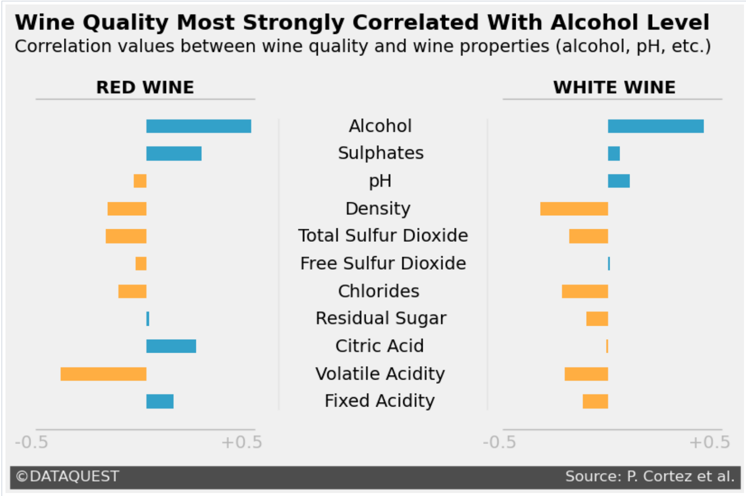
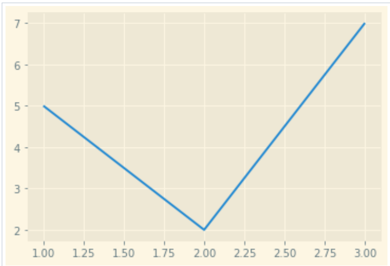
1. Matplotlib Styles

So far in this course, we've learned about design and data storytelling. In this lesson, we're going to focus our attention on Matplotlib's pre-defined styles. For this case study, we'll use the `fivethirtyeight` style to build this graph.



Matplotlib's pre-defined styles change the default visual properties of graphs. Below, we create a line plot using the `Solarize_Light2` style. To do that, we import the [`matplotlib.style` submodule] and then use the [`style.use()` function].

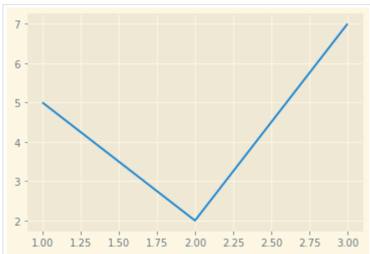
```
import matplotlib.pyplot as plt
import matplotlib.style as style

style.use('Solarize_Light2')
plt.plot([1, 2, 3], [5, 2, 7])
plt.show()
```



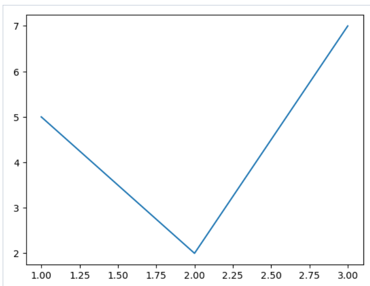
Note that we must use the `style.use()` function before we create the graph — before calling the `plt.plot()` function.

After we call `style.use('Solarize_Light2')`, all subsequent graphs will inherit this style. To get back to the default settings, we need to use `style.use('default')`.

```
style.use('Solarize_Light2')
plt.plot([1, 2, 3], [5, 2, 7])
plt.show()
```



```
style.use('default')
plt.plot([1, 2, 3], [5, 2, 7])
plt.show()
```



We can see all the available styles by accessing the [`style.available` attribute](#).

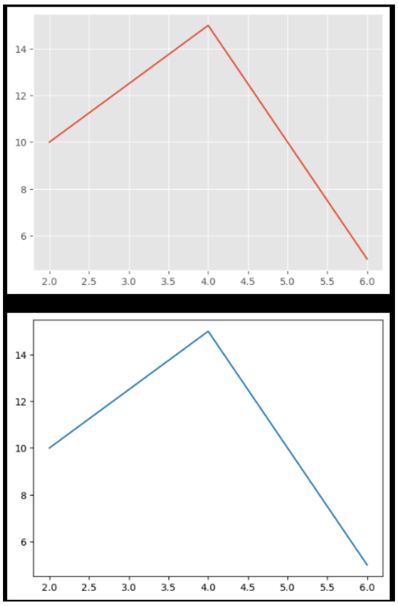
```
style.available
['Solarize_Light2',
 '_classic_test_patch',
 'bmh',
 'classic',
 'dark_background',
 'fast',
 'fivethirtyeight',
 'ggplot',
 'grayscale',
 'seaborn',
 'seaborn-bright',
 'seaborn-colorblind',
 'seaborn-dark',
 'seaborn-dark-palette',
 'seaborn-darkgrid',
 'seaborn-deep',
 'seaborn-muted',
 'seaborn-notebook',
 'seaborn-paper',
 'seaborn-pastel',
 'seaborn-poster',
 'seaborn-talk',
 'seaborn-ticks',
 'seaborn-white',
 'seaborn-whitegrid',
 'tableau-colorblind10']
```

If you want to switch between different styles, use `style.use('default')` between each change — some of the styles can interfere with one another.

Now, let's practice what we learned.

Instructions

1. Create a line plot using the `ggplot` style.
    - The x-coordinates are `[2, 4, 6]`.
    - The y-coordinates are `[10, 15, 5]`.
    - Close and display the plot using `plt.show()`.
2. Create a line plot using the default style.
    - The coordinates are the same as above.
    - Close and display the plot using `plt.show()`.




```
import matplotlib.pyplot as plt
import matplotlib.style as style

style.use('ggplot')
plt.plot([2, 4, 6],[10, 15, 5])
plt.show()

style.use('default')
plt.plot([2, 4, 6],[10, 15, 5])
plt.show()
```

2. Wine Quality Dataset

We'll now take one Matplotlib style and build upon it — the `fivethirtyeight` style. We've already seen two FiveThirtyEight graphs in our previous lesson. You can see more of their graphs [here](#).

We're going to use a dataset on wine quality. Researchers P. Cortez, A. Cerdeira, F. Almeida, T. Matos and J. Reis. collected this data for their [research paper](#). We can find documentation and download the dataset from the [UCI Machine Learning Repository](#).

The data comes in the form of two files:

- `winequality-red.csv`: data for red wine.
- `winequality-white.csv`: data for white wine.b

Below, we see the first five rows of the `winequality-red.csv` file:

```
import pandas as pd
red_wine = pd.read_csv('winequality-red.csv', sep=';')
red_wine.head()
```

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	quality
0	7.4	0.70	0.00	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	9.4	5
1	7.8	0.88	0.00	2.6	0.098	25.0	67.0	0.9968	3.20	0.68	9.8	5
2	7.8	0.76	0.04	2.3	0.092	15.0	54.0	0.9970	3.26	0.65	9.8	5
3	11.2	0.28	0.56	1.9	0.075	17.0	60.0	0.9980	3.16	0.58	9.8	6
4	7.4	0.70	0.00	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	9.4	5

We want to determine which attributes (pH, alcohol level, etc.) most strongly correlate with wine quality. Below, we see the correlation values between `quality` and the other columns (if you need a recap or want to learn about correlation, [this lesson](#) offers a good introduction).

```
red_wine.corr()['quality'][:-1]
fixed acidity           0.124052
volatile acidity       -0.390558
citric acid             0.226373
residual sugar          0.013732
chlorides              -0.128907
free sulfur dioxide    -0.050656
total sulfur dioxide   -0.185100
density                -0.174919
pH                     -0.057731
sulphates               0.251397
alcohol                 0.476166
Name: quality, dtype: float64
```

Red wine quality most strongly correlates with alcohol level and volatile acidity. If you're curious, you can find information on the Internet on each wine property. In [this article](#), for instance, we see that volatile acidity contributes to the smell and taste of vinegar in wine.

Let's now calculate correlations for the white wine dataset.

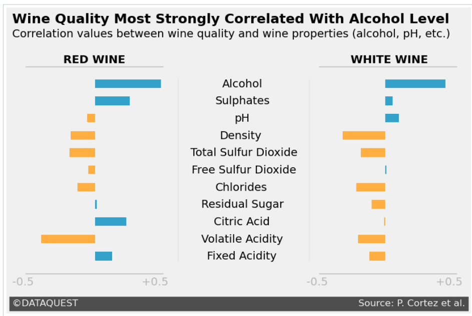
Instructions

1. Read in the `winequality-white.csv` file into a pandas `DataFrame`.
   - Use `sep=';'` to properly read the file.
   - Assign the result to `white_wine`.
2. Calculate the correlation between `quality` and the other columns of `white_wine`.
   - The result should be a pandas `Series` with the same structure as the `Series` resulted from `red_wine.corr()['quality'][:-1]`.
   - Assign the correlation values to `white_corr`.
3. Examine the correlation values — what are the strongest two correlations? How does this compare to the red wine values?

red_corrSeries (<class 'pandas.core.series.Series'>)	white_corrSeries (<class 'pandas.core.series.Series'>)
quality	quality
alcohol 0.476166	alcohol 0.435575
sulphates 0.251397	pH 0.099427
citric acid 0.226373	sulphates 0.053678
fixed acidity 0.124052	free sulfur dioxide 0.008158
residual sugar 0.013732	citric acid -0.009209
free sulfur dioxide-0.050656pH-0.057731	residual sugar -0.097577
chlorides-0.128907	fixed acidity -0.113663
density-0.174919	total sulfur dioxide -0.174737
total sulfur dioxide-0.185100	volatile acidity -0.194723
volatile acidity-0.390558	chlorides -0.209934
	density -0.307123

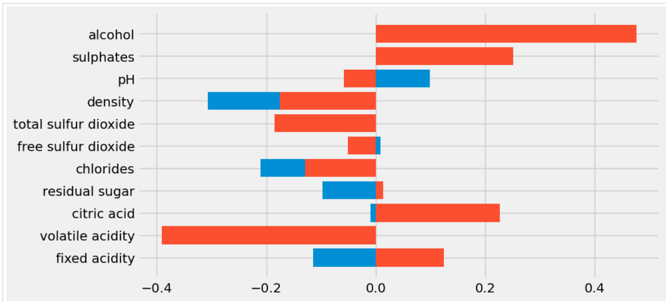
3.FiveThirtyEight Style

Previously, we calculated the correlation values between wine quality and wine properties. We want to represent these values visually in the form of two bar plots. Below, you can see what we want to build.



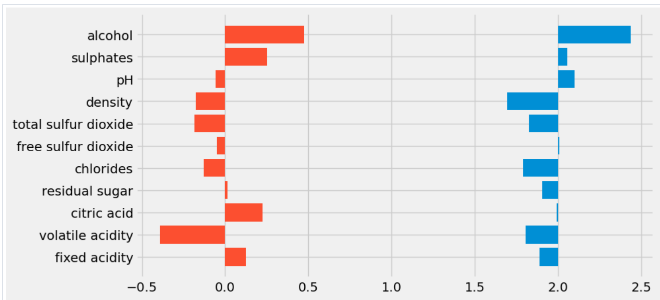
Let's start by creating the two bar plots using the `fivethirtyeight` style.

```
style.use('fivethirtyeight')
fig, ax = plt.subplots(figsize=(9, 5))
ax.barh(white_corr.index, white_corr)
ax.barh(red_corr.index, red_corr)
plt.show()
```



We can tell from the two colors that Matplotlib built two different bar plots. It's not clear which is which, though.
To separate them, we're going to move the white wine plot to the right side of the graph. To do that, we can use the `left` parameter of the `Axes.barh()` method. This parameter moves the left sides of the bars from their default x-coordinate of `0`. In our case, `left=2` moves them from `0` to `2` (for bars representing negative quantities, the right sides move from `0` to `2`).

```
# Assume the other code is written
ax.barh(white_corr.index, white_corr, left=2)
ax.barh(red_corr.index, red_corr)
```



Based on the principle of proximity, we now see two different bar plots: the red wine plot on the right (red-colored), and the white wine plot on the left (blue-colored).
To maximize the data-ink ratio, let's now erase the following:

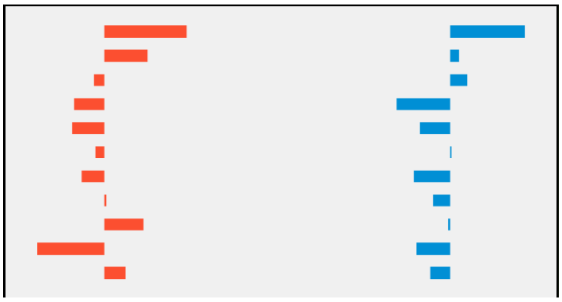
- Non-data ink
- Redundant data ink

Although you don't see the code, note that these have remained saved from the previous screen: `red_wine`, `white_wine`, `red_corr`, `white_corr`.

Instructions

1. Remove the grid of the graph using the `Axes.grid()` method. Read the documentation to find the parameter you need to use.
2. Remove the x- and y-tick labels. Use the `Axes.set_xticklabels()` method and the `Axes.set_yticklabels()` method.
3. Reduce the width of each bar to `0.5` by using the `Axes.barh()` method — you'll need to use the `height` parameter.

```
# Initial Code

style.use('fivethirtyeight')
fig, ax = plt.subplots(figsize=(9, 5))
# ax.barh(white_corr.index, white_corr, left=2)
# ax.barh(red_corr.index, red_corr)
# *** *** *** *** *** *** *** *** *** ***

# Solution Code
ax.barh(white_corr.index, white_corr, left=2, height=0.5)
ax.barh(red_corr.index, red_corr, height=0.5)

ax.grid(b=False)
ax.set_yticklabels([])
ax.set_xticklabels([])

plt.show()
```

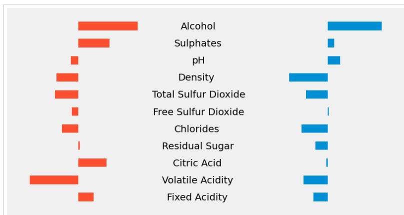


4.Adding Y-tick Labels

In the previous exercise, we erased the grid and the x- and y-tick labels, and we reduced the width of the bars. We'll now focus on adding structural elements so the audience can read the graph.

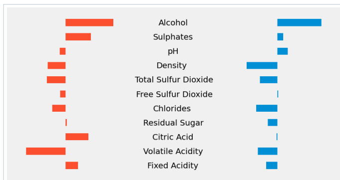
We begin by adding y-tick labels in the center of the graph — both bar plots have the same y-tick labels. Below, we add the labels using `Axes.text()` and specify the coordinates manually. This can be a bit cumbersome, but it also gives us the precision and flexibility we need.

```
# Assume the rest of the code is written
x_coords = {'Alcohol': 0.82, 'Sulphates': 0.77, 'pH': 0.91,
      'Density': 0.80, 'Total Sulfur Dioxide': 0.59,
      'Free Sulfur Dioxide': 0.6, 'Chlorides': 0.77,
      'Residual Sugar': 0.67, 'Citric Acid': 0.76,
      'Volatile Acidity': 0.67, 'Fixed Acidity': 0.71}
y_coord = 9.8

for y_label, x_coord in x_coords.items():
  ax.text(x_coord, y_coord, y_label)
  y_coord -= 1
```

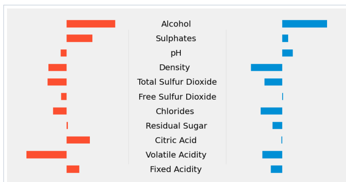


To create more space between the labels and each bar plot, we'll move the red wine bar plot a little to the left. We'll use `left=-0.1` — this moves the x-coordinate of the left sides of the bars from `0` to `-0.1`.

```
# Assume the rest of the code is written
ax.barh(red_corr.index, red_corr, height=0.5, left=-0.1)
```



To visually separate the labels from the bar plots, we're going to add two vertical lines — one to the left of the labels column, and the other to the right, like this:



Instructions

Using the `Axes.axvline()` method:

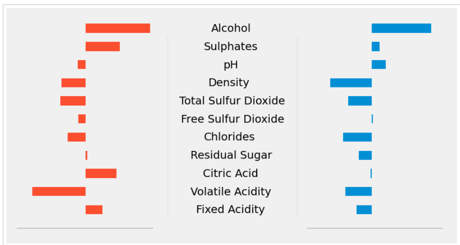
1. Add a vertical line to the left of the labels column. The line should have the following properties:
   - The x-coordinate is `0.5`.
   - The color is `grey`.
   - The `alpha` value is `0.1`.
   - The line width is `1`.
   - The `ymin` is `0.1` and the `ymax` is `0.9`.
2. Add a vertical line to the right of the labels column. The line should have the following properties:
   - The x-coordinate is `1.45`.
   - The color is `grey`.
   - The `alpha` value is `0.1`.
   - The line width is `1`.
   - The `ymin` is `0.1` and the `ymax` is `0.9`.

```
style.use('fivethirtyeight')
fig, ax = plt.subplots(figsize=(9, 5))
ax.barh(white_corr.index, white_corr, left=2, height=0.5)
ax.barh(red_corr.index, red_corr, height=0.5, left=-0.1)

ax.grid(b=False)
ax.set_yticklabels([])
ax.set_xticklabels([])

x_coords = {'Alcohol': 0.82, 'Sulphates': 0.77, 'pH': 0.91,
            'Density': 0.80, 'Total Sulfur Dioxide': 0.59,
            'Free Sulfur Dioxide': 0.6, 'Chlorides': 0.77,
            'Residual Sugar': 0.67, 'Citric Acid': 0.76,
            'Volatile Acidity': 0.67, 'Fixed Acidity': 0.71}
y_coord = 9.8
for y_label, x_coord in x_coords.items():
    ax.text(x_coord, y_coord, y_label)
    y_coord -= 1
########################## codigo añadido   ##########################
ax.axvline(x = 0.5 ,ymin = 0.1 , ymax = 0.9, alpha = 0.1, color = 'grey' )
ax.axvline(x = 1.45 ,ymin = 0.1 , ymax = 0.9,  alpha = 0.1, color = 'grey'  )
plt.show()
```

5.Adding X-tick Labels

On the previous screen, we focused on adding y-tick labels. Now, we need to add x-tick labels so the audience can read the correlation values.

To do that, **we're going to add a horizontal line under each bar plot.** Note that we control the position of the lines along the x-axis through the`xmin`and the`xmax`parameters.

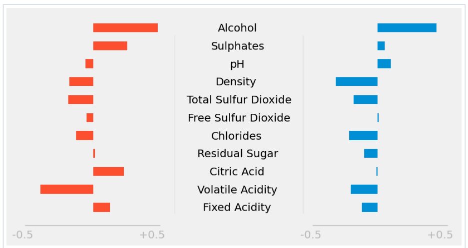



```
# Assume the rest of the code is written
ax.axhline(-1, color='grey', linewidth=1, alpha=0.5,
     xmin=0.01, xmax=0.32)
ax.axhline(-1, color='grey', linewidth=1, alpha=0.5,
      xmin=0.67, xmax=0.98)
```

All correlations range between -0.5 and +0.5, and we're going to use these two values as extremes.

We're going to add these values as x-tick labels under each horizontal line. Below, note that we also use string concatenation (and`' '*31`means`31`space characters).

```
# Assume the rest of the code is written
ax.text(-0.7, -1.7, '-0.5'+ ' '*31 + '+0.5',
    color='grey', alpha=0.5)
ax.text(1.43, -1.7, '-0.5'+ ' '*31 + '+0.5',
    color='grey', alpha=0.5)
```



Now, we're going to add a title to each bar plot to show which is the plot for red wine and which is the other. To do that, we're going to draw a horizontal line above each plot. Then, we'll write`"RED WINE"`and`"WHITE WINE"`respectively above the horizontal lines.

Instructions

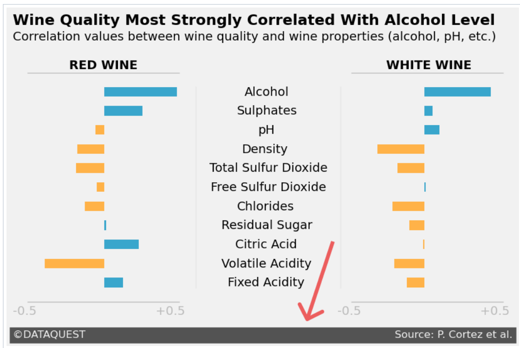
```
style.use('fivethirtyeight')
fig, ax = plt.subplots(figsize=(9, 5))
ax.barh(white_corr.index, white_corr, left=2, height=0.5)
ax.barh(red_corr.index, red_corr, height=0.5, left=-0.1)

ax.grid(b=False)
ax.set_yticklabels([])
ax.set_xticklabels([])

x_coords = {'Alcohol': 0.82, 'Sulphates': 0.77, 'pH': 0.91,
            'Density': 0.80, 'Total Sulfur Dioxide': 0.59,
            'Free Sulfur Dioxide': 0.6, 'Chlorides': 0.77,
            'Residual Sugar': 0.67, 'Citric Acid': 0.76,
            'Volatile Acidity': 0.67, 'Fixed Acidity': 0.71}
y_coord = 9.8
for y_label, x_coord in x_coords.items():
    ax.text(x_coord, y_coord, y_label)
    y_coord -= 1

ax.axvline(0.5, c='grey', alpha=0.1, linewidth=1,
           ymin=0.1, ymax=0.9)
ax.axvline(1.45, c='grey', alpha=0.1, linewidth=1,
           ymin=0.1, ymax=0.9)

ax.axhline(-1, color='grey', linewidth=1, alpha=0.5,
          xmin=0.01, xmax=0.32)
ax.text(-0.7, -1.7, '-0.5'+ ' '*31 + '+0.5',
        color='grey', alpha=0.5)
ax.axhline(-1, color='grey', linewidth=1, alpha=0.5,
           xmin=0.67, xmax=0.98)
ax.text(1.43, -1.7, '-0.5'+ ' '*31 + '+0.5',
        color='grey', alpha=0.5)
```

1. Add a horizontal line above the red bar plot. The line should have the following properties:
    - The y-coordinate is `11`.
    - The color is`grey`.
    - The line width is `1`.
    - The`alpha`value is`0.5`.
    - The`xmin`is`0.01`, and the`xmax`is`0.32`.
2. Add the text `RED WINE` above the horizontal line you've just built. The text should have the following properties:
    - Its coordinates are`-0.33`(x) and`11.2`(y).
    - It's bolded.
3. Add a horizontal line above the blue bar plot. The line should have the following properties:
    - The y-coordinate is`11`.
    - The color is`grey`.
    - The line width is`1`.
    - The`alpha`value is`0.5`.
    - The`xmin`is`0.67`, and the`xmax`is`0.98`.
4. Add the text `WHITE WINE` above the horizontal line you've just built. The text should have the following properties:
    - Its coordinates are`1.75`(x) and`11.2`(y).
    - It's bolded.

```
ax.axhline(11, color='grey', linewidth=1, alpha=0.5,
     xmin=0.67, xmax=0.98)

ax.axhline(11, color='grey', linewidth=1, alpha=0.5,
     xmin=0.01, xmax=0.32)

ax.text(-0.33, 11.2, 'RED WINE',
    color='grey', alpha=0.5, weight = 'bold')

ax.text(1.75, 11.2, 'WHITE WINE',
    color='grey', alpha=0.5, weight = 'bold')

plt.show()
```

6.Adding a Signature

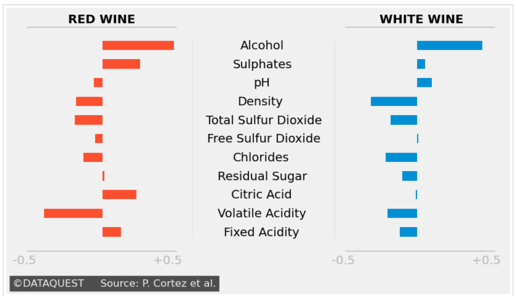
FiveThirtyEight graphs generally have a **signature bar at the bottom,** where we see the creator's name and the data source.



Matplotlib doesn't provide us with a function dedicated to generating signature bars. Again, **we need to be creative and use the existing tools in creative ways**.

One way to draw a signature bar is to add text with a dark background color. Below, we add the text`©DATAQUEST Source: P. Cortez et al.`with a background color of`#4d4d4d`(a shade of grey). The text itself has the color`#f0f0f0`, which is the same as the graph's background color.

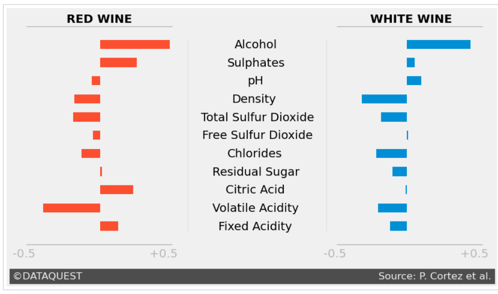
```
# Assume the rest of the code is written
ax.text(-0.7, -2.9,
    '©DATAQUEST   Source: P. Cortez et al.',
    color = '#f0f0f0',
    backgroundcolor = '#4d4d4d',
    size=12)
```



To create the visual effect of a signature, we need to add more white space between`©DATAQUEST`and`Source: P. Cortez et al.`. We can use multiplication to add multiple white spaces —`' '*94`adds 94 white spaces.

```
# Assume the rest of the code is written
ax.text(-0.7, -2.9,
    '©DATAQUEST' + ' '*94 + 'Source: P. Cortez et al.',
    color = '#f0f0f0',
    backgroundcolor = '#4d4d4d',
    size=12)
```

*espacio entre daraquest y 'source'



Note that we perceive the creator's name and the data source as grouped together. They are part of the same group (part of the signature) thanks to the enclosure we create with the dark grey rectangle.

Let's now add a title and a subtitle to our graph. To maximize data-ink, we're going to do the following:

- We'll use the title to show data.
- We'll use the subtitle to explain the numerical values.

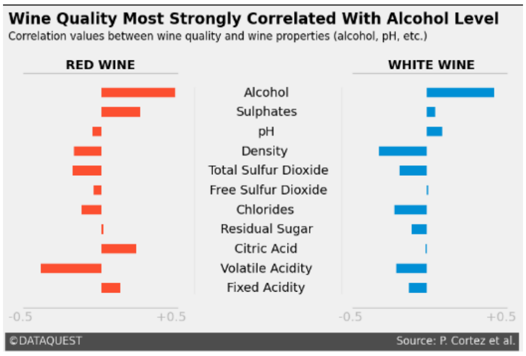
Instructions

```
style.use('fivethirtyeight')
fig, ax = plt.subplots(figsize=(9, 5))
ax.barh(white_corr.index, white_corr, left=2, height=0.5)
ax.barh(red_corr.index, red_corr, height=0.5, left=-0.1)

ax.grid(b=False)
ax.set_yticklabels([])
ax.set_xticklabels([])

x_coords = {'Alcohol': 0.82, 'Sulphates': 0.77, 'pH': 0.91,
            'Density': 0.80, 'Total Sulfur Dioxide': 0.59,
            'Free Sulfur Dioxide': 0.6, 'Chlorides': 0.77,
            'Residual Sugar': 0.67, 'Citric Acid': 0.76,
            'Volatile Acidity': 0.67, 'Fixed Acidity': 0.71}
y_coord = 9.8
for y_label, x_coord in x_coords.items():
    ax.text(x_coord, y_coord, y_label)
    y_coord -= 1

ax.axvline(0.5, c='grey', alpha=0.1, linewidth=1,
           ymin=0.1, ymax=0.9)
ax.axvline(1.45, c='grey', alpha=0.1, linewidth=1,
           ymin=0.1, ymax=0.9)

ax.axhline(-1, color='grey', linewidth=1, alpha=0.5,
          xmin=0.01, xmax=0.32)
ax.text(-0.7, -1.7, '-0.5'+ ' '*31 + '+0.5',
        color='grey', alpha=0.5)
ax.axhline(-1, color='grey', linewidth=1, alpha=0.5,
           xmin=0.67, xmax=0.98)
ax.text(1.43, -1.7, '-0.5'+ ' '*31 + '+0.5',
        color='grey', alpha=0.5)

ax.axhline(11, color='grey', linewidth=1, alpha=0.5,
           xmin=0.01, xmax=0.32)
ax.text(-0.33, 11.2, 'RED WINE', weight='bold')
ax.axhline(11, color='grey', linewidth=1, alpha=0.5,
           xmin=0.67, xmax=0.98)
ax.text(1.75, 11.2, 'WHITE WINE', weight='bold')

ax.text(-0.7, -2.9,
        '©DATAQUEST' + ' '*94 + 'Source: P. Cortez et al.',
        color = '#f0f0f0', backgroundcolor = '#4d4d4d',
        size=12)
```

1. Add the title `Wine Quality Most Strongly Correlated With Alcohol Level`. The title should have the following properties:
    - Its coordinates are`-0.7`(x) and`13.5`(y).
    - The size is`17`.
    - It's bolded.

2. Add the subtitle`Correlation values between wine quality and wine properties (alcohol, pH, etc.)`. Its coordinates are`-0.7`(x) and`12.7`(y). Leave the font size on default.

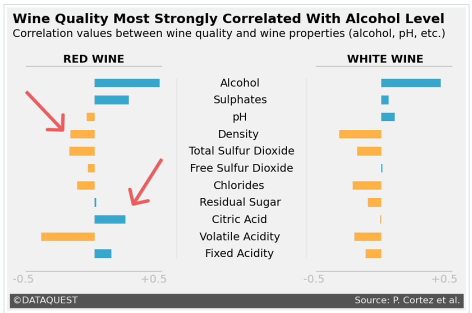
```
ax.text(-0.7, 13.5, 'Wine Quality Most Strongly Correlated With Alcohol Level',
size=17, weight='bold')

ax.text(-0.7, 12.7, 'Correlation values between wine quality and wine properties (alcohol, pH, etc.)', size=12)

plt.show()
```



7.Coloring Bars Differently

The last change we're going to make to our graph is the bar colors:

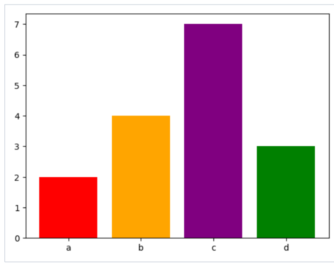
- **Positive correlation** values will take the color`#33A1C9`(a tint of blue).
- **Negative correlation** values will take the color`#ffae42`(a tint of orange).



To make this change, we'll use the `color` parameter of `Axes.barh()`. So far, we've only used strings with this parameter:`'blue'`,`'red'`,`'#b00b1e'`, etc.

The `color` parameter, however, can also take in an array of strings, where each string represents a color. Below, we use a Python `list` to specify the colors for four bars — note that Matplotlib preserves the order of colors in the list:

```
colors = ['red', 'orange', 'purple', 'green']
plt.bar(['a', 'b', 'c', 'd'], [2, 4, 7, 3],
    color=colors)
plt.show()
```



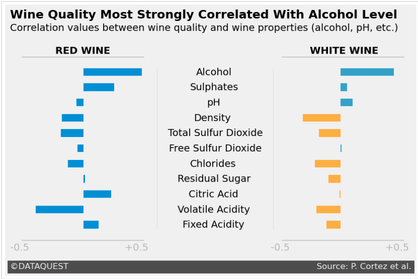
For our data, it can get cumbersome to manually add the color code for each correlation value. We're going to simplify this using pandas — below are the steps for the white wine data set:

- We calculate the correlations between`quality`and the other columns.
- We create a Boolean vector where zero and positive correlation values are mapped to`True`, and negative values are mapped to`False`.
- We map each Boolean value to a string representing a color code:`True`to`'#33A1C9'`, and`False`to`'#ffae42'`.

```
white_corr = white_wine.corr()['quality'][:-1]
positive_white = white_corr >= 0
color_map_white = positive_white.map({True:'#33A1C9',
                   False:'#ffae42'}
                   )

color_map_white

fixed acidity          #ffae42
volatile acidity       #ffae42
citric acid            #ffae42
residual sugar         #ffae42
chlorides              #ffae42
free sulfur dioxide    #33A1C9
total sulfur dioxide   #ffae42
density                #ffae42
pH                     #33A1C9
sulphates              #33A1C9
alcohol                #33A1C9
Name: quality, dtype: object
```

A pandas `Series` is also an array, which means we can pass `color_map_white` to the `color` parameter.

```
# Assume the rest of the code is written
ax.barh(white_corr.index, white_corr, color=color_map_white,
      height=0.5, left=2)
```



Now, let's follow the same steps for the red wine bar plot.

Instructions

```
positive_white = white_corr >= 0
color_map_white = positive_white.map({True:'#33A1C9', False:'#ffae42'})

positive_red = red_corr >= 0
color_map_red = positive_red.map({True:'#33A1C9', False:'#ffae42'})

style.use('fivethirtyeight')
fig, ax = plt.subplots(figsize=(9, 5))
ax.barh(white_corr.index, white_corr, left=2, height=0.5,
        color=color_map_white)

ax.barh(red_corr.index, red_corr, height=0.5, left=-0.1,
       color=color_map_red)

ax.grid(b=False)
ax.set_yticklabels([])
ax.set_xticklabels([])

x_coords = {'Alcohol': 0.82, 'Sulphates': 0.77, 'pH': 0.91,
            'Density': 0.80, 'Total Sulfur Dioxide': 0.59,
            'Free Sulfur Dioxide': 0.6, 'Chlorides': 0.77,
            'Residual Sugar': 0.67, 'Citric Acid': 0.76,
            'Volatile Acidity': 0.67, 'Fixed Acidity': 0.71}
y_coord = 9.8

for y_label, x_coord in x_coords.items():
    ax.text(x_coord, y_coord, y_label)
    y_coord -= 1

ax.axvline(0.5, c='grey', alpha=0.1, linewidth=1,
           ymin=0.1, ymax=0.9)
ax.axvline(1.45, c='grey', alpha=0.1, linewidth=1,
           ymin=0.1, ymax=0.9)

ax.axhline(-1, color='grey', linewidth=1, alpha=0.5,
          xmin=0.01, xmax=0.32)
ax.text(-0.7, -1.7, '-0.5'+ ' '*31 + '+0.5',
        color='grey', alpha=0.5)

ax.axhline(-1, color='grey', linewidth=1, alpha=0.5,
           xmin=0.67, xmax=0.98)
ax.text(1.43, -1.7, '-0.5'+ ' '*31 + '+0.5',
        color='grey', alpha=0.5)

ax.axhline(11, color='grey', linewidth=1, alpha=0.5,
          xmin=0.01, xmax=0.32)
ax.text(-0.33, 11.2, 'RED WINE', weight='bold')

ax.axhline(11, color='grey', linewidth=1, alpha=0.5,
          xmin=0.67, xmax=0.98)
ax.text(1.75, 11.2, 'WHITE WINE', weight='bold')

ax.text(-0.7, -2.9, '©DATAQUEST' + ' '*92 + 'Source: P. Cortez et al.',
        color = '#f0f0f0', backgroundcolor = '#4d4d4d',
       size=12)

ax.text(-0.7, 13.5,
        'Wine Quality Most Strongly Correlated With Alcohol Level',
        size=17, weight='bold')
ax.text(-0.7, 12.7,
        'Correlation values between wine quality and wine properties (alcohol, pH, etc.)')

plt.show()
```

1. Create a pandas `Series` for the red wine data set to specify the color order.
   - The correlation values are already saved in `red_corr`.
   - Zero and positive correlation values should have the color code `'#33A1C9'`.
   - Negative correlation values should have the color code `'#ffae42'`.
2. Use the `Series` you've just created to change the colors of the bars in the red wine bar plot.

```
positive_white = white_corr >= 0
color_map_white = positive_white.map({True:'#33A1C9', False:'#ffae42'})

positive_red = red_corr >= 0
color_map_red = positive_red.map({True:'#33A1C9', False:'#ffae42'})

style.use('fivethirtyeight')
fig, ax = plt.subplots(figsize=(9, 5))
ax.barh(white_corr.index, white_corr, left=2, height=0.5,
        color=color_map_white)

ax.barh(red_corr.index, red_corr, height=0.5, left=-0.1,
       color=color_map_red)

ax.grid(b=False)
ax.set_yticklabels([])
ax.set_xticklabels([])

x_coords = {'Alcohol': 0.82, 'Sulphates': 0.77, 'pH': 0.91,
            'Density': 0.80, 'Total Sulfur Dioxide': 0.59,
            'Free Sulfur Dioxide': 0.6, 'Chlorides': 0.77,
            'Residual Sugar': 0.67, 'Citric Acid': 0.76,
            'Volatile Acidity': 0.67, 'Fixed Acidity': 0.71}
y_coord = 9.8

for y_label, x_coord in x_coords.items():
    ax.text(x_coord, y_coord, y_label)
    y_coord -= 1

ax.axvline(0.5, c='grey', alpha=0.1, linewidth=1,
           ymin=0.1, ymax=0.9)
ax.axvline(1.45, c='grey', alpha=0.1, linewidth=1,
           ymin=0.1, ymax=0.9)

ax.axhline(-1, color='grey', linewidth=1, alpha=0.5,
          xmin=0.01, xmax=0.32)
ax.text(-0.7, -1.7, '-0.5'+ ' '*31 + '+0.5',
        color='grey', alpha=0.5)

ax.axhline(-1, color='grey', linewidth=1, alpha=0.5,
           xmin=0.67, xmax=0.98)
ax.text(1.43, -1.7, '-0.5'+ ' '*31 + '+0.5',
        color='grey', alpha=0.5)

ax.axhline(11, color='grey', linewidth=1, alpha=0.5,
          xmin=0.01, xmax=0.32)
ax.text(-0.33, 11.2, 'RED WINE', weight='bold')

ax.axhline(11, color='grey', linewidth=1, alpha=0.5,
          xmin=0.67, xmax=0.98)
ax.text(1.75, 11.2, 'WHITE WINE', weight='bold')

ax.text(-0.7, -2.9, '©DATAQUEST' + ' '*92 + 'Source: P. Cortez et al.',
        color = '#f0f0f0', backgroundcolor = '#4d4d4d',
       size=12)

ax.text(-0.7, 13.5,
        'Wine Quality Most Strongly Correlated With Alcohol Level',
        size=17, weight='bold')
ax.text(-0.7, 12.7,
        'Correlation values between wine quality and wine properties (alcohol, pH, etc.)')

plt.show()
```

8.Next steps

In this lesson, we learned about Matplotlib styles. We focused on the `fivethirtyeight` style and managed to build quite a nice graph.

Next, we'll practice what we learned by working on a guided project.