Faceting

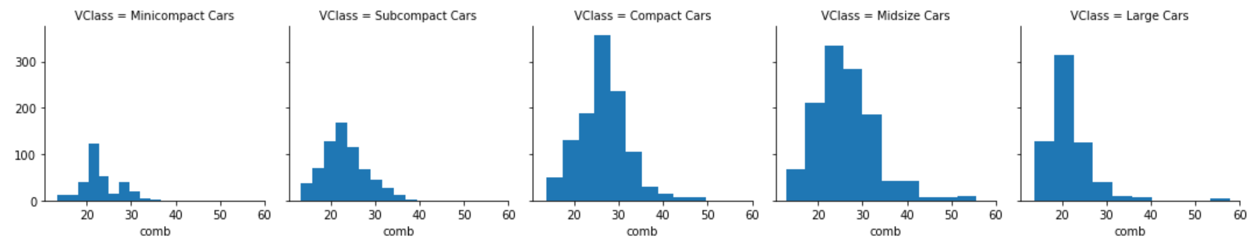
One general visualization technique that will be useful for you to know about to handle plots of two or more variables is **faceting**. In faceting, the data is divided into disjoint subsets, most often by different levels of a categorical variable. For each of these subsets of the data, the same plot type is rendered on other variables. Faceting is a way of comparing distributions or relationships across levels of additional variables, especially when there are three or more variables of interest overall. While faceting is most useful in multivariate visualization, it is still valuable to introduce the technique here in our discussion of bivariate plots.

For example, rather than depicting the relationship between one numeric variable and one categorical variable using a violin plot or box plot, we could use faceting to look at a histogram of the numeric variable for subsets of the data divided by categorical variable levels. Seaborn's FacetGrid class facilitates the creation of faceted plots. There are two steps involved in creating a faceted plot. First, we need to create an instance of the FacetGrid object and specify the feature we want to facet by (*vehicle class, "VClass" in our example*). Then we use the map method on the FacetGrid object to specify the plot type and variable(s) that will be plotted in each subset (*in this case, the histogram on combined fuel efficiency "comb"*).

Example 1.

```
# Preparatory Step

fuel_econ = pd.read_csv('fuel_econ.csv')


# Convert the "VClass" column from a plain object type into an ordered categorical type

sedan_classes = ['Minicompact Cars', 'Subcompact Cars', 'Compact Cars', 'Midsize Cars', 'Large Cars']

vclasses = pd.api.types.CategoricalDtype(ordered=True, categories=sedan_classes)

fuel_econ['VClass'] = fuel_econ['VClass'].astype(vclasses);


# Plot the Seaborn's FacetGrid

g = sb.FacetGrid(data = fuel_econ, col = 'VClass')

g.map(plt.hist, "comb")
```

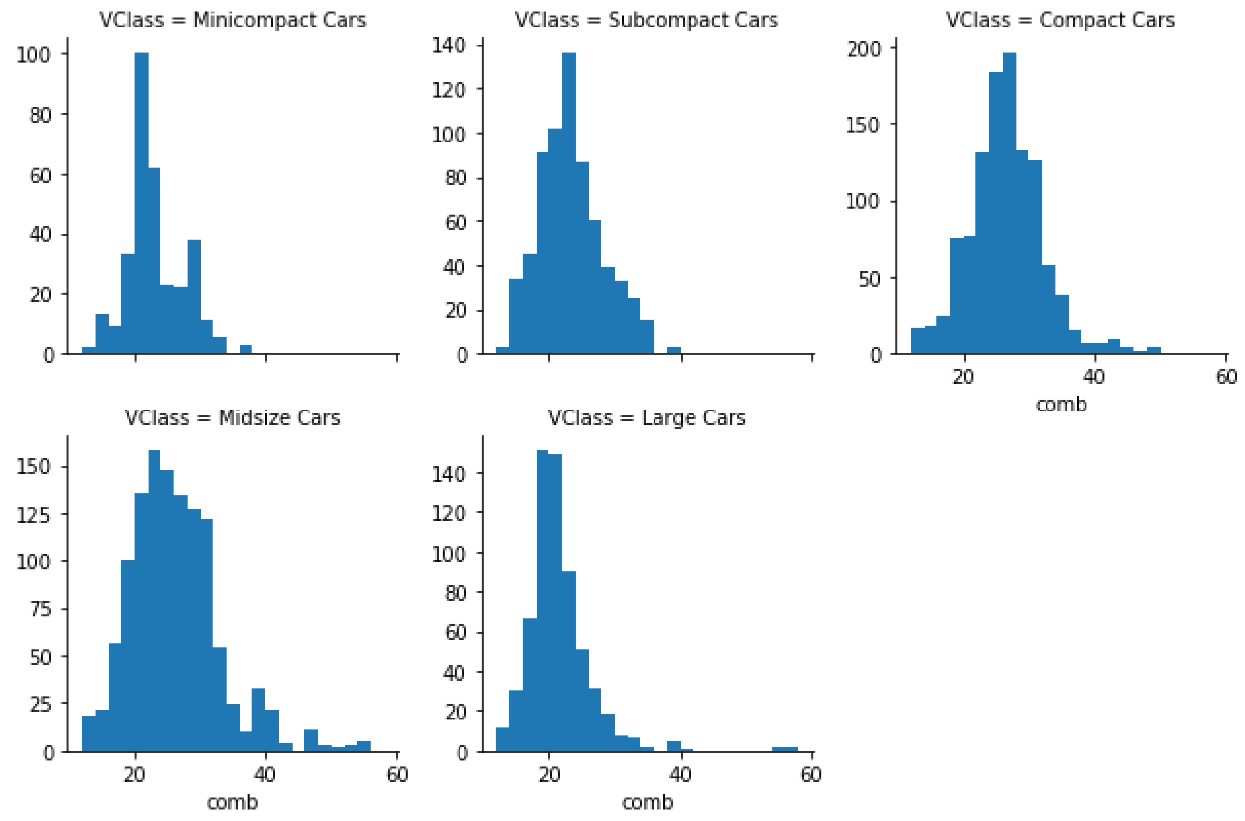
In the map call, just set the plotting function and variable to be plotted as positional arguments. Don't set them as keyword arguments, like x = "comb", or the mapping won't work properly.



Notice that each subset of the data is being plotted independently. Each uses the default of ten bins from hist to bin together the data, and each plot has a different bin size. Despite that, the axis limits on each facet are the same to allow clear and direct comparisons between groups. It's still worth cleaning things a little bit more by setting the same bin edges on all facets. Extra visualization parameters can be set as additional keyword arguments to the map function.

Example 2.

```
bin_edges = np.arange(12, 58+2, 2)


# Try experimenting with dynamic bin edges

# bin_edges = np.arange(-3, fuel_econ['comb'].max()+1/3, 1/3)


g = sb.FacetGrid(data = fuel_econ, col = 'VClass', col_wrap=3, sharey=False)

g.map(plt.hist, 'comb', bins = bin_edges);
```



Additional Variation

If you have many categorical levels to plot, then you might want to add more arguments to the FacetGrid object's initialization to facilitate clarity in the conveyance of information. The example below includes a categorical variable, "trans", that has 27 different transmission types. Setting col_wrap = 7 means that the plots will be organized into rows of 7 facets each, rather than a single long row of 27 plots.

Also, we want to have the facets for each transmission type in the decreasing order of combined fuel efficiency.

Example 3.

```
# Find the order in which you want to display the Facets

# For each transmission type, find the combined fuel efficiency

group_means = fuel_econ[['trans', 'comb']].groupby(['trans']).mean()


# Select only the list of transmission type in the decreasing order of combined fuel efficiency

group_order = group_means.sort_values(['comb'], ascending = False).index
```

```
# Use the argument col_order to display the FacetGrid in the desirable group_order
g = sb.FacetGrid(data = fuel_econ, col = 'trans', col_wrap = 7, col_order = group_order)
g.map(plt.hist, 'comb')
```