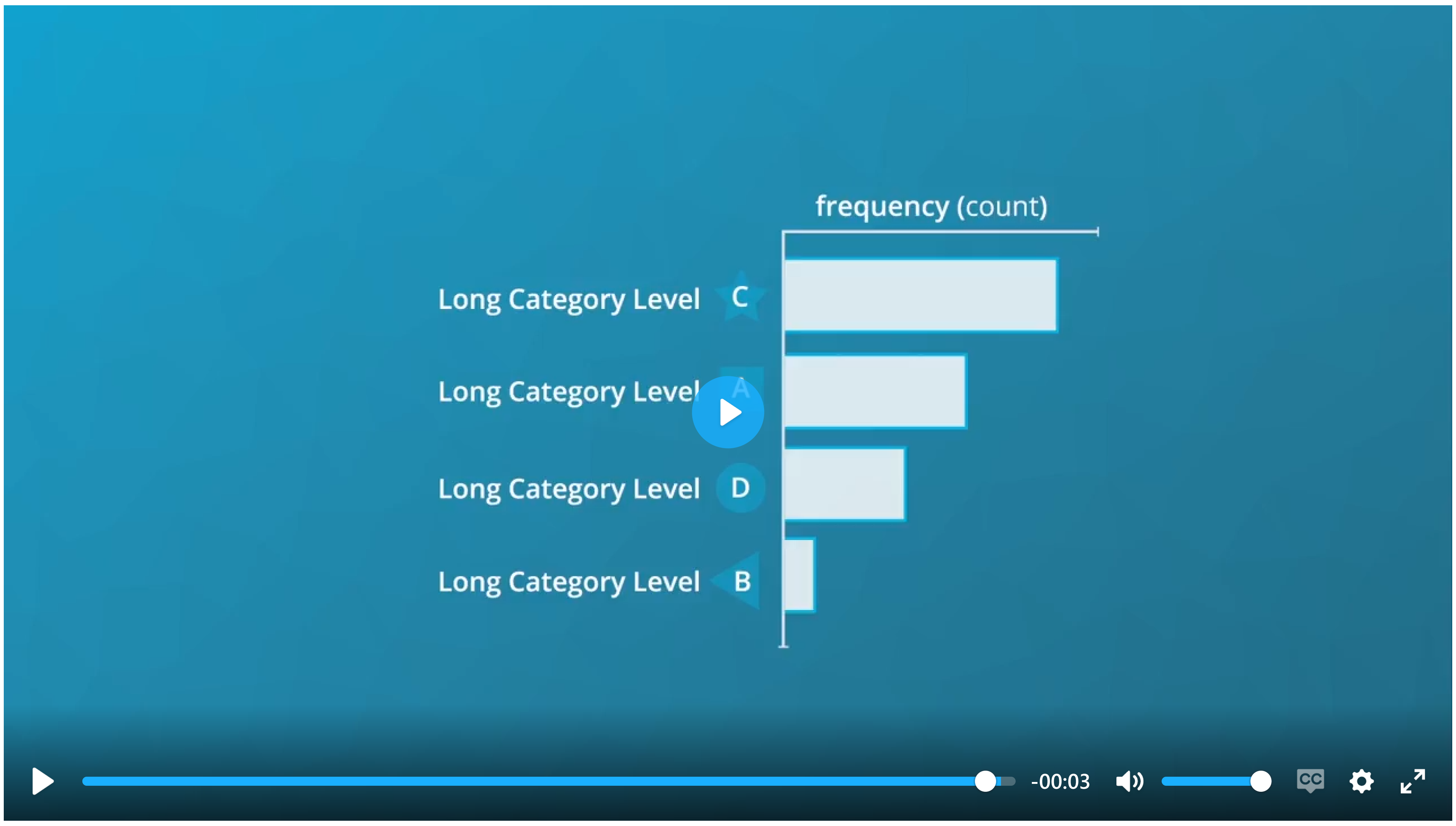
03. Bar Charts

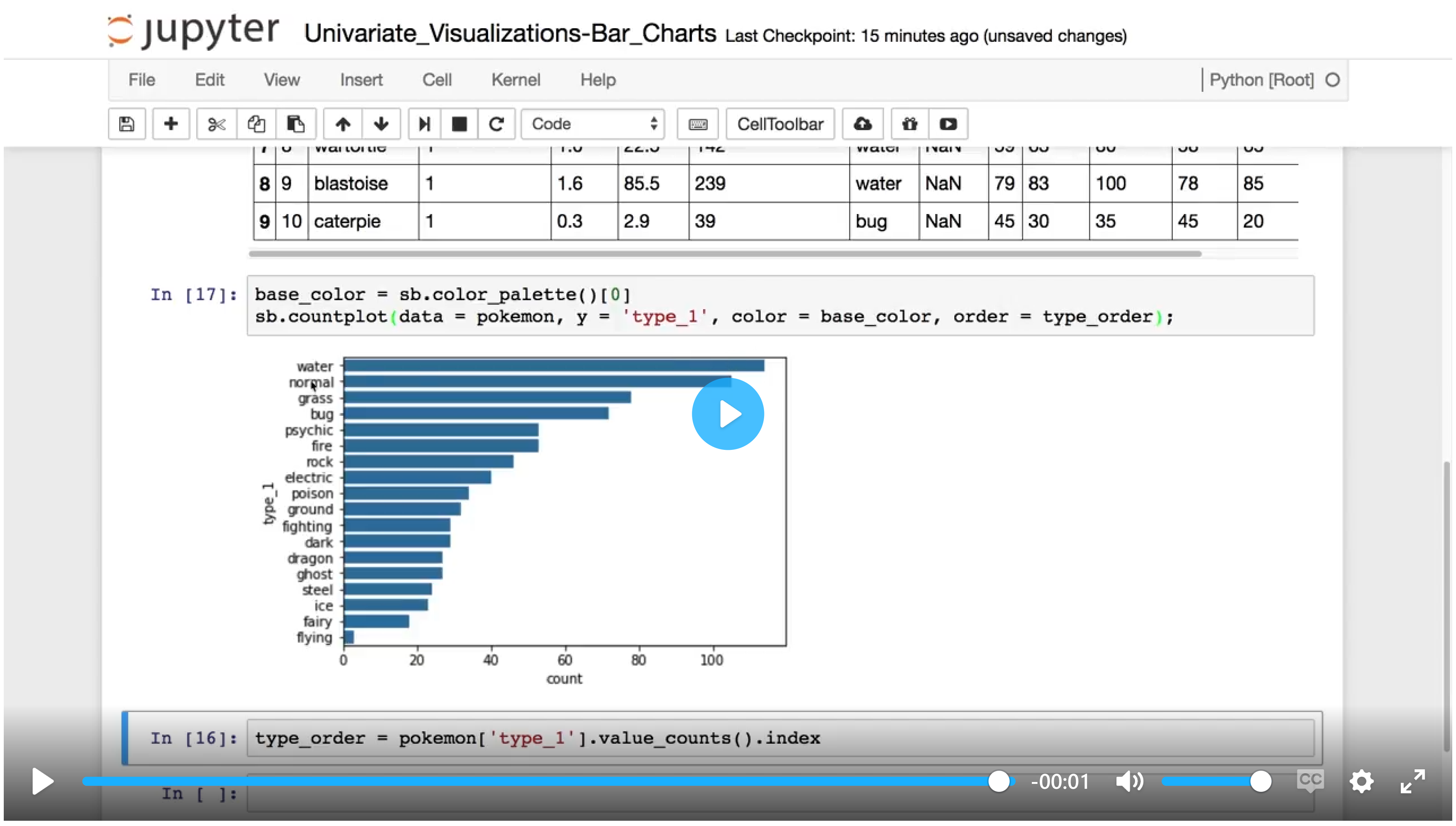
A **bar chart** depicts the distribution of a categorical variable. In a bar chart, each level of the categorical variable is depicted with a bar, whose height indicates the frequency of data points that take on that level.

L3 031 Bar Charts V3



Bar Chart - Demo

DataVis L3 03 V2


jupyter Univariate_Visualizations-Bar_Charts Last Checkpoint: 15 minutes ago (unsaved changes)
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Python [Root]
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7	8	wartortle	1	1.0	22.5	142	water	NaN	59	63	80	58	65
8	9	blastoise	1	1.6	85.5	239	water	NaN	79	83	100	78	85
9	10	caterpie	1	0.3	2.9	39	bug	NaN	45	30	35	45	20

```
In [17]: base_color = sb.color_palette()[0]
         sb.countplot(data = pokemon, y = 'type_1', color = base_color, order = type_order);
```

```
In [16]: type_order = pokemon['type_1'].value_counts().index
```

```
In [ ]:
```

INSTRUCTOR NOTE:

The `pokemon.csv` file is available to download at the bottom of this page, though it is also present in the upcoming Jupyter notebook workspace.

Bar Chart using Seaborn

A basic bar chart of frequencies can be created through the use of seaborn's `countplot` function.

```
seaborn.countplot(*, x=None, y=None, data=None, order=None, orient=None, color=None)
```

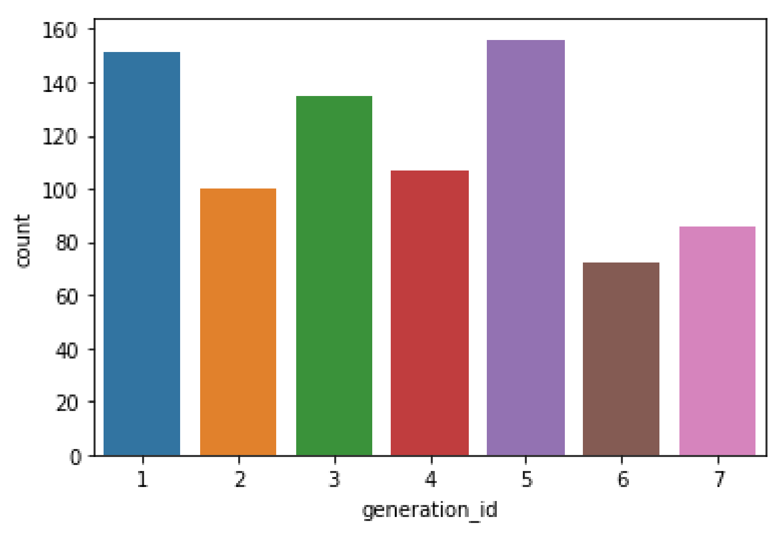
We will see the usage of a few of the arguments of the `countplot()` function.

Example 1. Create a vertical bar chart using Seaborn, with default colors

```
# Necessary imports
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sb
%matplotlib inline

# Read the csv file, and check its top 10 rows
pokemon = pd.read_csv('pokemon.csv')
print(pokemon.shape)
pokemon.head(10)

# A semicolon (;) at the end of the statement will supress printing the plotting information
sb.countplot(data=pokemon, x='generation_id');
```

```
(807, 14)
```

	id	species	generation_id	height	weight	base_experience	type_1	type_2	hp	attack	defense	speed	special-attack	special-defense
0	1	bulbasaur	1	0.7	6.9	64	grass	poison	45	49	49	45	65	65
1	2	ivysaur	1	1.0	13.0	142	grass	poison	60	62	63	60	80	80
2	3	venusaur	1	2.0	100.0	236	grass	poison	80	82	83	80	100	100
3	4	charmander	1	0.6	8.5	62	fire	NaN	39	52	43	65	60	50
4	5	charmeleon	1	1.1	19.0	142	fire	NaN	58	64	58	80	80	65
5	6	charizard	1	1.7	90.5	240	fire	flying	78	84	78	100	109	85
6	7	squirtle	1	0.5	9.0	63	water	NaN	44	48	65	43	50	64
7	8	wartortle	1	1.0	22.5	142	water	NaN	59	63	80	58	65	80
8	9	blastoise	1	1.6	85.5	239	water	NaN	79	83	100	78	85	105
9	10	caterpie	1	0.3	2.9	39	bug	NaN	45	30	35	45	20	20

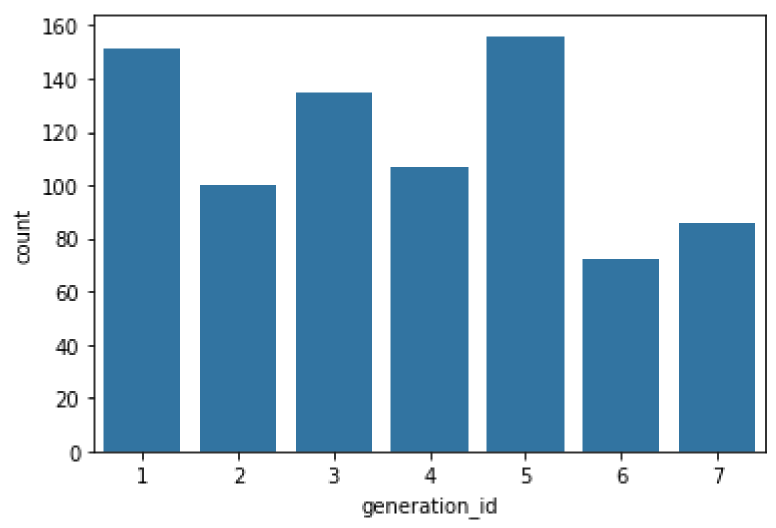


In the example above, all the bars have a different color. This might come in handy for building associations between these category labels and encodings in plots with more variables.
Otherwise, it's a good idea to simplify the plot and reduce unnecessary distractions by plotting all bars in the same color. You can

choose to have a uniform color across all bars, by using the `color` argument, as shown in the example below:

Example 2. Create a vertical bar chart using Seaborn, with a uniform single color

```
# The `color_palette()` returns the the current / default palette as a list of RGB tuples.
# Each tuple consists of three digits specifying the red, green, and blue channel values to specify a
color.
# Choose the first tuple of RGB colors
base_color = sb.color_palette()[0]

# Use the `color` argument
sb.countplot(data=pokemon, x='generation_id', color=base_color);
```



Bar Chart using the Matplotlib

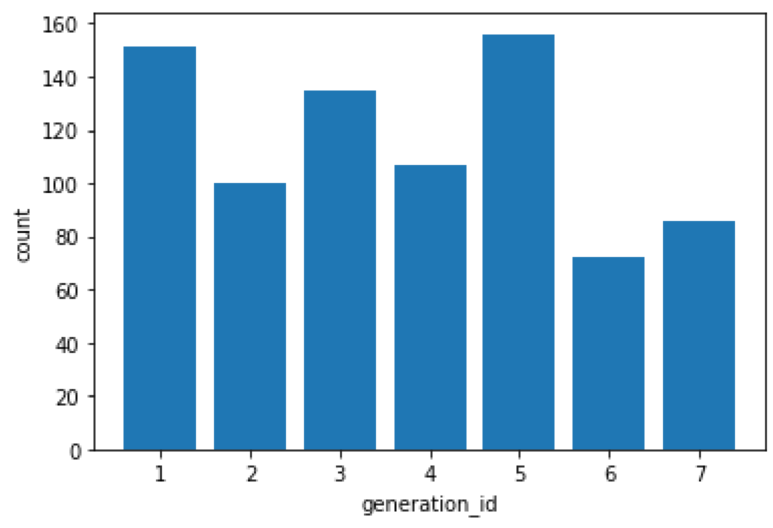
You can even create a similar bar chart using the Matplotlib, instead of Seaborn. We will use the `matplotlib.pyplot.bar()` function to plot the chart. The syntax is:

```
matplotlib.pyplot.bar(x, y, width=0.8, bottom=None, *, align='center', data=None)
```

Refer to the documentation for the details of optional arguments. In the example below, we will use `Series.value_counts()` to extract a Series from the given DataFrame object.

Example 3. Create a vertical bar chart using Matplotlib, with a uniform single color

```
# Return the Series having unique values
x = pokemon['generation_id'].unique()

# Return the Series having frequency count of each unique value
y = pokemon['generation_id'].value_counts(sort=False)

plt.bar(x, y)

# Labeling the axes
plt.xlabel('generation_id')
plt.ylabel('count')

# Dsiplay the plot
plt.show()
```



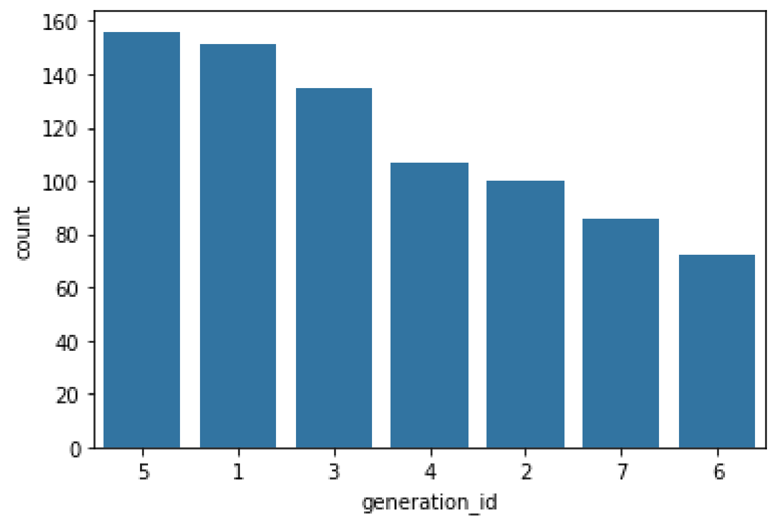
There is a lot more you can do with both Seaborn and Matplotlib bar charts. *The remaining examples will experiment with seaborn's `countplot()` function.*

For nominal-type data, one common operation is to sort the data in terms of frequency. In the examples shown above, you can even order the bars as desirable. With our data in a pandas DataFrame, we can use various DataFrame methods to compute and extract an ordering, then set that ordering on the "order" parameter:

This can be done by using the `order` argument of the `countplot()` function.

Example 4. Static and dynamic ordering of the bars in a bar chart using seaborn.countplot()

```
# Static-ordering the bars
sb.countplot(data=pokemon, x='generation_id', color=base_color, order=[5,1,3,4,2,7,6]);

# Dynamic-ordering the bars
# The order of the display of the bars can be computed with the following logic.
# Count the frequency of each unique value in the 'generation_id' column, and sort it in descending order
# Returns a Series
freq = pokemon['generation_id'].value_counts()

# Get the indexes of the Series
gen_order = freq.index

# Plot the bar chart in the decreasing order of the frequency of the `generation_id`
sb.countplot(data=pokemon, x='generation_id', color=base_color, order=gen_order);
```



While we could sort the levels by frequency like above, we usually care about whether the most frequent values are at high levels, low levels, etc. For ordinal-type data, we probably want to sort the bars in order of the variables. The best thing for us to do in this case is to convert the column into an ordered categorical data type.

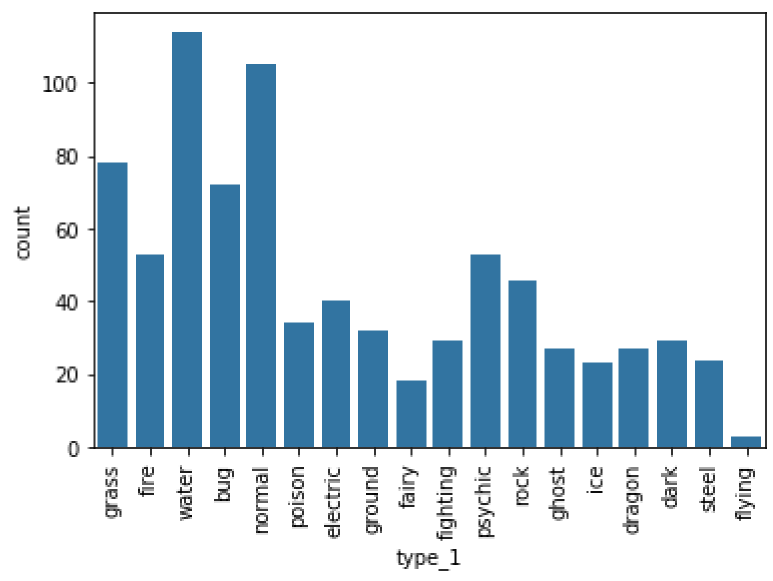
Additional Variation - Refer to the `CategoricalDtype` to convert the column into an ordered categorical data type. By default, pandas reads in string data as object types, and will plot the bars in the order in which the unique values were seen. By converting the data into an ordered type, the order of categories becomes innate to the feature, and we won't need to specify an "order" parameter each time it's required in a plot.

Should you find that you need to sort an ordered categorical type in a different order, you can always temporarily override the data type by setting the "order" parameter as above.

The category labels in the examples above are very small. In case, the category labels have large names, you can make use of the `matplotlib.pyplot.xticks(rotation=90)` function, which will rotate the category labels (not axes) counter-clockwise 90 degrees.

Example 5. Rotate the category labels (not axes)

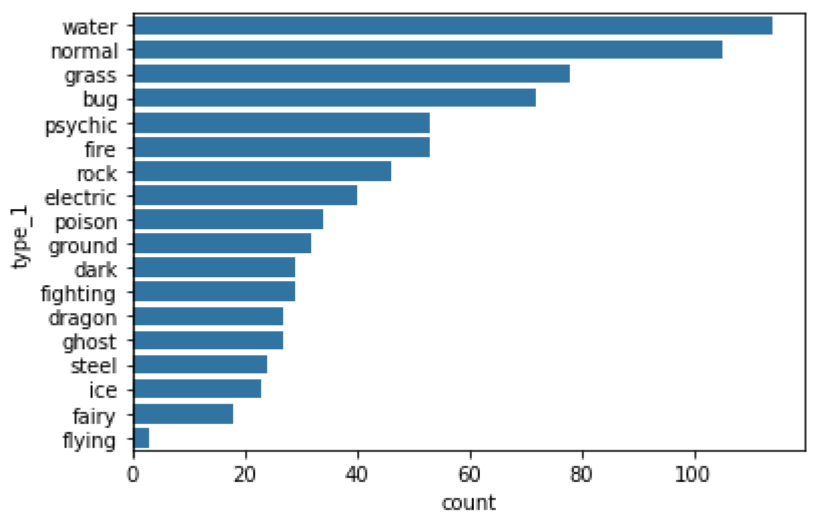
```
# Plot the Pokemon type on a Vertical bar chart
sb.countplot(data=pokemon, x='type_1', color=base_color);

# Use xticks to rotate the category labels (not axes) counter-clockwise
plt.xticks(rotation=90)
```



Even after using the `matplotlib.pyplot.xticks(rotation=90)` function, if the category labels do not fit well, you can rotate the axes.

Example 6. Rotate the axes clockwise

```
# Plot the Pokemon type on a Horizontal bar chart
type_order = pokemon['type_1'].value_counts().index
sb.countplot(data=pokemon, y='type_1', color=base_color, order=type_order);
```



Next Concept