# Video: "MATLABPlotCombinations" (13:50)

Video (0:00):

      Lesson 8 explores ways to combine graphs for better visual display. We have already used 'hold on' and 'hold off' to create line graphs on the same figures. In this lesson we will look at ways to overlay bar charts and plots on the same axis. For emphasis we will use insets for parenthetical information and `plotyy` for items with different units. We will also use `subplot` to create a plot mosaic. The lesson uses the CaliforniaTB data set and we have already downloaded the lesson and set up the data. We will begin by defining some variables. The TB array has 3 columns. The first one is years, the second one is cases and the third one is infection rate per one hundred thousand cases. We will start by plotting cases and years to see what the data looks like. As usual we will create a new figure and plot the data. We see that the axis need to be scaled and of course everything needs to be labeled. Let me scale the cases before I forget. I have another dataset TB gender which contains the cases broken down by men and women, let me also plot that on the same graph. TB gender only has 10 rows, it started in 1998 where as TB started in 1985. Let me define a variable genderYears corresponding to the gender by years for TB gender. I will also define menTB and womenTB corresponding to the men and women respectively. Rather than plotting the men and the women separately let me create a new array, genderTB that contains menTb and womenTB as its columns so I can use a single plot. I will use the usual plots with hold on and hold offs to plot all of these on the same axis, I'm using the x, y form of plot. When I save and execute I see a very strange graph with the overall cases being virtually invisible. This is because I forgot to scale genderTB. After fixing the scaling and saving and executing I see a better graph, I can now at least see all 3 lines, but it isn't quite what I want. I'd like to see the case breakdown of men and women so line graphs don't really show it to me, but we can use stacked bar charts. I just have to change the plot to bar and add the argument stack to make it a stacked bar chart. After saving and executing I see the breakdown in a much clearer way. From a visual standpoint this figure needs work. Let me change the color map to copper because this will make men and women more distinguishable. I will also change the color of the cases line to black and make it bigger so it stands out more. I use the LineWidth argument to do this. I'll also add appropriate labels to the graph and take a look.

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      Now I'll add a pie chart insect to this graph. Insets are useful for displaying information when you don't want it to be the primary focus. When assembling a complicated figure it's a good idea to make sure each part works before putting it in the figure. I'm going to try the pie chart first by itself. I'll create a new variable totalByGender that holds the totals for men and women cases. The pie chart is just a pie command. I save and execute and see that it works. Now I'm going to create a new figure with the stacked bar chart as the primary focus and the pie as an inset. I'll start with a new copy of the pie chart figure. An inset is simply and axis places on the figure and I create that axis with the axis command. I need to position my axis somewhere on the

unit square I'll guess the upper right corner. I use the position property to do this. The value of the position property is a 4 value vector. The first 2 values are the x and y positions of the lower left corner of the new axis. The second 2 values are the width and the height of the axis. Now i'll add the pie chart using the axis. When I save and execute I see I'm a little off. We have to move it and we could make the pie chart a little bigger. I'll adjust the positions and the size of the pie chart and let me add a legend. I have to add the legend command above the axis so it applies to the graphs above ut and not the pie chart. I'll also add a title. I'll also put a box around the original axis to give the graph a more finished look. I save and execute and see there are still some problems. The pie is too far out and it overlaps with the legend. I adjust the pie position. The pie position looks correct but the legend still needs to be adjusted. I'll use the location argument to move the legend to a better spot, in this case the lower left corner. I save and execute and see my finished graph.

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        The next example I'm going to plot 2 variables with different units on the same graph: infection rate and cases. First I create a variable for infection rate which is the 3rd column. Infection rate and cases have different units they shouldn't have the same axis, so we will use plotyy to solve that problem. Plotyy overlays 2 sets of axis, the x value should be roughly the same but they don't have to agree exactly. The y values are going to be different. Plotyy usually has 4 arguments: the first x and y followed by the second x and y. I save and execute to see the graph. To make the graph more visually distinctive. I'm going to plot cases as a bar chart and overlay it with a line graph of the infection rate. Plotyy allows you to specify what type of graph you want for each set of data. When I view the graph and see that the colors aren't too good and it's hard to see the graphs. To make the changes I need to add properties to the axis and the graphs. Plotyy return handles to the axis and the graphs which allow me to do that. Ax is a 2 element vector where ax[1] is a handle to the left axis and ax[2] is a handle to the right axis. H1 is a handle to the bar graph and h2 is a handle to the line graph. Here I'm setting the ylabel of the left axis to cases in thousands. Notice I have a syntax error when referring to the particular axis. I'm going to set the xlabel of the left graph. Now I'm going to add a title and I don't need to specify the axis. To change the colors of the bars I will use the set command. The property is FaceColor and I'm going to make it a nice light grey. I'm also going to make the line graph line wider so it's more easy to see. I forgot to label the y axis of the right group, so let me do that. The handle is ax(2) and is infection rate per one hundred thousand. Here is the finished graph.

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        The last graph demonstrates how to use subplot to create a mosaic of plot axis. You should always begin by laying out your mosaic before adding any graphics. I create a new figure and create each new subplot. The first 2 arguments of subplot give the arrangement of axis in the plot mosaic. I'm going to have axis arranged in two rows. The last argument gives the position of each graph starting right to left, top to bottom. My plots are labeled 1 and 2. I'm going to create a

mosaic of the pie chart and the infection rate. I start by cutting and pasting the pie chart in. It goes after the subplot but don't have the figure line. Now I cut and paste the other one in without the figure line. This example appears complicated because it has a lot of code but if you look closely you will see it's just the 2 previous examples combined and separated by subplot calls. I save and execute and look at the graph and see it's going to need a few adjustments. The pie chart is way too big and I see redundant information. Let me get rid of the title in the lower graph and the xlabel in the upper graph. I'll adjust the position of the pie chart too and the size. I save and execute and I see the graph looks a lot better but  there is still a few issues. The infection rate per hundred thousand label is too long. I can get rid of the word infection but a bigger problem is the axis don't line up and it's a fatal flaw. We'll have to fix it with an xLim property this is demonstrated in the lesson.