



The Data Literacy Company

Why should my students graph data in Tuva instead of using a spreadsheet application?

Spreadsheet applications such as Google sheets, Excel, and Numbers are useful for organizing data, but they **are not designed for learning** to visually explore data in different ways quickly and with a statistical mindset.

"Overall, using Tuva greatly sped up the process of creating graphs. Instead of using that time to "make" a graph [in Google] they were able to go more in depth with analyzing what the graphs says about their results." - Toni B., Science Teacher

Tuva	Spreadsheet-based Graphing
Students can quickly and intuitively explore data by simply dragging and dropping different attributes of the data to either axis.	Graphing in spreadsheets involves numerous technical steps, range selections, and clicks
Students can transition to different ways of looking at data quickly without bogging down in multiple technical maneuvers between graph and spreadsheet; they can keep focused on the data.	Technical maneuvers consumes much time when graphing in spreadsheets
Students can develop an aggregate view of data by visualizing how data are distributed along a number line using dot plots, box plots, or histograms. They can use exploratory tools such as dividers, movable reference lines, and a sketch tool to help them reason about group properties of data and make sense of it in a real-world context.	Distributions of data are not easily made in spreadsheet applications
Students can quickly filter data to look only at selected categories or sub-ranges of the data, or to see how including or excluding parts of the data affects statistical measures.	Filtering data in spreadsheets often requires reorganizing the spreadsheet and re-creating a graph from scratch
Students can visually compare graphs using summary statistics (mean, median, linear regression, standard deviation, mode) intuitively and with minimal clicking.	



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<p>Students can visually (and quantitatively) compare variability between groups and reason about what variability means in terms of predictability and uncertainty in claims.</p>	<p>Don't easily make dot plots or box plots, so discussion of variability and its implications for uncertainty in claims are often missing from students' reasoning about data.</p>
<p>Students can see the unique combination of attributes of any individual case (sample), and how a case relates to the rest of the group, using Tuva's interactive display that represents data in several ways at once.</p>	

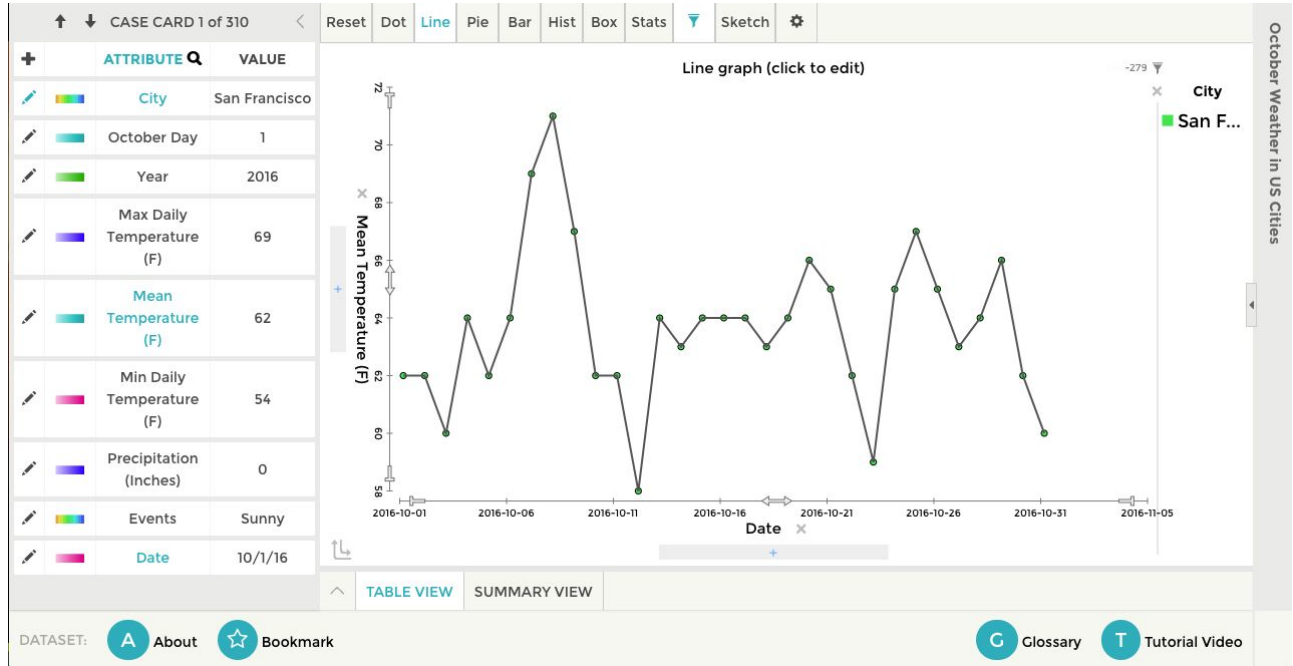
Here is an example of exploring weather data using the same dataset in [Google Sheets](http://tuva.la/2rEhTI5) (<http://tuva.la/2rEhTI5>) and in [Tuva](http://tuva.la/2qYYFei) (<http://tuva.la/2qYYFei>)

<p style="text-align: center;">Google Sheets (http://tuva.la/2rEhTI5)</p>	<p style="text-align: center;">Tuva (http://tuva.la/2qYYFei)</p>
<p><i>What were average daily temperatures during October 2016 in San Francisco?</i></p>	
<ul style="list-style-type: none"> ● Highlight 3 spreadsheet columns ● Click Insert and select Chart ● In Chart editor click Line graph icon ● Click Insert ● Click on X axis, type axis label ● Click Enter 	<ul style="list-style-type: none"> ● Click the pencil by the City attribute ● Uncheck all cities except San Francisco ● Drag date to X axis ● Drag Mean Temperature to Y axis ● Click on Line graph at the top ● Select Line Graph By Category
<p><i>How did October daily temperatures in San Francisco compare with Wichita, Kansas?</i></p>	
<ul style="list-style-type: none"> ● Right click on the graph ● Click Advanced edit ● Click Recommendations tab ● Click on Select Data Range icon ● Highlight appropriate spreadsheet cells ● Click OK 	<ul style="list-style-type: none"> ● Click the Pencil Icon by the City attribute ● Check Wichita
<p><i>How does the variability in October daily temperatures compare in San Francisco and Wichita?</i></p>	
<p>[Google doesn't display a distribution of data, so students must describe range, center, and how tightly grouped the data are from the line graphs.]</p>	<ul style="list-style-type: none"> ● Drag Mean Temperature to X axis ● Drag City to Y axis ● Click Dot on the top menu (or Box)



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An Example of Data Visualization in Tuva:



An Example of Data Visualization in Google Sheets:

