HIMANSHU SHARMA

BEST EXCEL CHARTS FOR DATA ANALYSIS AND REPORTING

FROM THE BESTSELLING AUTHOR
OF 'MATHS AND STATS FOR WEB ANALYTICS'



Learn to Select Best Excel Charts for Data Analysis and Reporting

Written by Himanshu Sharma, Founder of Optimize Smart

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About the author

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- Over 15 years of experience in digital analytics and marketing
- Author of four best-selling books on digital analytics and conversion optimization

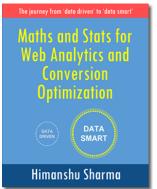


- Nominated for Digital Analytics Association Awards for Excellence
- Runs one of the most popular blogs in the world on digital analytics
- Consultant to countless small and big businesses over the decade

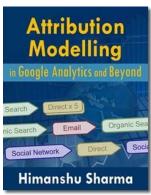
Website: www.optimizesmart.com

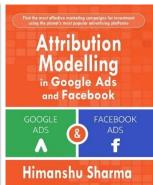
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Table of Contents

- 1. The importance of data visualization
- 2. The anatomy of an Excel chart
- 3. Most common data types
- 4. When to use a clustered column chart
- 5. Breaking a clustered column chart
- 6. When to use a combination chart
- 7. When to use a stacked column chart
- 8. When to use a 100% stacked column chart
- 9. When to use a bar chart
- 10. When to use a line chart
- 11. When to use a number chart
- 12. When to use a gauge chart
- 13. When to use a scatter chart
- 14. When to use a pie chart
- 15. When to use a stacked area chart
- 16. When to use a histogram
- 17. When to use a Venn diagram
- 18. Charts to avoid for reporting purposes
- 19. Best practices for designing column and line charts



The importance of data visualization

<u>Data visualization</u> is the presentation of data (both qualitative and quantitative data) in graphical format. Through data visualization you can easily:

- 1. Visualize data (make sense of data, especially big data)
- 2. Classify and categorize data
- 3. Find a relationship among data
- 4. Understand the composition of data
- 5. Understand the distribution of data
- 6. Understand the overlapping of data
- 7. Determine patterns and trends
- 8. Detect outliers and other anomalies in data
- 9. Predict future trends
- 10. Tell meaningful and engaging stories to decision-makers

Data presentation is a very important skill for an optimizer (marketer, analyst). In fact, it is so valuable that LinkedIn lists it as one of the top skills that could get you hired in 2017:





Source: LinkedIn Unveils The Top Skills That Can Get You Hired In 2017

Excel charts are commonly used for data visualization and presentation. But selecting the right Excel chart is always a challenge. If you use an incorrect Excel chart for your analysis, you may misinterpret data and make the wrong business and marketing decisions. If you use an incorrect Excel chart for your presentation, then stakeholders may misinterpret your charts and take wrong decisions.

Therefore selecting the right Excel chart is critically important.

The anatomy of an Excel chart

In order to read an Excel chart, it is important that you understand the various components of the chart.

Consider the following data table in Excel:



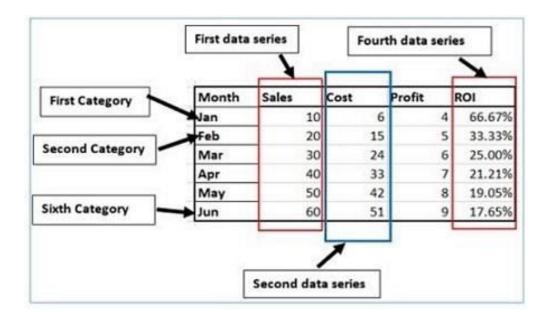
Month	Sales	Cost	Profit	ROI
Jan	10	6	4	66.67%
Feb	20	15	5	33.33%
Mar	30	24	6	25.00%
Apr	40	33	7	21.21%
May	50	42	8	19.05%
Jun	60	51	9	17.65%

This data table has got five variables: 'Month', 'Sales', 'Cost', 'Profit' and 'ROI':

Variables				
Month	Sales	Cost	Profit	ROI
Jan	10	6	4	66.67%
Feb	20	15	5	33.33%
Mar	30	24	6	25.00%
Apr	40	33	7	21.21%
May	50	42	8	19.05%
Jun	60	51	9	17.65%

This data table is made up of categories and data series:

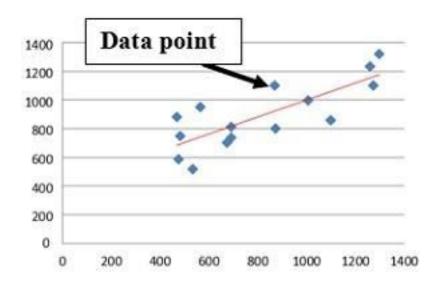




<u>Categories</u> - Here the first category is 'Jan', the second category is 'Feb', the third category is 'Mar' and so on.

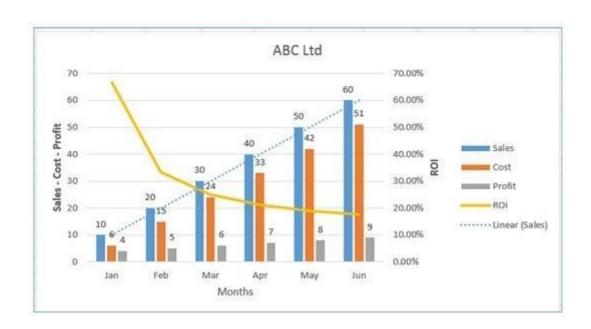
<u>Data series</u> - A data series is a set of related data points.

<u>Data point</u> - A data point represents an individual unit of data. 10, 20, 30, 40, etc are examples of data points. In the context of charts, a data point represents a mark on a chart:

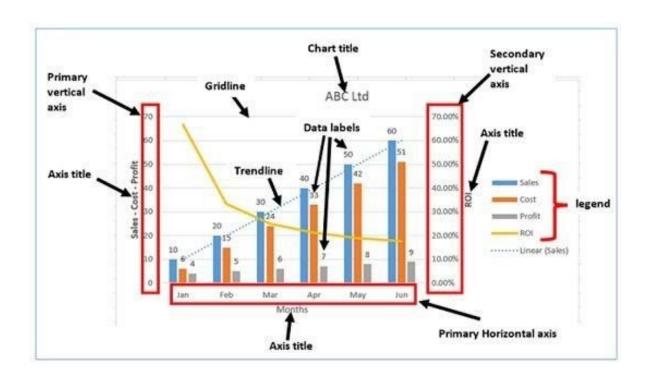


Optimize Smart

Consider the following Excel chart which is made from the data table mentioned earlier:



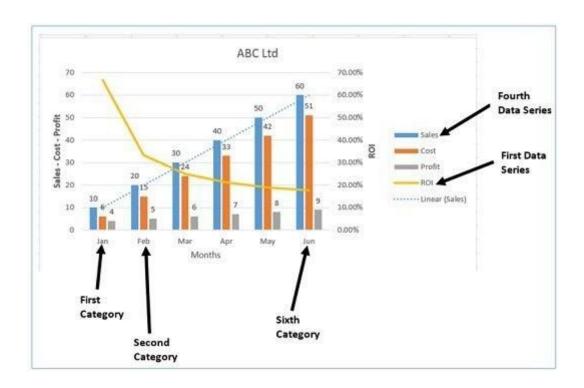
This chart is made up of the following **chart elements**:





- 1. Primary Horizontal Axis:
- 2. Primary Vertical Axis
- 3. Secondary Vertical Axis
- 4. Primary Horizontal Axis Title
- 5. Primary Vertical Axis Title
- 6. Secondary Vertical Axis Title
- 7. Chart Title
- 8. Data Labels
- 9. Gridlines
- 10.Legend
- 11.Trendline

In Excel, categories are plotted on the horizontal axis and data series are plotted on the vertical axis:





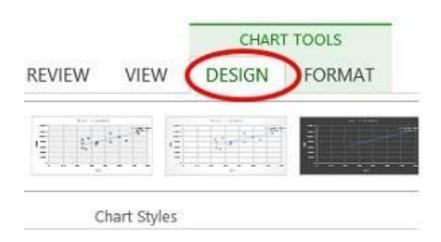
From the chart above, we can conclude the following:

- Months are plotted on the primary horizontal axis.
- Sales, cost and profit are plotted on the primary vertical axis.
- ROI is plotted on the secondary vertical axis.

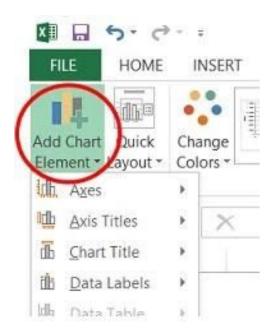
In order to add, remove or edit a chart element in Excel (2013), follow the steps below:

Step-1: Open MS Excel and navigate to the spreadsheet which contains the chart you want to edit.

Step-2: Select the chart and then from the "*Design*' tab select '*Add Chart Element*' drop-down menu:





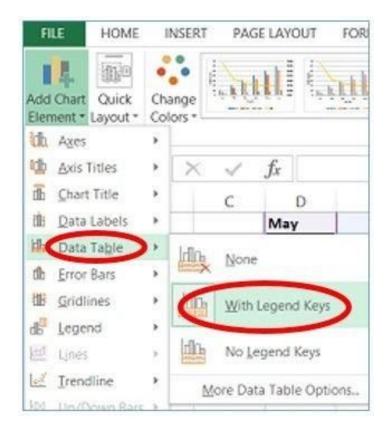


You can also include '**Data table'** in the chart above, by following the steps below:

Step-1: Click on the chart in Excel (2013)

Step-2: Click on 'Add Chart Element' > 'Data Table' > 'With legend Keys':





You can now see your chart with data table:





The type of Excel chart you select for your analysis and reporting depends upon the type of data you want to analyze and report and what you want to do with data:

- 1. Visualize data (make sense of data especially big data)
- 2. Classify and categorize data
- 3. Find a relationship among data
- 4. Understand the composition of data
- 5. Understand the distribution of data
- 6. Understand the overlapping of data
- 7. Determine patterns and trends
- 8. Detect outliers and other anomalies in data
- 9. Predict future trends
- 10. Tell meaningful and engaging stories to decision-makers



Most common data types

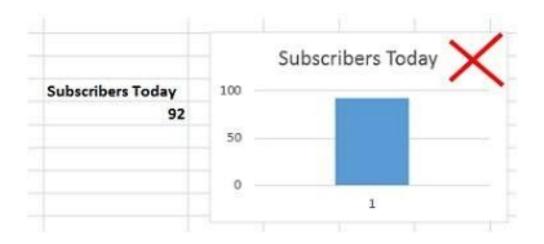
Following are the most common data types that can be visualized:

- Quantitative data (also known as interval/ratio data) is the data that can be measured. For example 10 customers, sales, ROI, weight, etc.
- Qualitative data is the data that can be classified/categorized but it can not be measured. For example colors, satisfaction, rankings, etc.
- Discrete data quantitative data with a finite number of values/observations. For example 5 customers, 17 points, 12 steps, etc.
- **Continuous data** quantitative data with value / observation within a range/interval. For example sales in the last year.
- Nominal data qualitative data that can not be put into a meaningful order (i.e. ranked). For example {Blue, Yellow, Green, Red, Black}
- Ordinal data qualitative data that can be put into a meaningful order (i.e. ranked). For example {Very Satisfied, Satisfied, Unsatisfied, very unsatisfied} or {Strong dislike, dislike, neutral, like, strong like}

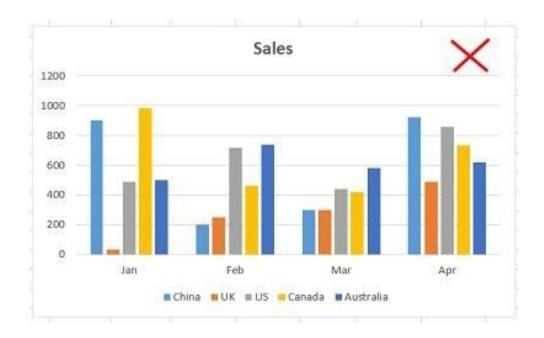
When to use a clustered column chart

#1 Use a <u>clustered column chart</u> when you want to compare two to four data series. In other words, avoid using column charts if you have just one data series to plot:



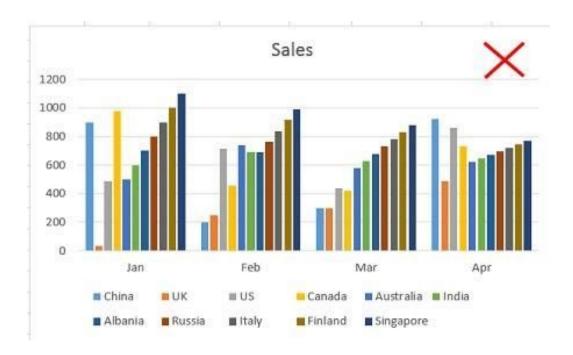


Alternatively, avoid creating a column chart that has got more than four data series. For example, the following chart contains just five data series and it has already started looking cluttered:

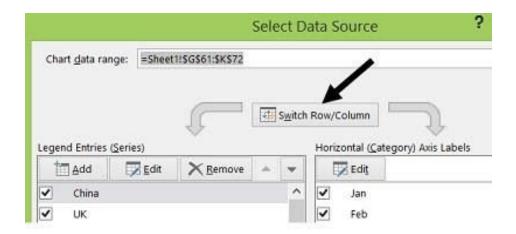


The chart below contains 11 data series and is very difficult to read and understand:



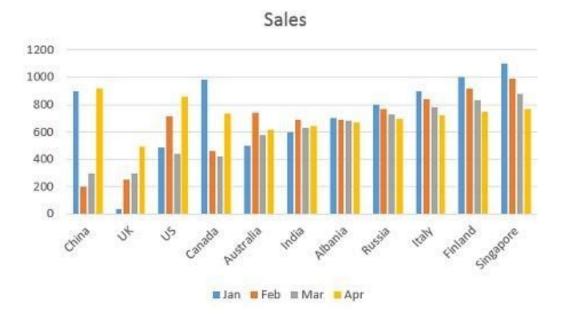


If you want to create a column chart which contains a lot of data series then you can **try switching 'row' and 'column' of the chart** and see whether it makes any difference:



For example, after switching the row and column of the chart (with 11 data series), it looks like the one below:





Now this chart, though still look cluttered, is much easier to read and understand.

#2 Use a **clustered column chart** when the data series you want to compare have the same unit of measurement. So avoid using column charts that compare data series with a different unit of measurements. For example in the chart below 'Sales' and 'ROI' have a different unit of measurement. The data series 'Sales' is of type number. Whereas the data series 'ROI' is of type percentage:

Month	Sales	ROI
Jan	10	66.67%
Feb	20	33.33%
Mar	30	25.00%
Apr	40	21.21%
May	50	19.05%
Jun	60	17.65%





#3 Use a **clustered column chart** when the data series you want to compare are of comparable sizes. So if the values of one data series dwarf the values of the other data series then do not use the column chart. For example in the chart below the values of the data series 'Website Traffic' completely dwarf the values of the data series named 'Transactions':



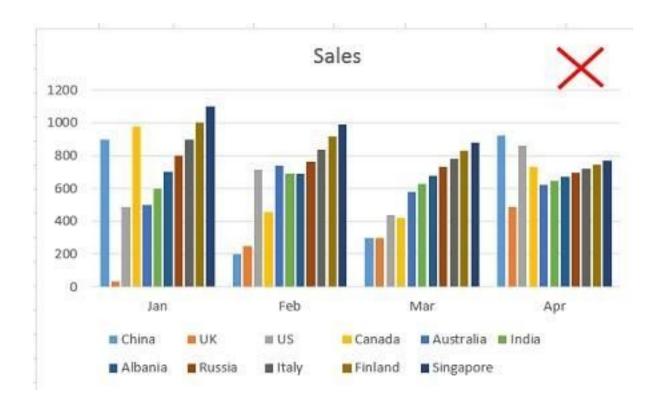


#4 Use a clustered column chart when you want to show the maximum and minimum values of each data series you want to compare.

#5 Use a clustered column chart when you want to focus on short term trends (i.e. changes over days or weeks) and/or the order of categories is not important.

Breaking a clustered column chart

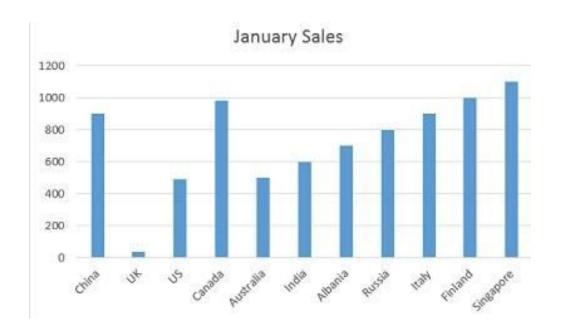
The chart below contains 11 data series and is very difficult to read and understand:



One method of making this chart easier to read and understand is by breaking it into several smaller clustered column charts. For example, you can create one column chart which just compares the sales performance of various



countries in January. Create another column chart which just compares the sales performance of various countries in Feb and so on:



The rule of thumb is to <u>avoid presenting too much data in one chart</u>, <u>regardless of the chart type you use</u>.

When to use a combination chart

A combination chart is simply a combination of two or more charts. For example the combination of a column chart with a line chart. I use combination charts a lot and I think you must know how to create them as they are very useful. Following is a short video on creating a combination chart in Excel:

#1 Use a combination chart when you want to compare two or more data series that have different units of measurement:





#2 Use a combination chart when you want to compare two or more data series that are not of comparable sizes:





When to use a stacked column chart

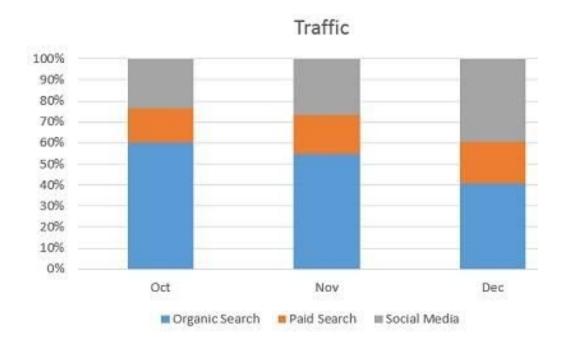
Use a stacked column chart when you want to compare data series along with their composition and the overall size of each data series is important:



When to use a 100% stacked column chart

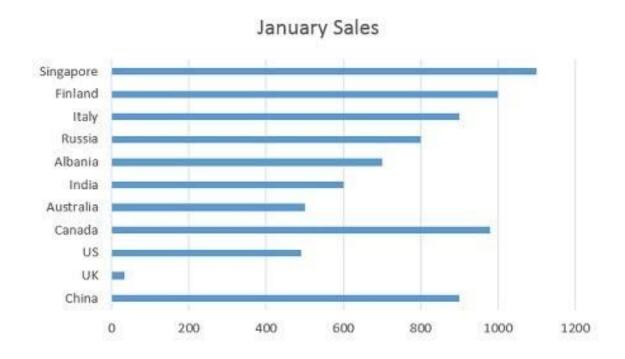
Use a **100% stacked column chart** when you want to compare data series along with their composition but the overall size of each data series is not important:





When to use a bar chart

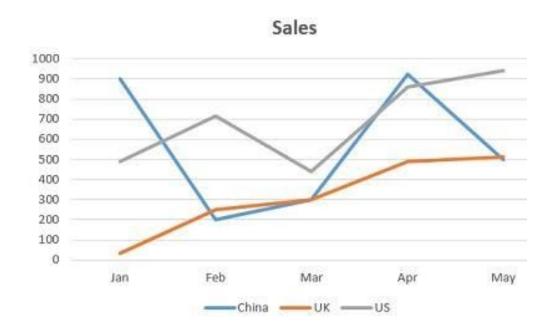
#1 Use a bar chart whenever the axis labels are too long to fit in a column chart:





When to use a line chart

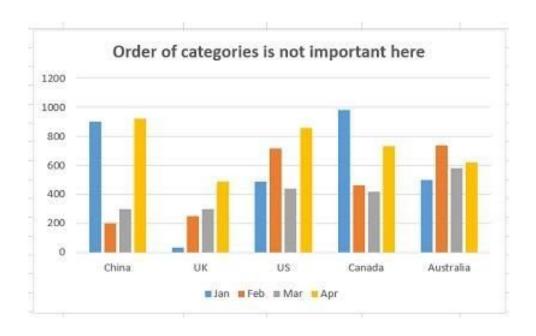
#1 Use **line charts** when you want to show/focus on data trends (uptrend, downtrend, short term trend, sideways trend, long term) especially long term trends (i.e. changes over several months or years) between the values of the data series:



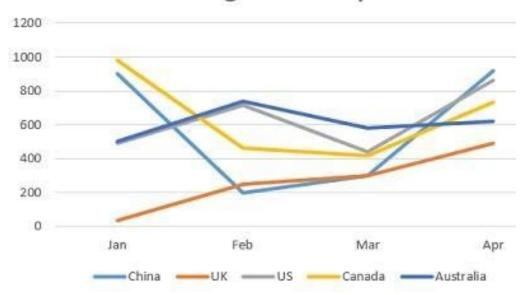
#2 Use **line charts** when you have too many data points to plot and the use of column or bar chart clutters the chart.

#3 Use a line chart instead of a clustered column chart if the order of categories is important:





Order of categories is important here





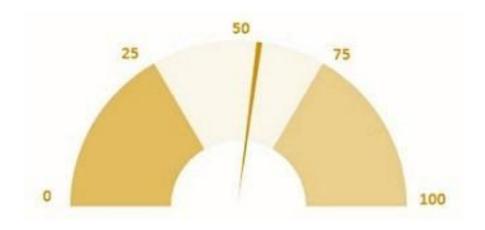
When to use a number chart?

If you want to visualize just one type of data and it contains a numeric value which does not fall in any range/interval then use the number chart:



When to use a gauge chart (also known as speedometer chart)

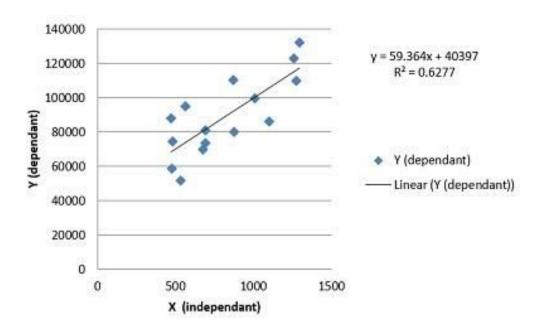
If you want to visualize just one type of data and it contains a numeric value which falls in a range/interval then use the gauge chart (also known as speedometer chart):





When to use a scatter chart

#1 Consider using a scatter chart when you want to analyze and report the relationship/correlation between two variables:



From this chart, we can conclude that the relationship between the two variables ('x' and 'y') is linear. What that means, as the value of the variable 'x' increases there is a corresponding increase in the value of the variable 'y'.

#2 Create a scatter chart only when there are ten or more data points on the horizontal axis. The more data points the better it is for a scatter chart.

Conversely, just a few data points (like five or six data points) are not good enough for creating a scatter chart.



#3 Use a scatter chart when you want to show 'why'. For example: why revenue is correlated with average order value or why conversion rate is correlated with the number of transactions.

When to use a pie chart

#1 Use a <u>pie chart</u> when you want to show a 100% composition of data. In other words, the various pie slices you use must add up to 100%. What that means is, do not create a pie chart where the various pie slices do not represent parts of the whole pie. For example, the following pie chart is not a good representation of data composition as the two pie slices add up to 82% and not 100%:

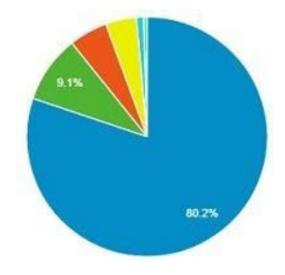


#2 Use a pie chart to show the composition of data only when you have got one data series and less than five categories to plot. For example, the following pie chart shows the breakdown of website traffic sources in the last month:



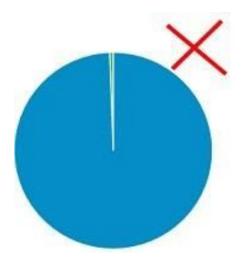


Here I have got only four categories (search traffic, referral traffic, direct traffic, and campaigns) to plot. So a pie chart is ideal to show the breakdown. However, if there were more than four categories to plot, like eight or ten categories, then the pie chart would have become cluttered and hard to read. For example, the following pie chart looks cluttered because it has got too many categories:





#3 Use a pie chart to show data composition only when the pie slices are of comparable sizes. In other words, do not use a pie chart if the size of one pie slice completely dwarfs the size of the other pie slice(s):

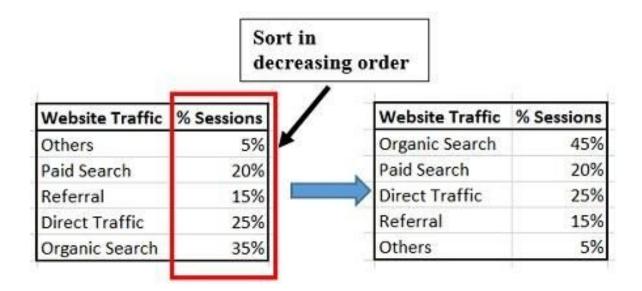


#4 Order your pie slices in such a way that as you look clockwise from top to bottom, the biggest pie slice comes first followed by the second biggest pie slice and so on. This makes the pie chart easy to read:



These pie charts are made from the following data:



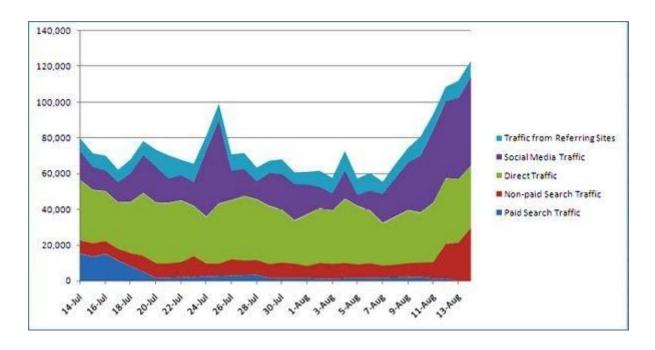


In order to create a pie chart where the biggest pie slice comes first followed by the second biggest pie slice and so on, I have sorted the data in decreasing order (from largest to smallest).

When to use a stacked area chart

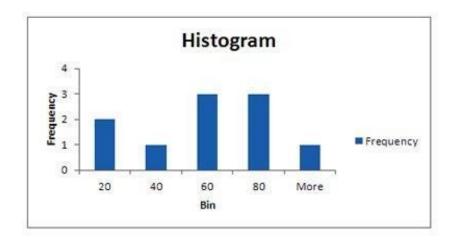
Use a stacked area chart when you want to show the trend of composition and emphasize the magnitude of change over time. For example following stacked area chart shows the breakdown of website traffic:





When to use a histogram

Use a histogram to show frequency distribution for quantitative data:

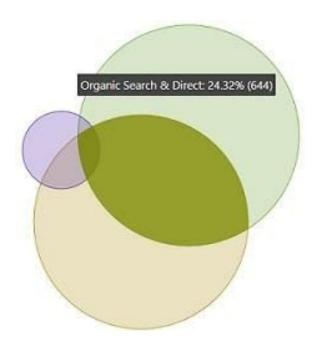


Note: You would need to install the <u>Analysis ToolPak</u> in order to create a histogram in Excel.



When to use a Venn diagram

Use a Venn diagram to show the overlapping of data. The multi-channel conversion visualizer chart used in Google Analytics to visualize <u>multi-channel</u> <u>attribution</u> is actually a Venn diagram:



In the context of web analytics, we can use a Venn diagram to determine whether or not a website has got an attribution problem. If there is little to no overlap between two or more marketing channels then the website doesn't have attribution issues.

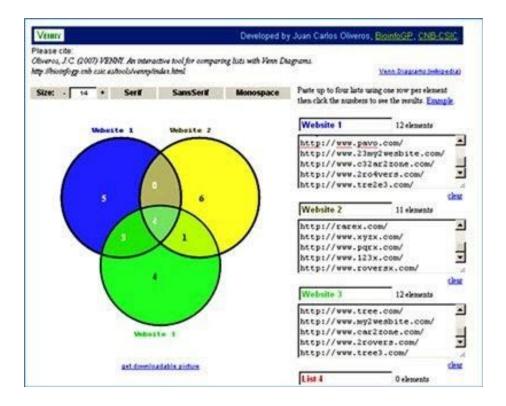
If there is a good amount of overlap then the website has got attribution issues and you should seriously consider taking multi-channel attribution into account while analyzing and interpreting the performance of marketing campaigns.



To learn more about attribution modelling read this article: <u>Beginners Guide to</u>

<u>Google Analytics Attribution Modelling</u>

Another great use of Venn diagrams is in <u>visualizing the back link</u> overlaps between websites:



The tool that I have used to create this Venn diagram is known as <u>Venny</u>.

Note: You can create a Venn diagram in Excel. Check out this tutorial on the Microsoft Office website: Create a Venn diagram

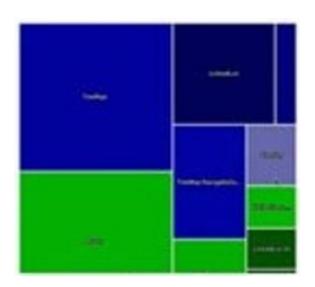


Charts to avoid for reporting purposes

Throughout this book, I have talked about the charts that should be used. But there are some charts which should be avoided for reporting purposes unless your target audience is as data-savvy as you.

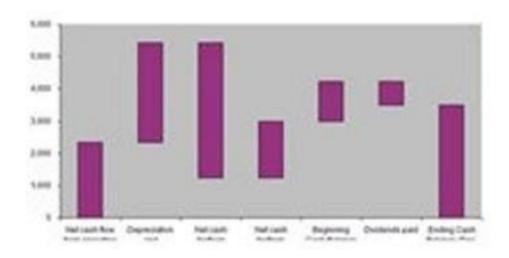
Following are those charts:

Treemap

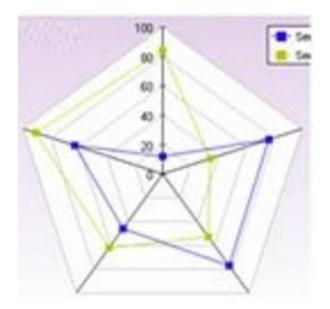




Waterfall chart

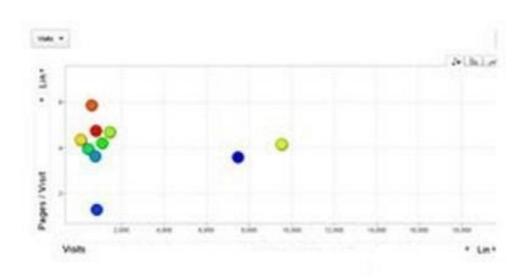


Radar chart





Bubble chart



The reason you should be avoiding reporting data via these charts to your clients is simple. The majority of people have no idea what you are trying to communicate via these charts. Use these charts only when your target audience is as data-savvy as you.

Best practices for designing column and line charts

#1 Start the 'Y' axis value at zero

When you do not start the 'Y' axis value of a chart at zero, the chart does not accurately reflect the size of the variables (in case of column charts) and trend (in case of line charts).



For example, the following column chart amplify changes because the 'y' axis value starts at 440 instead of 0:



Following is the correct column chart:



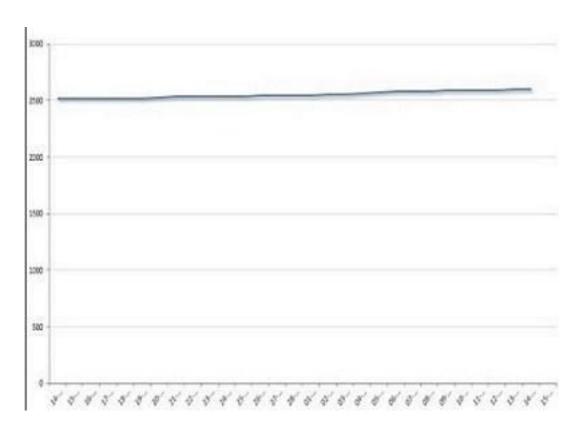


Another example. The following line chart amplifies the growth of Facebook fans because the 'y' axis value start at 2500 instead of 0:



Following is the correct line chart:

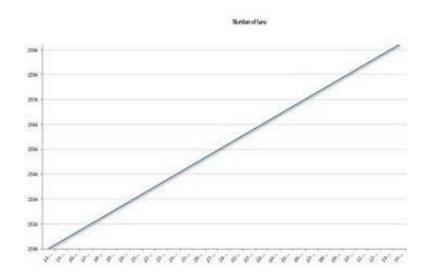




#2 Do not use line chart (to create trends) if you have less than eight data points

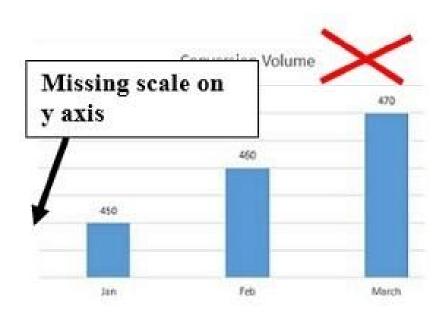
When you create a line chart with a few data points, the trend that you see can be very misleading. For example, the following line chart just contain two data points and as a result, it makes the growth look phenomenal:





For a line chart, the more data points the better.

#3 Do not hide the scale on the 'y' axis of a column/line chart



When you hide the scale of the 'y' axis, your chart won't accurately reflect the size of the variables (in case of column charts) and trend (in case of line



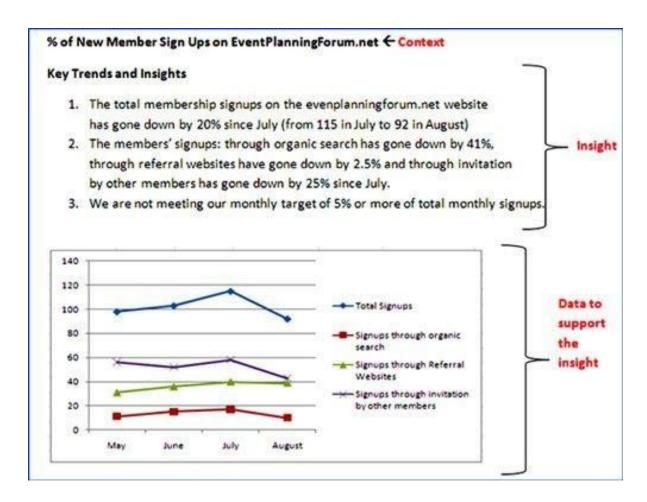
charts). Without any scale on the y-axis, there is no way of knowing where the y-axis starts. When you use such charts it creates doubt on your analysis.

#4 Add context to your chart

Different people analyze and interpret the same chart differently. It all depends upon the **context** in which they analyze and interpret the chart. No matter what chart you select, some people will always find a way to misinterpret your chart. Therefore it is critical that you provide context with your chart in the form of written commentary and describe exactly the intent of your chart.

First present the context, then the insight and then the chart to support your insight. In this way, you are giving clues to your chart reader regarding how to read your chart. For example:







You are most likely doing Google Analytics all wrong. Here is why...

I have dealt with hundreds of Google Analytics accounts in my career.

I have seen a lot of issues from incorrect tracking code, selecting the wrong KPIs to analyzing data without using custom reports or advanced segments.

But do you know the biggest issue of all in Google analytics?....

It is the "misinterpretation of analytics data."

Many marketers make the mistake of crediting conversions to the wrong marketing channel.

And they seem to be making this mistake over and over again.

They give the credit for conversions to the last touchpoint (campaign, ad, search term...).

They can't help themselves because they believe that Google Analytics reports are 'what you see is what you get.'

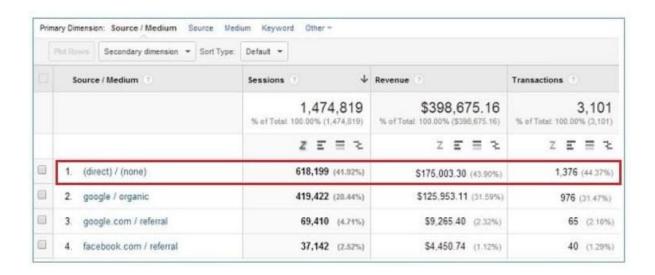
But they are actually 'what you interpret is what you get.'

This has resulted in marketers making wrong business decisions and losing money.



All the data you see in Google Analytics reports today lies to you unless you know exactly how to interpret it correctly.

For example, let's talk about direct traffic.



The majority of marketers looking at this standard 'All Traffic' report in Google Analytics for the last three months will draw the following conclusions:

- Organic traffic is playing a secondary role to direct traffic.
- The majority of traffic and revenue are coming through direct traffic.
- We need to speed up content development and link building to increase organic traffic to the website.





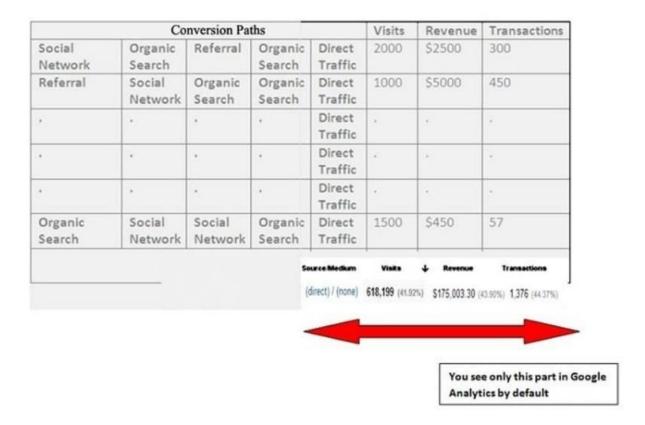
- >> All untagged or incorrectly tagged marketing campaigns from display ads to emails could be reported as direct traffic by Google.
- >> Whenever a referrer is not passed, the traffic is reported as direct traffic by Google.
- >> Mobile applications don't send a referrer. Word/PDF documents don't send a referrer.
- >> '302 redirects' sometimes cause the referrer to be dropped. Sometimes browsers don't pass the referrer.
- >> During an https to http redirect (or vice versa) the referrer is not passed because of security reasons.

All such traffic is reported as direct traffic by Google.



So on the surface it may look like that most people are visiting your website directly but this is not usually the case.

But this analysis does not end here, because you are still not looking at the complete picture.



People do not always access your website directly and then make a purchase straight away.

They are generally exposed to multiple marketing channels (display ads, social media, paid search, organic search, referral websites, email etc) before they access your website directly.

Before they make a purchase.

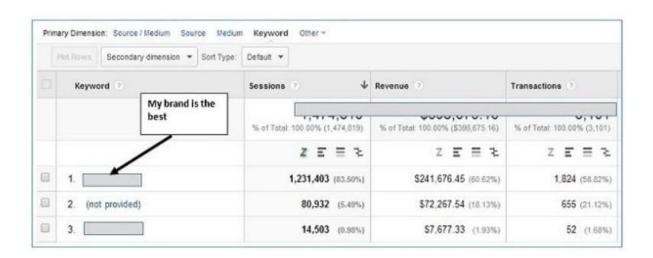


So if you are unaware of the role played by prior marketing channels, you will credit conversions to the wrong marketing channels.

Like in the present case to direct traffic.

To get this type of understanding you need to understand and implement web analytics.

People do not always search for your brand name and then make a purchase straight away.



They generally start their search with a non branded and generic search term then they refine their search queries as they get a better understanding of what exactly they are looking for.

Sometimes they make a purchase right after making a search but often they come back later to your site via a branded search term.



Since a website or brand name is easiest to remember among all branded search terms, it often ends up being attributed a lot of conversions and transactions by Google Analytics.

You learn data analysis and data interpretation from web analytics and not from Google Analytics.

The direction in which your analysis will move will determine the direction in which your marketing campaigns will move.

You get that direction from 'web analytics' and not from 'Google Analytics.'

Web/digital analytics is not about Google Analytics (GA) or Google Tag Manager (GTM). It is about analyzing and interpreting data, setting up goals, strategies and KPIs.

It's about creating a strategic roadmap for your business.

That's why the knowledge of web/digital analytics is so important.

What is the number one skill to have? The skill of all skills?

Some people would say 'marketing'. Some would say 'conversion optimization'. Some would say 'copywriting'. Some would say 'public speaking'...

But here is the thing. None of these skills really matter if you don't have that one skill, the number one skill, the skill of all skills.



That skill is 'analytics'. That's your foundation.

Without adequate knowledge of analytics:

- 1. Your marketing won't work because you won't know what is working and not working in your marketing and where to spend time and money.
- 2. Your conversion optimization won't work because, without the knowledge of maths and stats, all your tests will fail.
- 3. Your copywriting and/or public speaking skills will fail you because you won't know the desires and pain points of your target audience. So you won't be able to address them.

So if you are not ready to learn and master analytics, why you are even doing all these other things. What is the point?

The moment you try to scale your marketing, you are going to fail.

That's why the knowledge of web/digital analytics is so important.

So what I have done is, I have put together a completely free training for you.

This training will teach you what digital analytics really is and how I have been able to leverage it to generate floods of news sales and customers. And how you can literally copy what I have done to get similar results.

Reserve My Seat Now