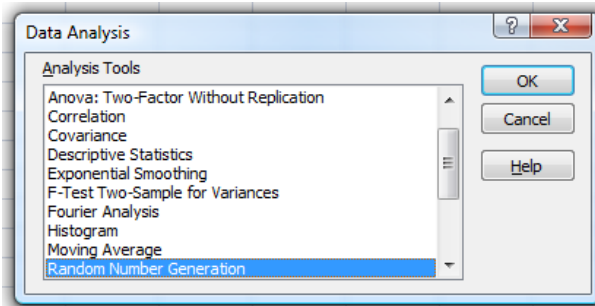
File->Options->Add-Ins->Manage Excel Add-ins (Go...)

Select on Analysis ToolPak and click OK.

A new item appears under data called "Data Analysis". When the item is selected, it shows the different things you can do:



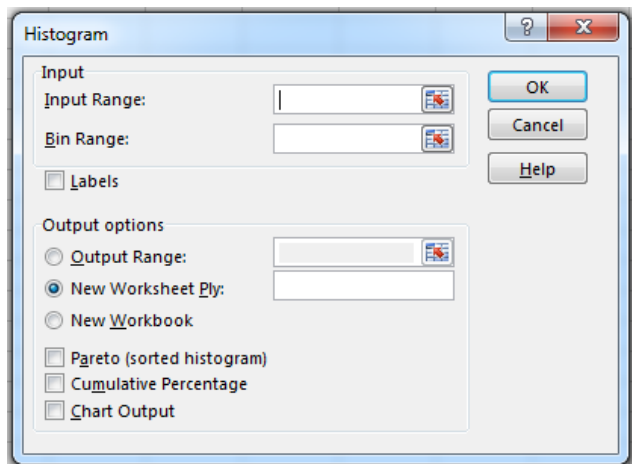
Data Visualization and Iconographics



Open the file **Histogram**

Take for example, how many students in grade 9 are a certain height? How is this data distributed?

So, click on Data Analysis, then Histogram:



A	B	C	D	E	F
		Height			
	Student	to the			
	Number	nearest inch		Bin	
	1	65		56	
	2	70		58	
	3	65		60	
	4	73		62	
	5	68		64	
	6	59		66	
	7	63		68	
	8	67		70	
	9	65		72	
	10	63		74	
	11	64			
	12	71			
	13	59			
	14	61			
	15	70			
	16	68			
	17	66			
	18	65			
	19	69			
	20	71			
	21	67			
	22	64			
	23	63			
	24	70			
	25	61			

Data Visualization and Iconographics

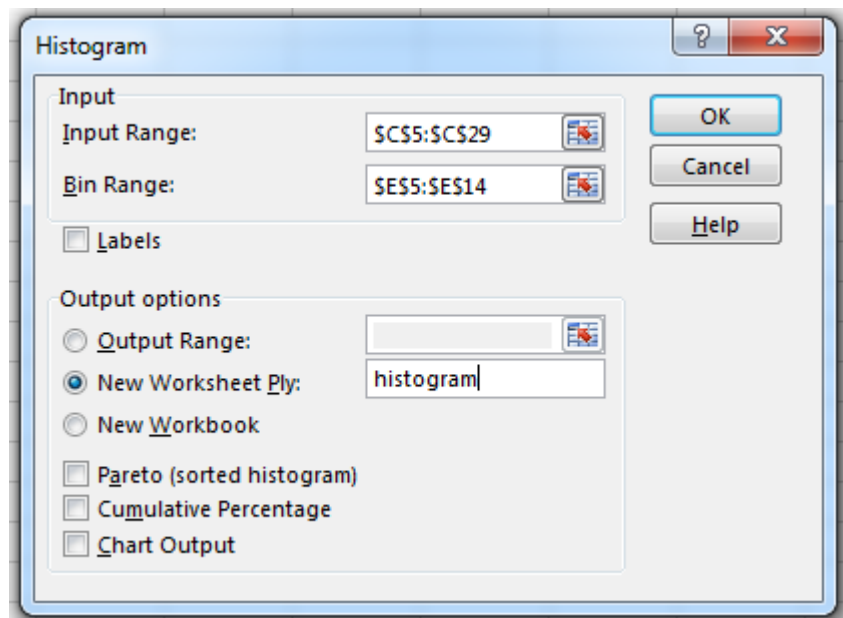
The input range is the all of the student's heights. The bin range contains range of items want to throw them in. I made a container every 2 inches from below the minimum height.

The Output gives the possibility of putting it on the sheet, in a new worksheet, or a new workbook. I usually pick the new worksheet.

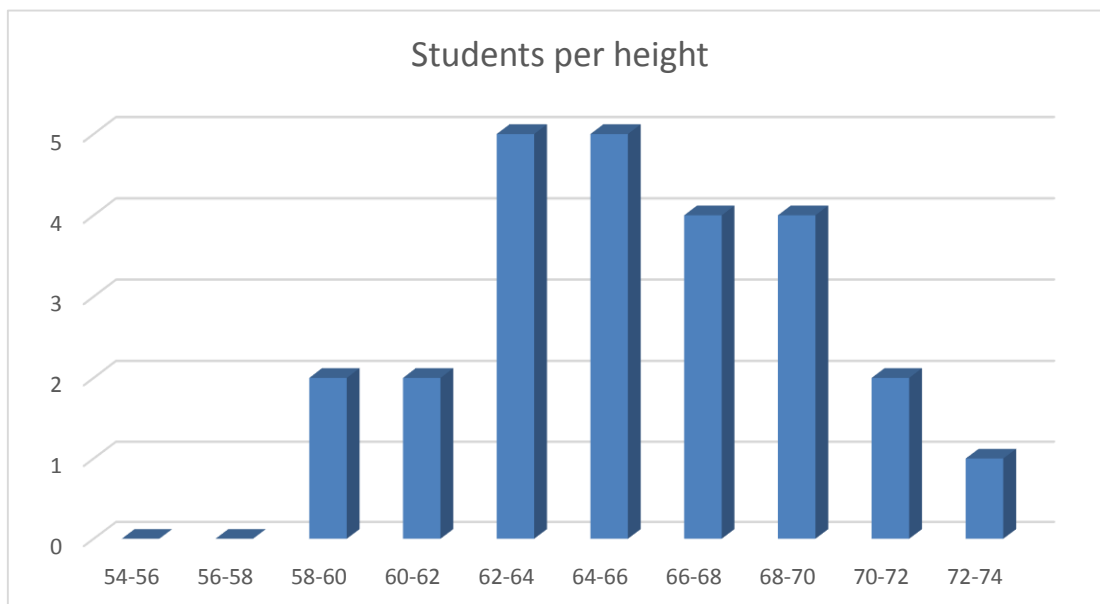
It also gives the ability to add:

- Pareto charts
- Cumulative Percentages
- Chart Output

Bin	Frequency
56	0
58	0
60	2
62	2
64	5
66	5
68	4
70	4
72	2
74	1
More	0



Which, when graphed, makes it much easier to understand what is going on:



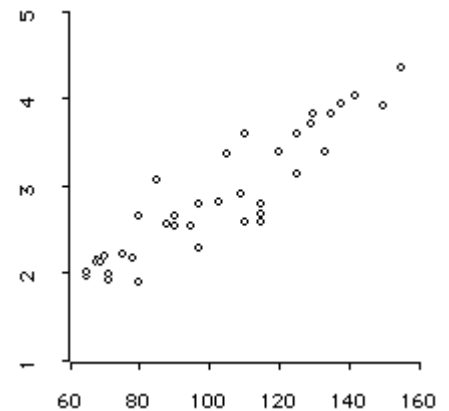
Scatterplot

Scatterplots display paired data using the vertical or the y axis and a horizontal axis or the x axis. The tools for statistics called correlation and regression are then used for showing trends on this type of graph.

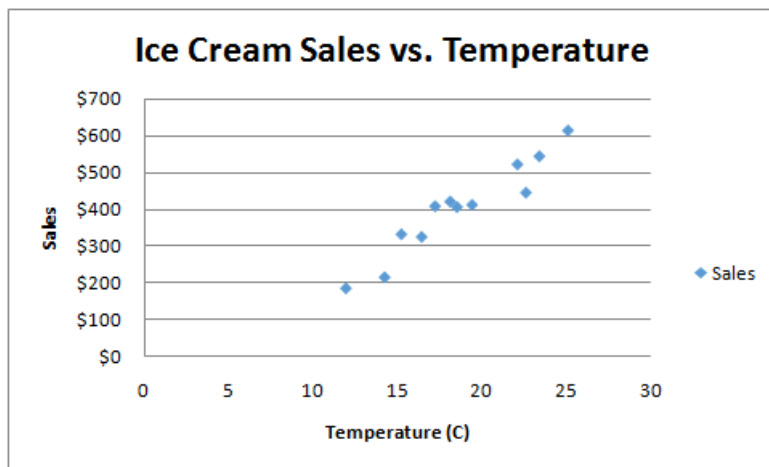
Create your own Scatterplot

Open the file **scatterplot**

1. Select the data from C4:D15
2. Go to Insert->Scatter-> 2D plot
3. Add Titles and Labels
4. Profit!

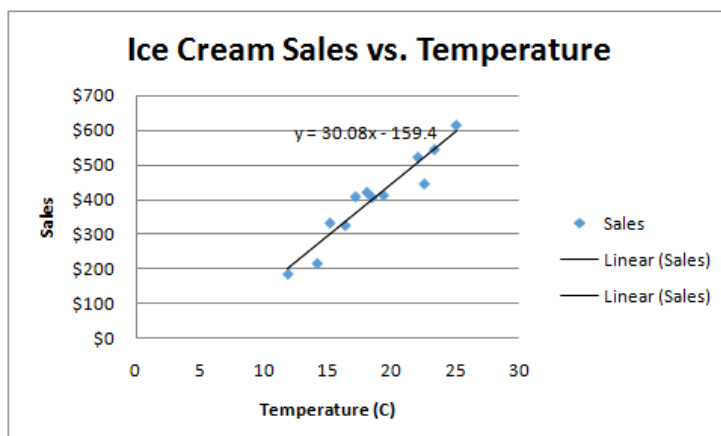
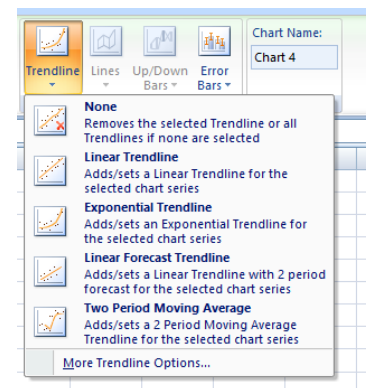


Make sure the x-axis values are on the right of the table. This is default in Excel.



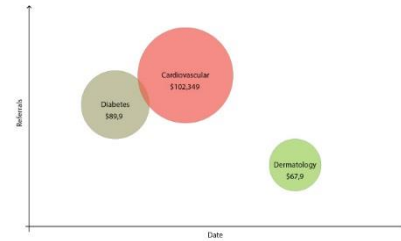
An awesome feature in excel is to get the trendline!

1. Select the chart
2. Select Chart Tools->Layout->Trendline
3. You, as the expert, will have to say what type of trendline the data is representing.
4. I also recommend getting the equation on the chart



Bubble Graphs

A bubble chart is a variation of a scatter chart in which the data points are replaced with bubbles, and an additional dimension of the data is represented in the size of the bubbles. Just like a scatter chart, a bubble chart does not use a category axis — both horizontal and vertical axes are value axes. In addition to the x values and y values that are plotted in a scatter chart, a bubble chart plots x values, y values, and z (size) values.



Create your own Bubble Graph

Bubble charts are often used to present financial data. Different bubble sizes are useful to visually emphasize specific values.

To create a bubble chart, arrange your data in rows or columns on a worksheet so that x values are listed in the first row or column and corresponding y values and bubble size (z) values are listed in adjacent rows or columns.

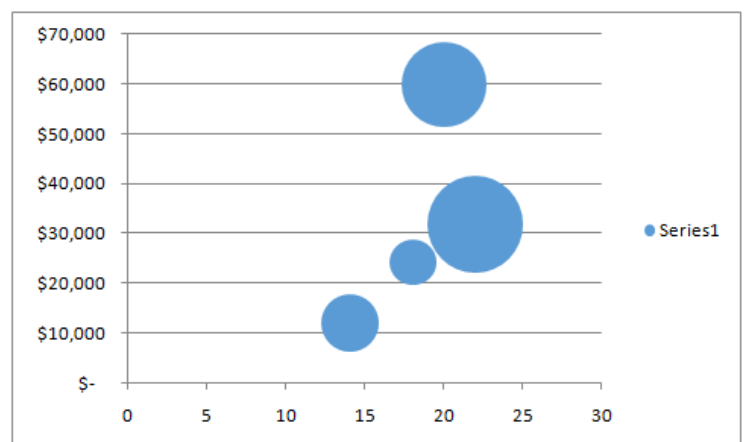
Open the file bubblechart:

Number of products	Sales	Market Share %
14	\$ 12,200	15%
20	\$ 60,000	33%
18	\$ 24,400	10%
22	\$ 32,000	42%

In this bubble chart, the number of products is displayed along the horizontal axis, the sales amounts are displayed along the vertical axis, and the market share percentages are represented by the size of the bubbles.

Consider using a bubble chart when your data includes the following:

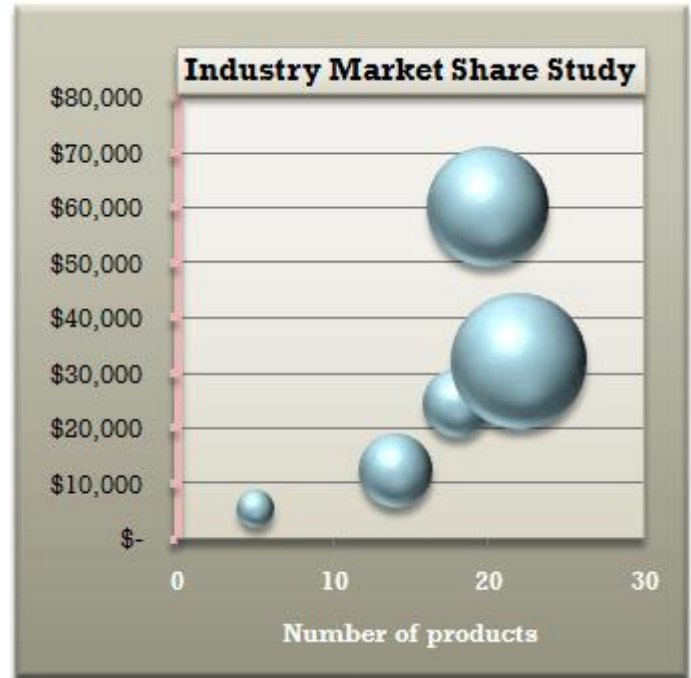
- Three values per data point** : Three values are required for each bubble. These values can be in rows or columns on the worksheet, but they must be in the following order: x value, y value, and then z value.
- Multiple data series** : Plotting multiple data series in a bubble chart (multiple bubble series) is similar to plotting multiple data series in a scatter chart (multiple scatter series). Scatter charts use sets of x values and y values, but bubble charts use sets of x values, y values, and z values.



When you create a bubble chart, you can choose one of the following bubble chart subtypes.

- **Bubble or bubble with 3-D effect :** Both bubble chart types compare sets of three values instead of two. The third value determines the size of the bubble marker. You can choose to display bubbles in 2-D format or with a 3-D effect.
- 1.) Select only the numbers of products, sales, and market share
 - 2.) Select Insert->Other Charts-> Bubble

Update accordingly!



Pareto Graph

Many people have heard of this as the “80-20 rule”. That is, that doing 20% of the work can generate 80% of the advantage of doing the entire job. In the idea of quality improvement, we can say that a large majority of the problems (80%) are produced by a few key issues (20%).

Open the File Pareto

- 1.) Sort rows in decreasing order of importance of the causes (i.e., the most important cause first)
- 2.) Sum the numbers together

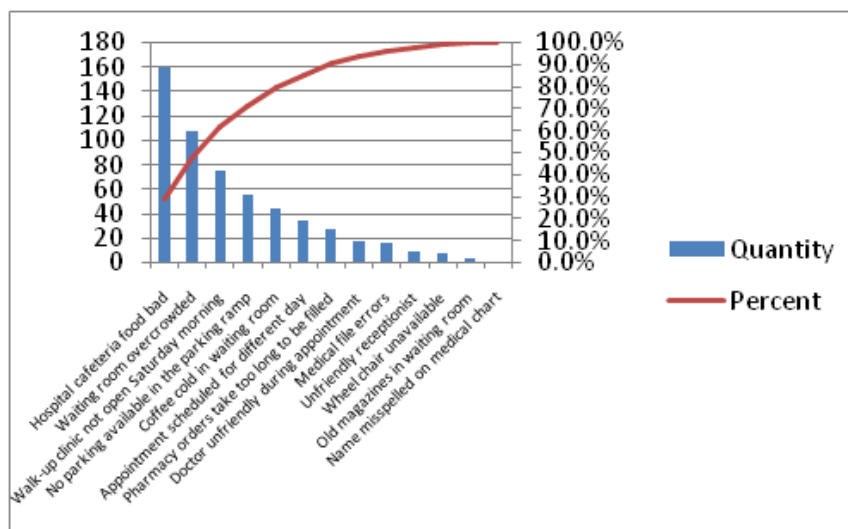
Add a cumulative percentage column to the table

Add a new column to the table and get the percentages of each of the complaints. This is done by taking the quantity of each complaint, dividing it by the total number of complaints, and multiplying by 100.

For example, hospital cafeteria food (bad) has 159 complaints. So $159/557 \times 100 = 28.5\%$

Patient Complaints for the Month	Quantity	Percent
Hospital cafeteria food bad	159	28.5%
Waiting room overcrowded	108	19.4%
Walk-up clinic not open Saturday morning	75	13.5%
No parking available in the parking ramp	56	10.1%
Coffee cold in waiting room	44	7.9%
Appointment scheduled for different day	34	6.1%
Pharmacy orders take too long to be filled	28	5.0%
Doctor unfriendly during appointment	17	3.1%
Medical file errors	16	2.9%
Unfriendly receptionist	9	1.6%
Wheel chair unavailable	8	1.4%
Old magazines in waiting room	3	0.5%
Name misspelled on medical chart	0	0.0%

- 3.) Plot with numbers on the left and cumulative percentages on the secondary y axis.



Consistency in Graphs

Since there are many people working on this report – consistency will be HUGE! Thankfully, there is a design document/specification for this. You can download it from the site.

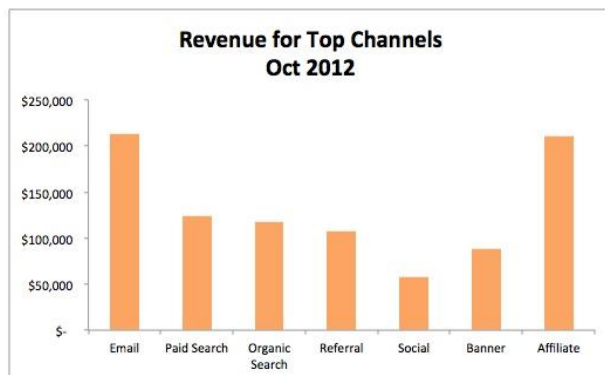
Here are some highlights:

- Arial font only!
- Always use the minimum number of colors necessary.
- Graph Background Grid Lines (1pt.)
- Use the minimum number of colors needed to visualize your graph or chart.
- Avoid Drop Shadows & Other Special Effects
- Avoid Using White Text on Colored Backgrounds

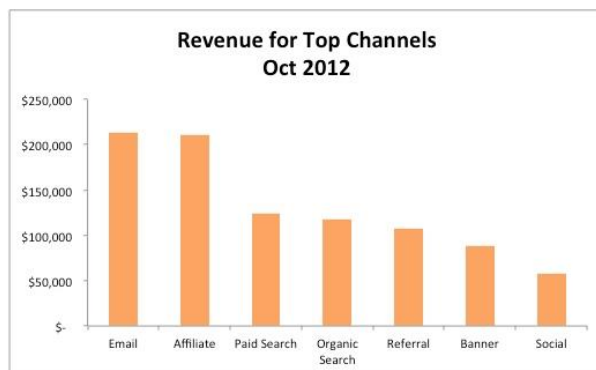
Tips on sprucing up graphs in Excel

Sort bar graph data before designing.

If you're using a bar graph to display your data, this tip can make a big difference. Most bar graphs look like the one below.



They're kinda random. You spend just a fraction of a second too long figuring out which ones are outliers. Instead, you should reorder your data points to go from largest to smallest. Here's what that looks like:



If your bar graph is horizontal, larger values should be at the top. If your bar graph is vertical, order them from left to right. Why? That's how people read English (if you're presenting this data in another language where that isn't true, change up your order to better reflect reading patterns).

To order the graphs in Excel, you'll need to sort the data from largest to smallest. Click 'Data,' choose 'Sort,' and select how you'd like to sort everything.

Remove background lines

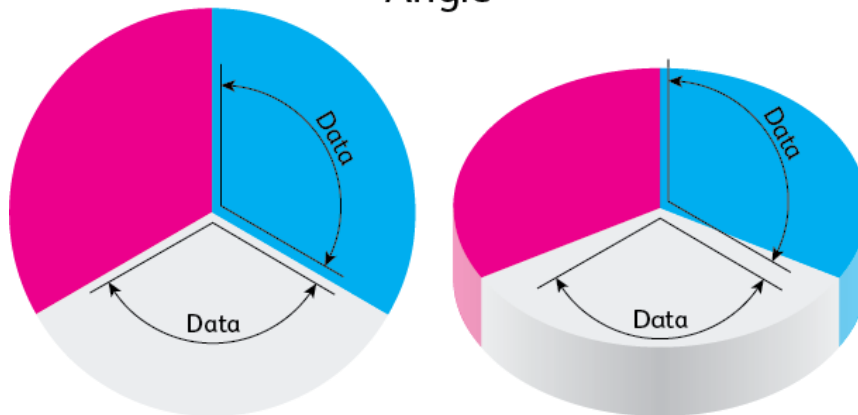
Graphs allow you to roughly compare data within a set, not dig into it. No one's looking at your graph to see incremental differences between data points -- they want to see general, overarching trends.

To help people focus on those trends, remove the lines in the background of your graph or chart. These lines are superfluous, unhelpful, and distracting -- cut them from your graph to help people focus on the big takeaways.

Stay away from 3D effects

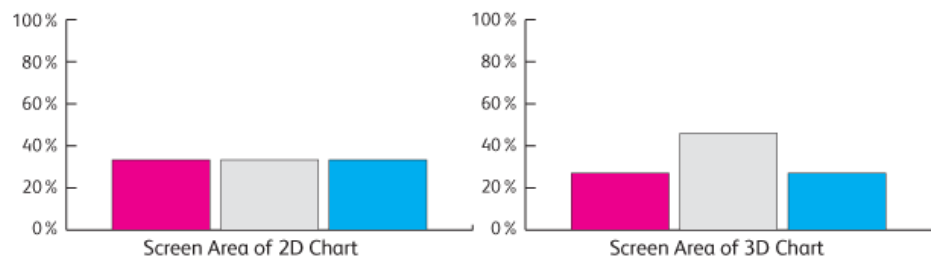
This comes from my time teaching 5S/Lean/6 Sigma things. I found out that (occasionally), making items 3D may give a different impression than the graph is actually portraying (especially on pie charts) because of the parallax making the front items look bigger.

Angle



Area

If you actually look at the area each section takes up on the screen, you'll see why it's easy to misinterpret 3D graphs:



From the Report

Table 15 - Minnesota Per Capita Personal Income (\$)

County	2007	2008	2009	2010	2011	2012
Aitkin	\$27,613	\$29,072	\$29,681	\$30,724	\$32,510	\$34,084
Carlton	\$28,846	\$30,044	\$30,333	\$31,151	\$32,520	\$33,329
Cook	\$36,178	\$37,626	\$38,597	\$39,763	\$43,363	\$45,001
Itasca	\$29,445	\$31,068	\$31,327	\$32,269	\$34,279	\$35,177
Koochiching	\$31,891	\$32,712	\$33,497	\$35,288	\$36,321	\$36,182
Lake	\$36,242	\$38,007	\$37,406	\$39,589	\$42,561	\$44,191
Pine	\$25,968	\$26,939	\$27,323	\$28,213	\$29,403	\$30,568
St. Louis	\$35,090	\$36,259	\$35,327	\$36,423	\$38,920	\$39,976
Total of Counties	\$251,273	\$261,727	\$263,491	\$273,420	\$289,877	\$298,508
Minnesota State Total	\$41,588	\$43,068	\$41,202	\$42,616	\$45,135	\$46,925

Source: US Department of Commerce, Bureau of Economic Analysis

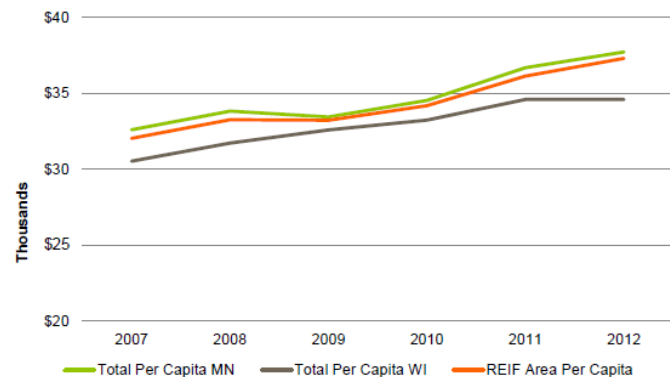
Why is Total of Counties in there?

Table 17 - Combined Per Capita Income (\$)

	2007	2008	2009	2010	2011	2012
Total Per Capita MN	\$32,592	\$33,821	\$33,445	\$34,531	\$36,691	\$37,726
Total Per Capita WI	\$30,528	\$31,720	\$32,588	\$33,238	\$34,593	\$34,593
REIF Area Per Capita	\$32,037	\$33,260	\$33,216	\$34,186	\$36,132	\$37,302

Source: US Department of Commerce, Bureau of Economic Analysis

Figure 11 - Per Capita Income by State and Combined (2007-2012)



Good. But, why are we going all the way down to \$20K on bottom?

Table 21: 15-County Regional Consumer Confidence Indicators

Time	ICS	ICS, Percent Change	ICC	ICC, Percent Change	ICE	ICE, Percent Change
Fall 2013	100.00		100.00		100.00	
Spr. 2014	100.91	0.91%	100.26	0.26%	101.36	1.36%
Fall 2014	103.83	2.89%	102.31	2.05%	104.86	3.46%

Source: University of Wisconsin-Superior

What is important here? Why are we showing it? What is our point?

Table 3. Price Ratio Measures

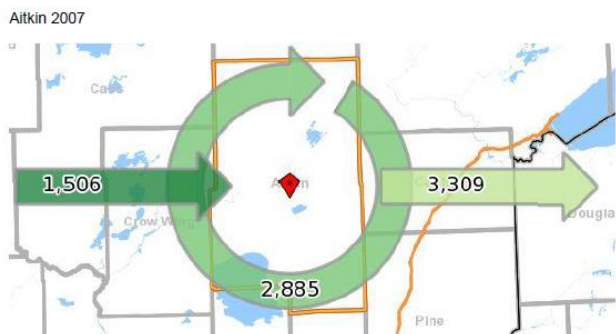
REI	Price-to-Earnings		Forward Price/Earnings	PEG Ratio	PEG Payback	Short Ratio	Shares Short % Change
	Firm	Industry					
Allete (ALE)	17.7	19.3	14.5	2.4	9.7	15.61	-35.84
Ascena Retail Group (ASNA)	15.3	22	10.43	0.7	6.1	5.32	5.31
Calumet (CLMT)	*	13.5	18.13	1.3	9.3	2.88	-11.49
Canadian National Railway (CNI)	23.3	21.4	15.9	1.5	9.2	7.09	25.09
Cliffs Natural Resources (CLF)	28.7	119	6.4	0	*	8.53	12.85
Enbridge Energy Partners (EEP)	*	40	*	4.4	15.4	12.57	13.59
Ikonics (IKNX)	39.5	17.2	*	*	*	1.00	-50.46
Louisiana-Pacific (LPX)	294.1	42.9	13.4	9	23.2	7.63	4.64
Polymet (PLM)	*	119	*	*	*	25.65	-1.73
Sappi Limited (SPPJY)	*	217.4	26.5	*	*	1.03	-9.21
United Health Group (UNH)	15.6	17	11.7	1.6	8.4	6.06	-18.36
US Steel (X)	*	59.2	32.3	0.3	4.6	5.59	3.07
Average	62.03	36.97	16.58	2.36	10.74	8.25	-5.21

Let's Look at Shiller PE for the S&P 500

Data Visualization and Iconographics



What would we see if we placed the data above on this graph? Is it accurate? Should we put LPX in with its industries to make it more reasonable?



What is this graph supposed to show us? Why do we care? A decent graph, but a legend is definitely needed. Would demographics and total population help?

Pivot Tables

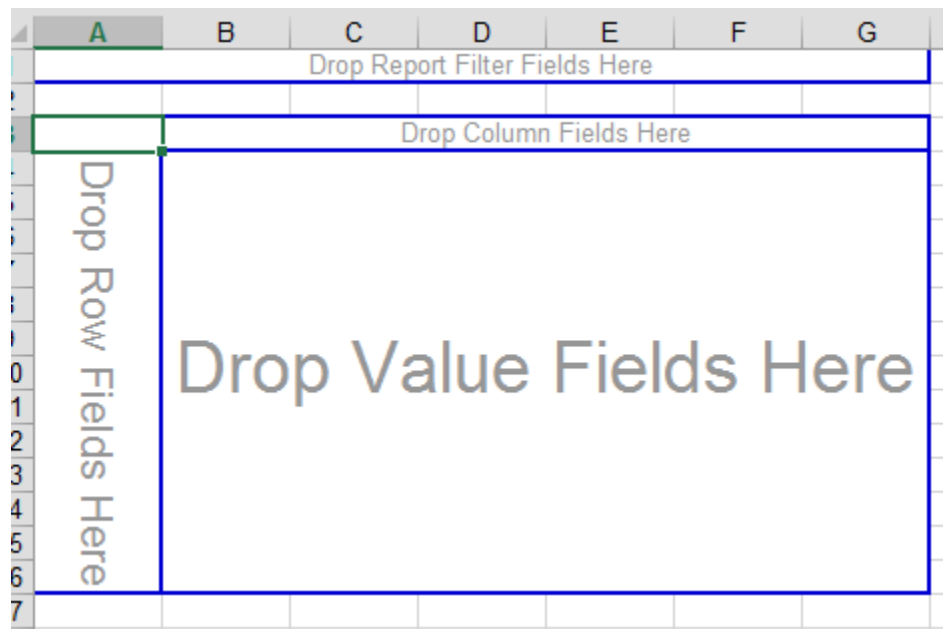
A PivotTable report is an interactive table that you can use to quickly summarize large amounts of data. You can rotate its rows and columns to see different summaries of the source data, filter the data by displaying different pages, or display the details for areas of interest. You can start a Pivot table by opening the Pivot Table toolbar and clicking on the wizard.

Open Sorting Lists.xls

Independent Variable - a variable (often denoted by x) whose variation does not depend on that of another.

Dependent Variable - a variable (often denoted by y) whose value depends on that of another.

1. Click anywhere in the data
2. Insert->Pivot Table
3. Click OK



Drag and drop Independent fields on “Drop Column Fields” and “Drop Row Fields”

Drop Dependent fields on Drop Value Fields Here

Sum of Quantity	Month			
County	April-00	May-00	September-00	Grand Total
Cook		22000		22000
Itasca	66500	42500		109000
Lake		60000	10600	70600
St. Louis	58500		26500	85000
Grand Total	125000	124500	37100	286600

Data Visualization and Iconographics

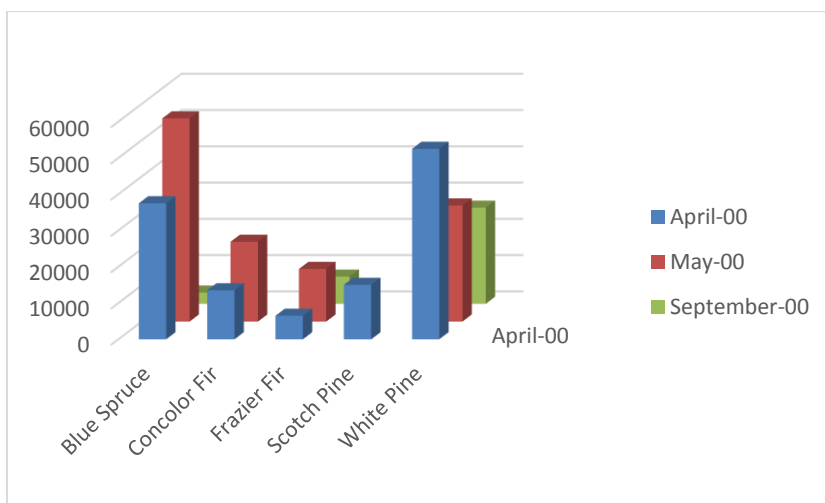
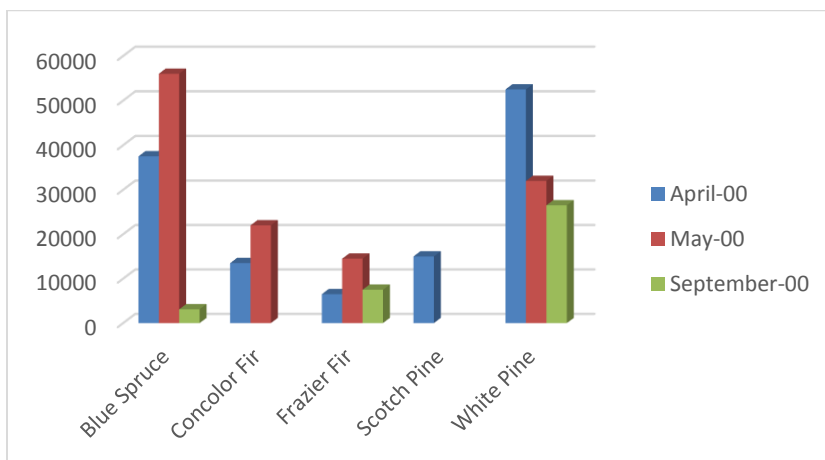
Check the data, is it correct? What does this tell you?

Perhaps we should re-arrange the data. Instead of County and Month – try Type and month. Do this just like playing solitaire – drag and drop the fields to the place you want.

Sum of Quantity	Month			
Type	April-00	May-00	September-00	Grand Total
Blue Spruce	37500	56000	3100	96600
Concolor Fir	13500	22000		35500
Frazier Fir	6500	14500	7500	28500
Scotch Pine	15000			15000
White Pine	52500	32000	26500	111000
Grand Total	125000	124500	37100	286600

What does this tell you?

Make a graph of it using Pivot Charts:



Using Power Map

Power Map is a new 3D visualization add-in for Excel for mapping, exploring, and interacting with geographical and temporal data, enabling people to discover and share new insights.

Go to Google and search for Power Map or go to this link:

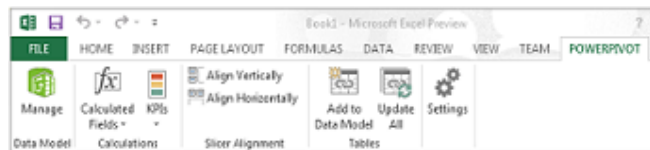
<http://www.microsoft.com/en-us/download/details.aspx?id=29074> (Power Pivot - 2010)

<https://www.microsoft.com/en-us/download/details.aspx?id=38395> (Power Map - 2013)

After install – you must enable the addin.

1. Go to **File > Options > Add-Ins**.
2. In the **Manage** box, click **COM Add-ins > Go**.
3. Check the **Microsoft Office Power Pivot in Microsoft Excel** box, and then click **OK**. If you have other versions of the Power Pivot add-in installed, those versions are also listed in the COM Add-ins list.

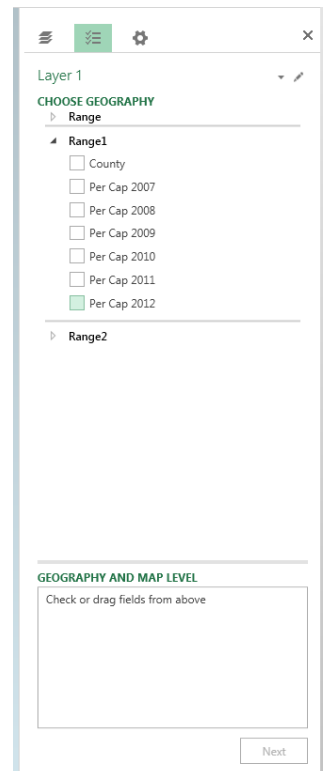
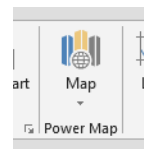
The ribbon now has a Power Pivot tab.



Now, we just need some data! Open the file PerCapitaByCounty.xlsx

When using Powermap, we have to be very precise in location. The best way for getting precise geographic data is Longitude and Latitude. But, that won't work when we are talking about counties! So, we have to be precise in the counties we are talking about. Did you know there are St. Louis counties in MN and MI? Or Lake counties in MN, IN, IL? So, states are important!

1. Select the data from A1:G9. Notice that the headers of the data were selected.
2. Click Insert->Map->Launch Power Map
3. A new Panel will open saying "Launch Powermap" and at the bottom, there will be a + sign with the label "New Tour"
4. Click "New Tour"
5. A new window opens with the world on it. On the right, a panel shows up that has the headings of our data.
6. Select County
Items appear on the map with County in the Geography and Map Level
7. Click Next



8. Now that the counties are selected, it is time to select the dependent variable to graph. Select Per Cap 2007.

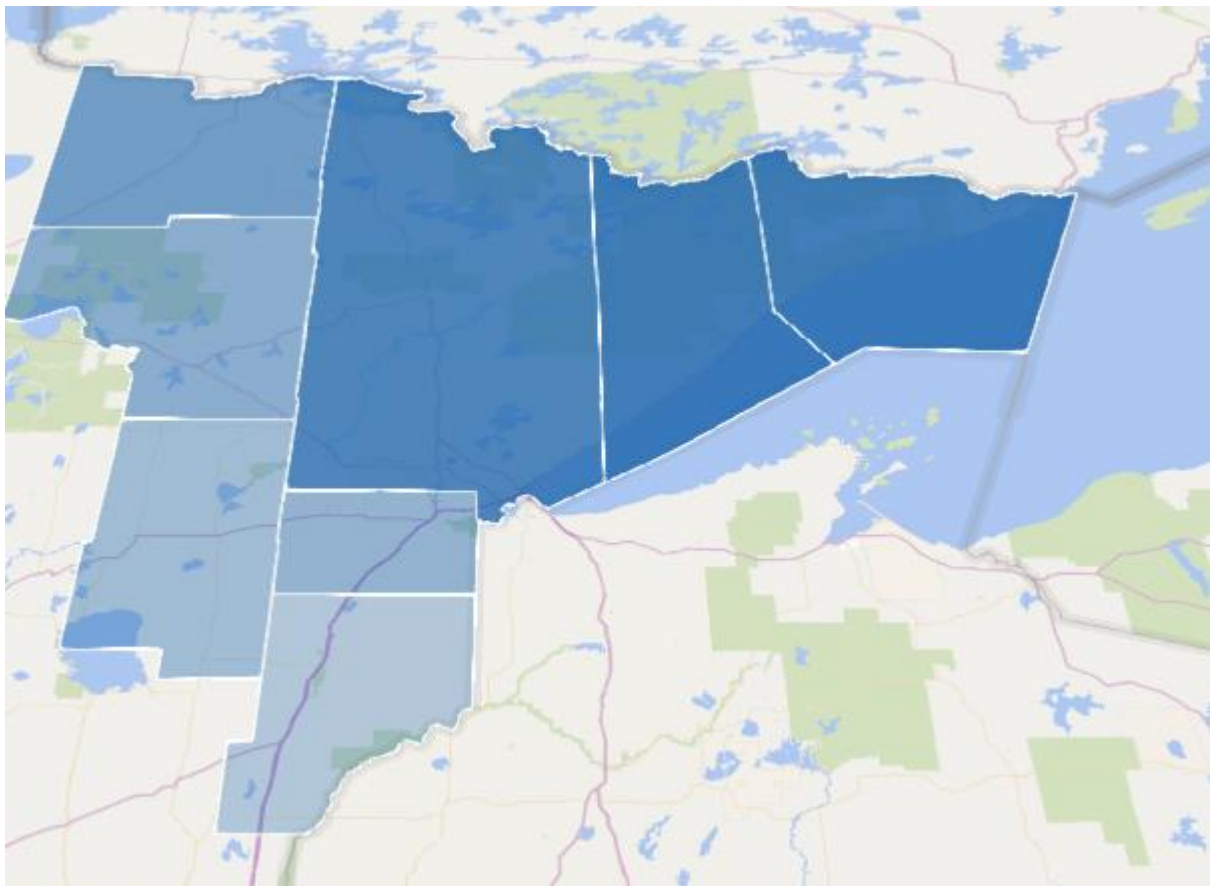
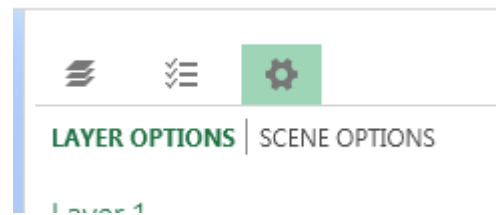
We now have columns of the money on each county. This is great – but not very useful.

9. Above Height on the right, there are different ways to look at the data



HEIGHT

- Stacked Column
 - Clustered Column
 - Bubble Graph
 - Heat Map
 - Visualization by Region—select this
10. Now, each of the counties are colored. They do differ slightly between them, but we may need to increase the amount of contrast. Select the Cog on the top of the panel for Layer Options.
11. This formatting allows for changes in color and contrast. Change the Color Scale to 25% and zoom in



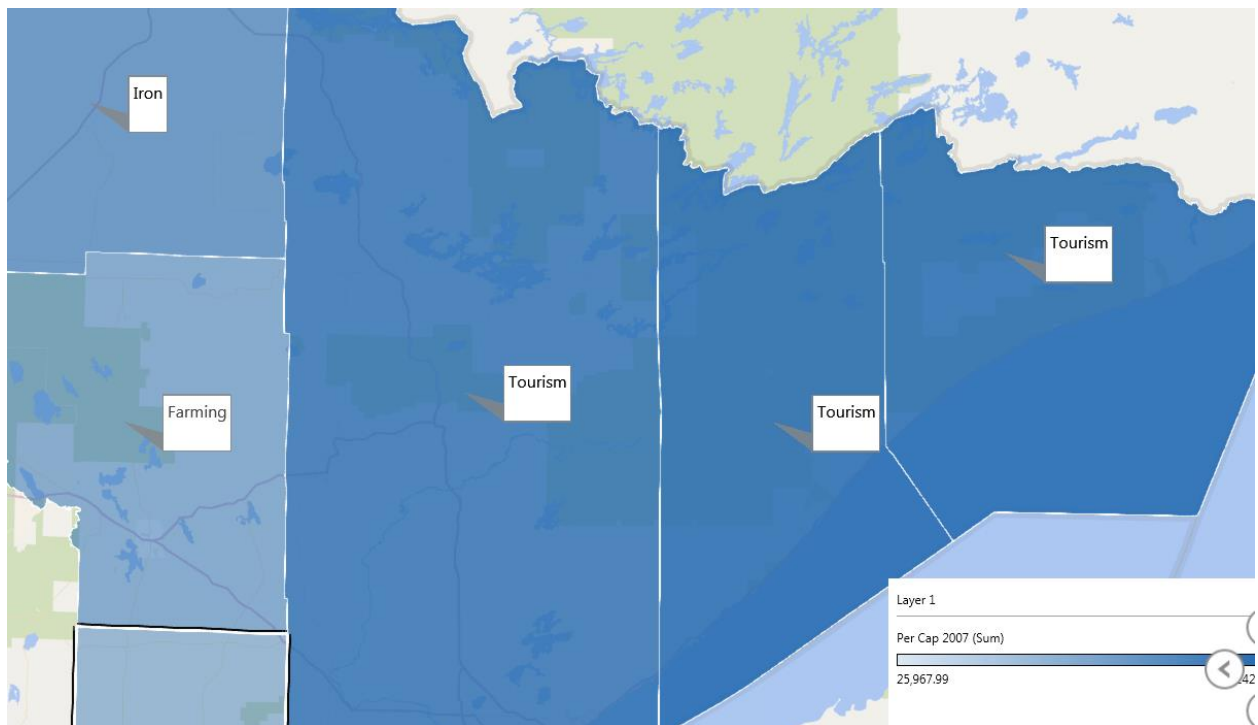
Data Visualization and Iconographics

With this new chart, lots of changes can be made.

1. Themes – how should the geography be shown?
2. Map Labels
3. Flat Map
4. Charts
5. Annotations

Let's add some Annotations on what the major industries are

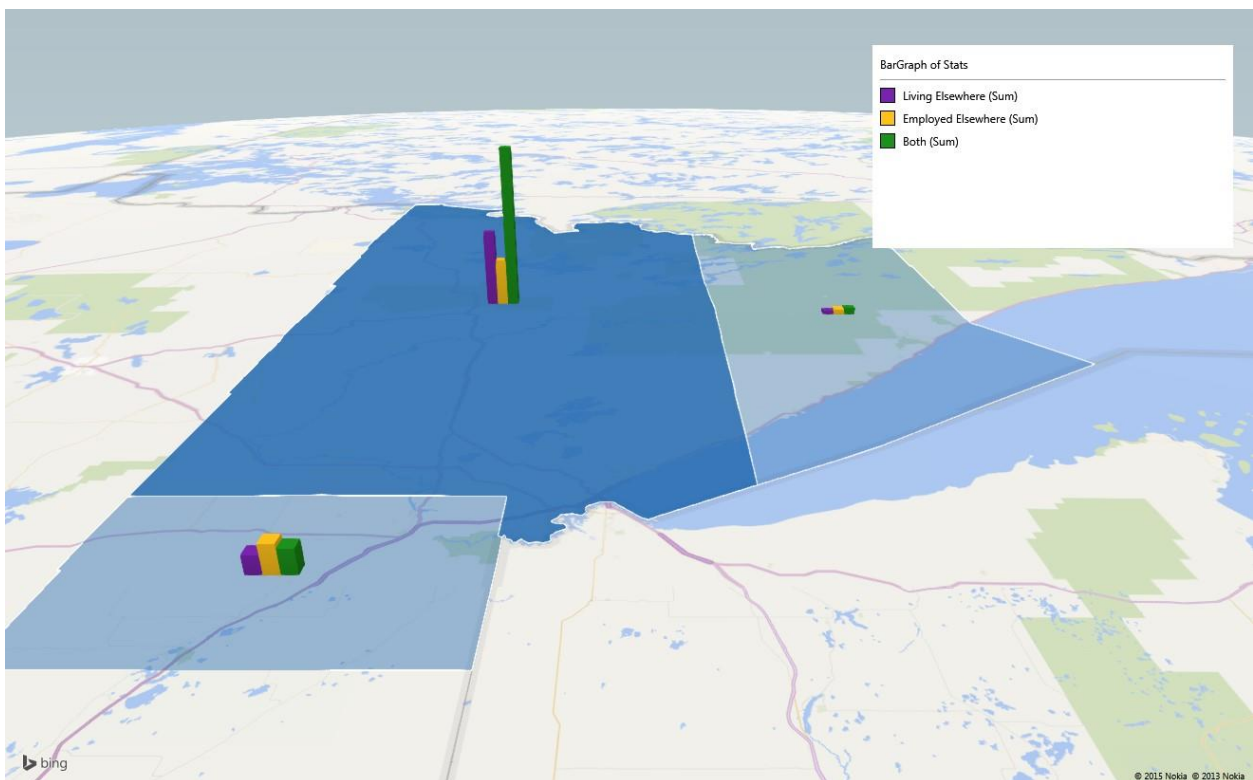
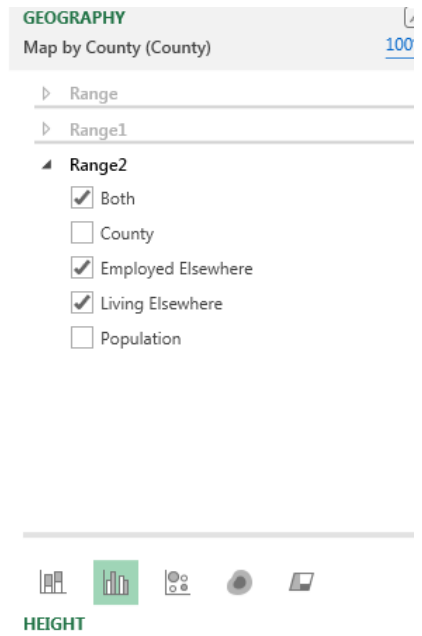
1. Right click on the county
2. Select Add annotation
3. Type in the information for the county



Create a population and clustered bar graph

Open the file **CountryAndWaorkingPop.xls**

- Select all the data and push it into PowerMap
- Call this layer Population of County
- Create another layer
- Select County names again (Click Next)
- Select the remaining data and make it a clustered column



Statistics

Moving Average example:

The following illustration shows a summary of Contoso Pharmaceutical's inventory for their 10 best-selling products from last year. This report shows a large variance in the ending inventory quantities from month to month, indicating both shortages and stagnant product — neither of which is good for business. With a few simple steps, you can use this information to manage your inventory levels more precisely this year.

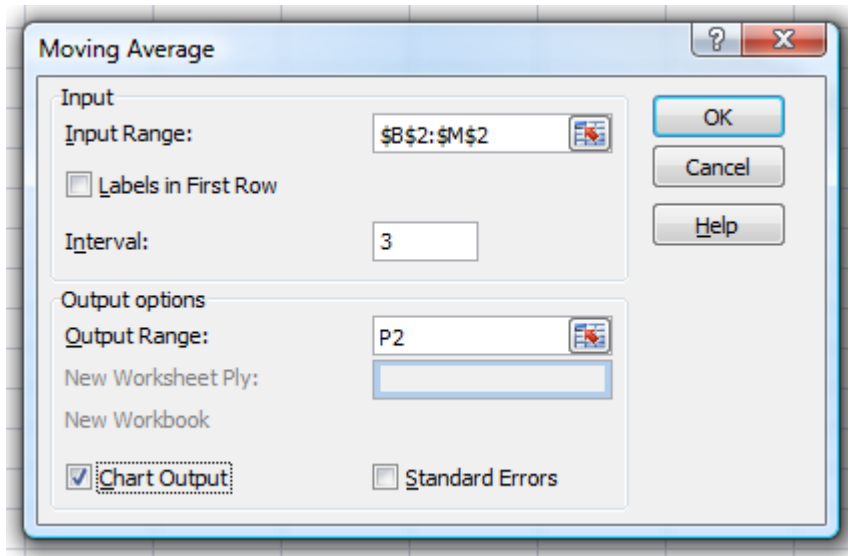
Prod_ID	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
1176	96	10	10	72	72	60	60	14	2	93	94	26
401	19	11	4	47	47	69	52	13	13	56	64	75
1482	78	11	7	46	5	30	30	19	9	100	90	74
1548	96	11	0	99	99	74	74	18	1	73	18	74
1406	48	13	65	99	99	46	46	16	16	94	33	58
1517	3	13	13	26	26	92	92	10	1	44	18	47
301	15	15	32	55	55	17	8	46	8	59	69	84
303	32	18	41	65	65	11	11	50	1	72	43	51
688	46	18	0	-20	26	75	75	15	1	23	99	49
786	43	18	65	94	92	85	85	35	3	82	91	23

Open the file **Moving Average**

The Moving Average analysis tool projects values in the forecast period, based on the average value of the variable over a specific number of preceding periods. A moving average provides trend information that a simple average of all historical data would mask. This example uses the data for Contoso product 1176 to predict a target inventory level for the new fiscal year.

1. On the Tools menu, click Data Analysis.
2. In the Data Analysis dialog box, click Moving Average, and then click OK.

3. The Moving Average dialog box opens.



1. In the Input Range box, enter a single row or column of data. This example uses the row of data from product 1176 on the Contoso top-10 products report.
2. In the Interval box, enter the number of values that you want to include in the moving average. In this example, enter 3, the default interval.

NOTE The interval is the number of data points used to calculate the moving average. The larger the interval, the smoother the moving average line; the smaller the interval, the more the moving average is affected by individual data point fluctuations.

In the Output Range box, enter the cell address where you want the results to start.

3. Select the Chart Output check box to see a graph comparing the actual and forecasted inventory levels.
4. Click OK.

