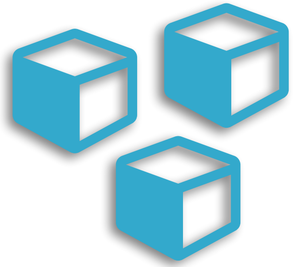
INTERMEDIATE PYTHON FOR DATA SCIENCE

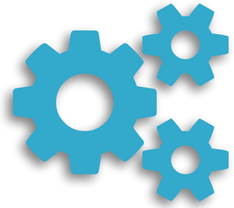
Basic Plots with Matplotlib

- Visualization

- Data Structures



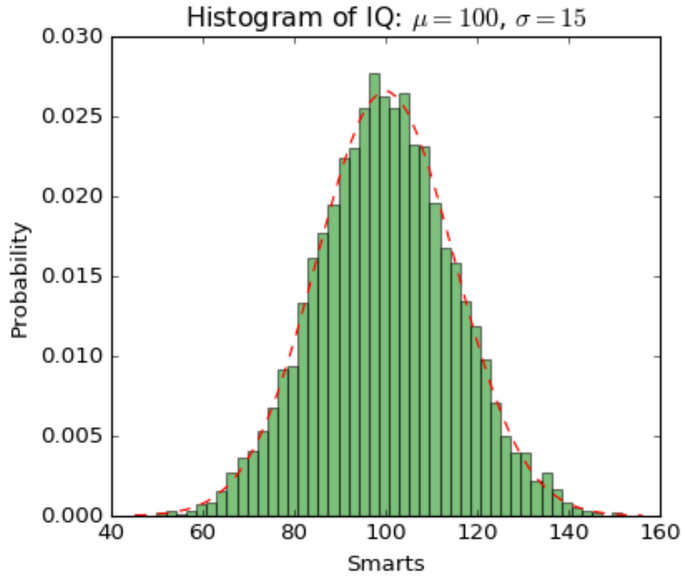
- Control Structures

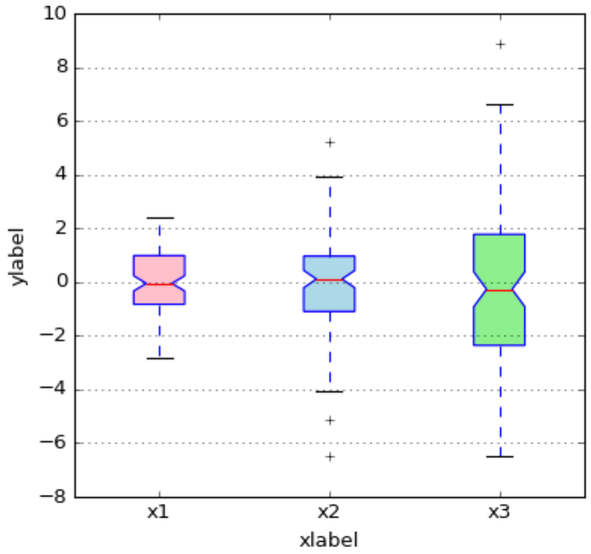


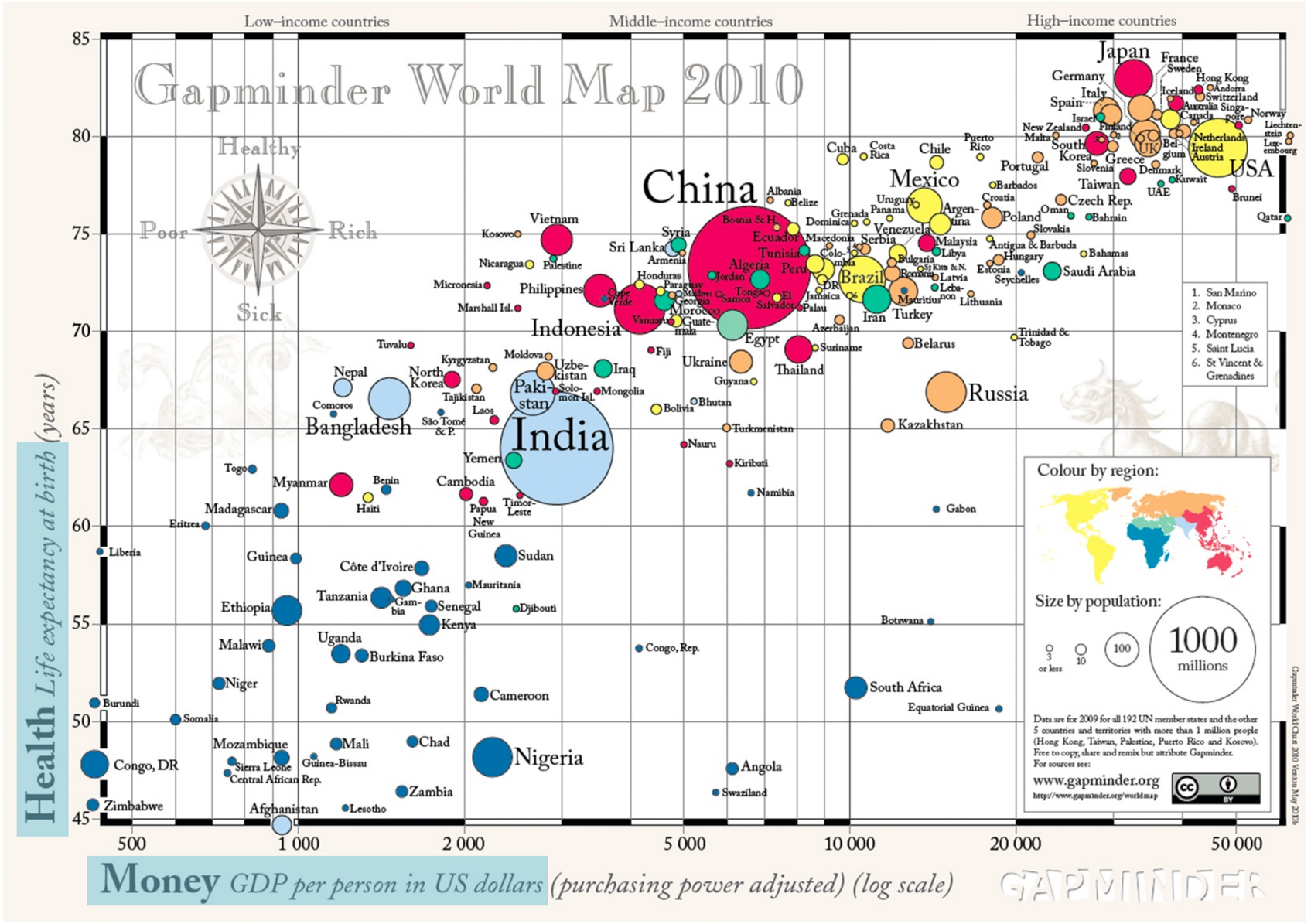
- Case Study

Data Visualization

- Very important in Data Analysis
  - Explore data
  - Report insights







Source: GapMinder, Wealth and Health of Nations

Matplotlib

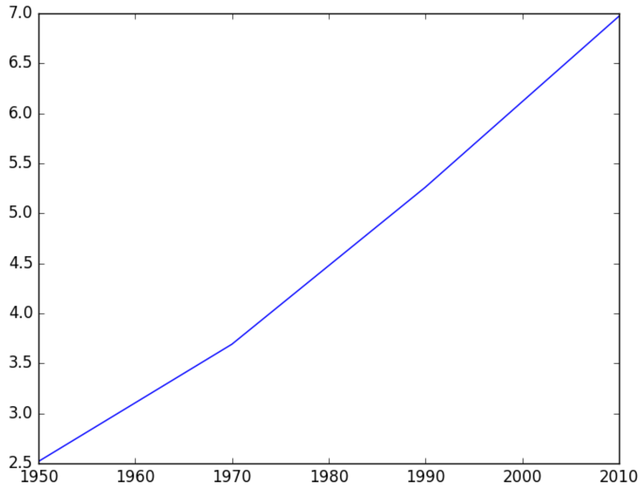
```
In [1]: import matplotlib.pyplot as plt

In [2]: year = [1950, 1970, 1990, 2010]

In [3]: pop = [2.519, 3.692, 5.263, 6.972]

In [4]: plt.plot(year, pop)
                 x     y

In [5]: plt.show()
```



Matplotlib

```
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pop  = [2.519, 3.692, 5.263, 6.972]
```

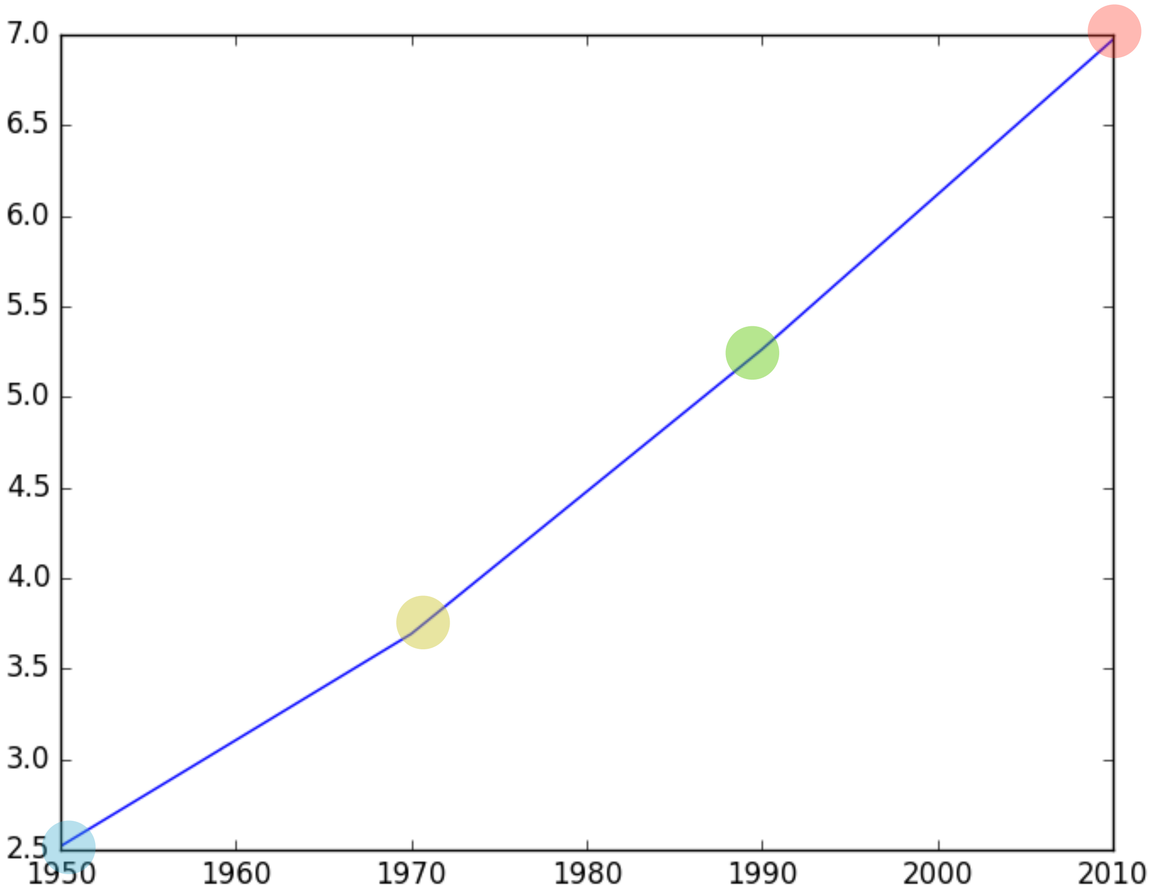

Scatter plot

```
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In [3]: pop = [2.519, 3.692, 5.263, 6.972]
In [4]: plt.plot(year, pop)
In [5]: plt.show()
```
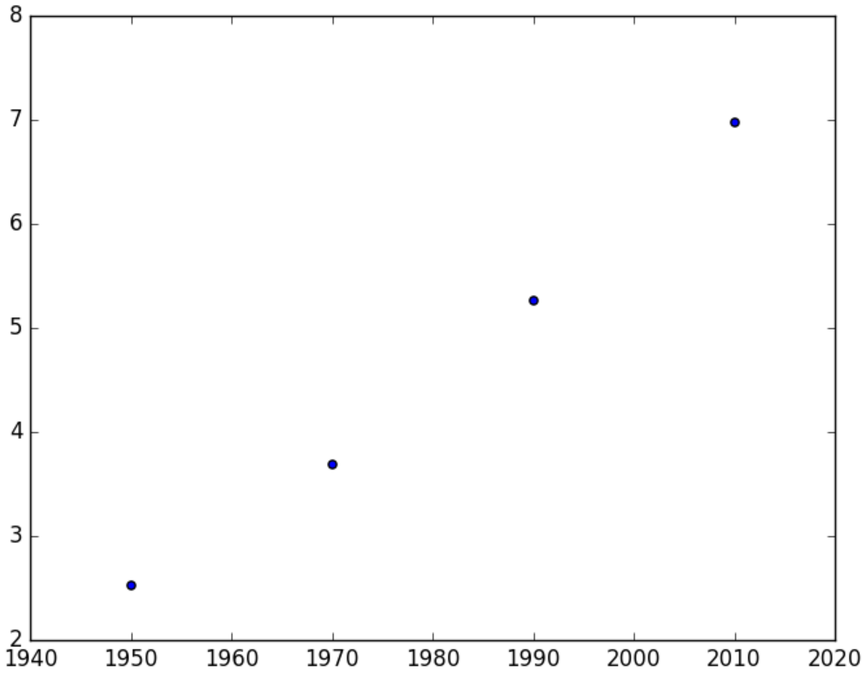

Scatter plot

```
In [1]: import matplotlib.pyplot as plt
In [2]: year = [1950, 1970, 1990, 2010]
In [3]: pop = [2.519, 3.692, 5.263, 6.972]
In [4]: plt.scatter(year, pop)
In [5]: plt.show()
```



INTERMEDIATE PYTHON FOR DATA SCIENCE

Let’s practice!

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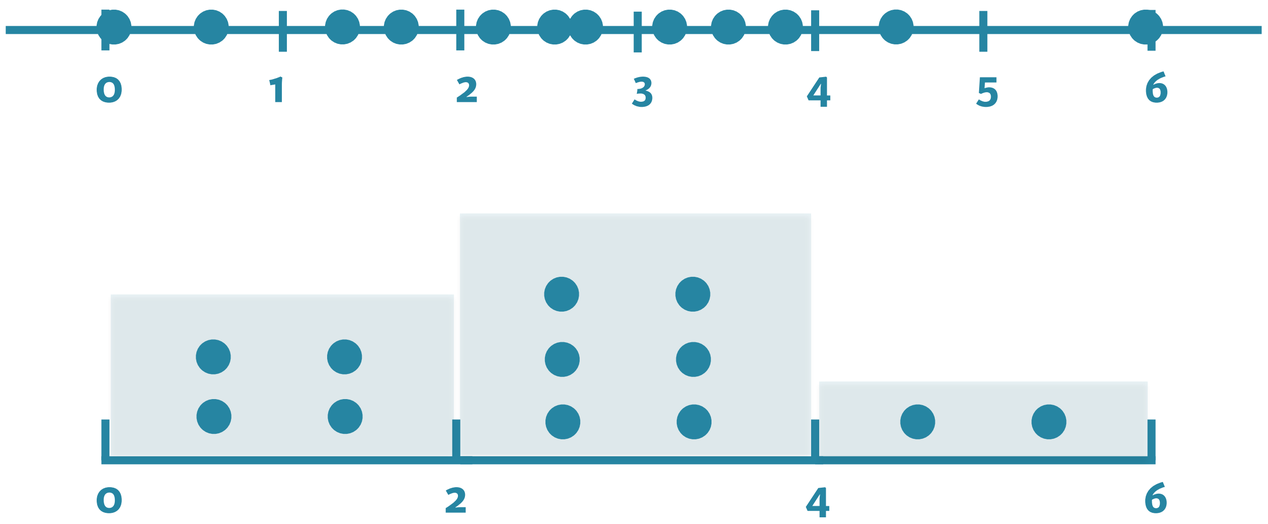
Histogram

Histogram

- Explore dataset
- Get idea about distribution

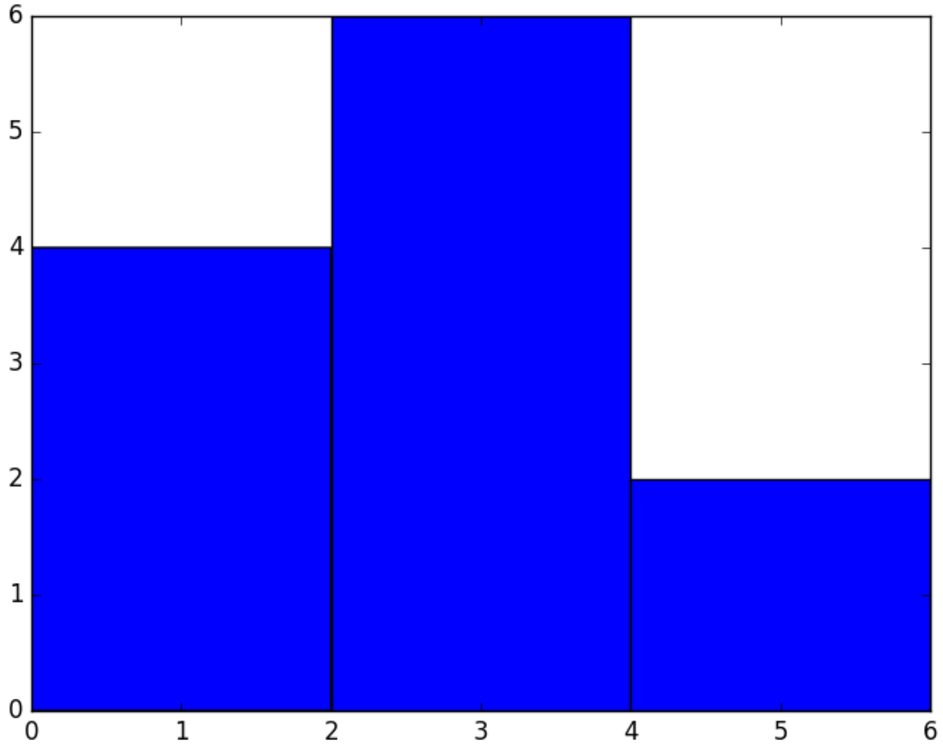


Matplotlib

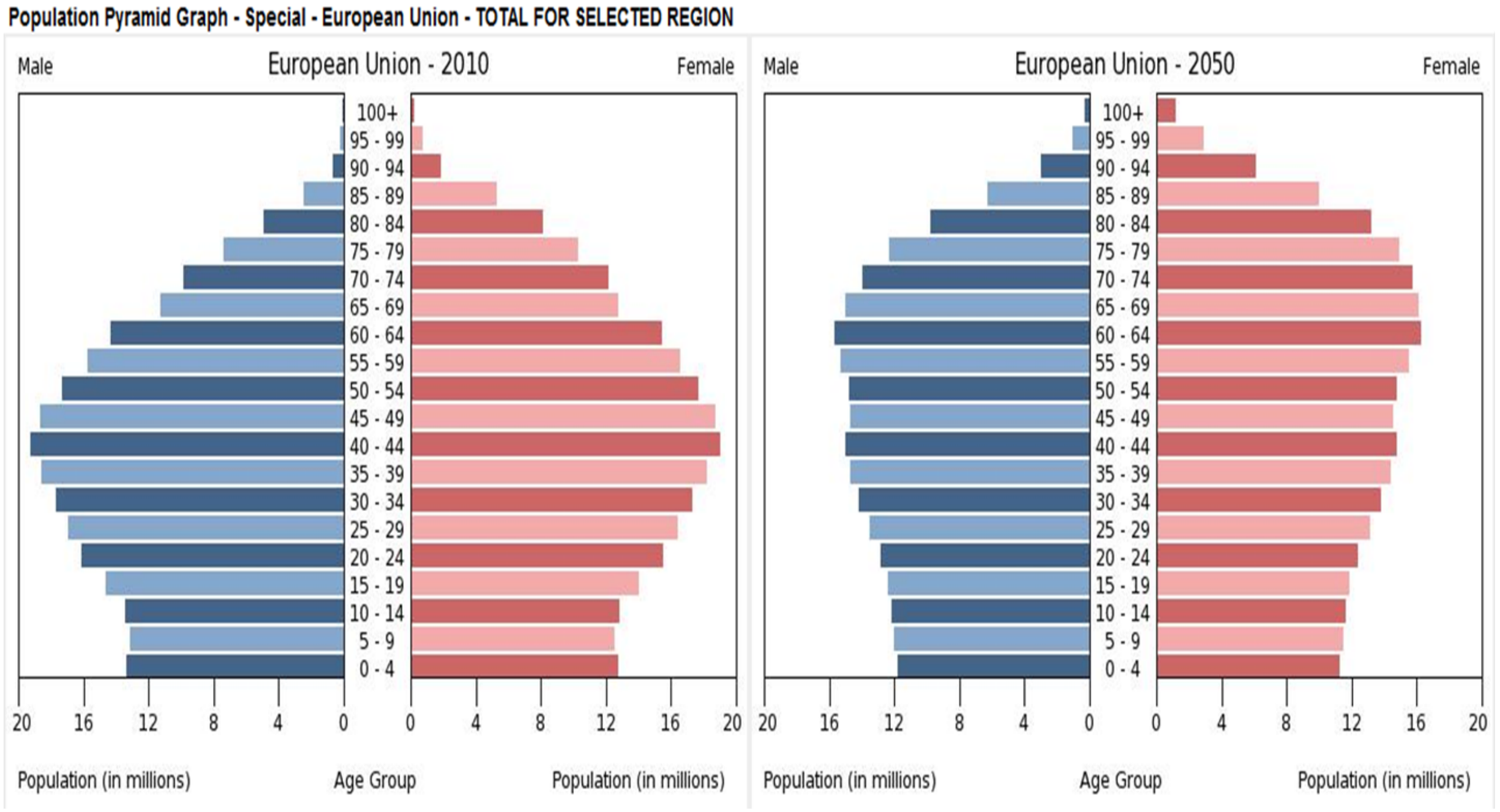
```
In [1]: import matplotlib.pyplot as plt

In [2]: help(plt.hist)

  Help on function hist in module matplotlib.pyplot:

  hist(x, bins=10, range=None, normed=False, weights=None,
  cumulative=False, bottom=None, histtype='bar', align='mid',
  orientation='vertical', rwidth=None, log=False, color=None,
  label=None, stacked=False, hold=None, data=None, **kwargs)
      Plot a histogram.

      Compute and draw the histogram of *x*. The return value is a
      tuple (*n*, *bins*, *patches*) or ([*n0*, *n1*, ...],
      *bins*, [*patches0*, *patches1*,...]) if the input contains
      multiple data.

  ...
```

Matplotlib example

```
In [3]: values = [0,0.6,1.4,1.6,2.2,2.5,2.6,3.2,3.5,3.9,4.2,6]
In [4]: plt.hist(values, bins = 3)
In [5]: plt.show()
```



Population Pyramid



INTERMEDIATE PYTHON FOR DATA SCIENCE

Let’s practice!

INTERMEDIATE PYTHON FOR DATA SCIENCE

Customization

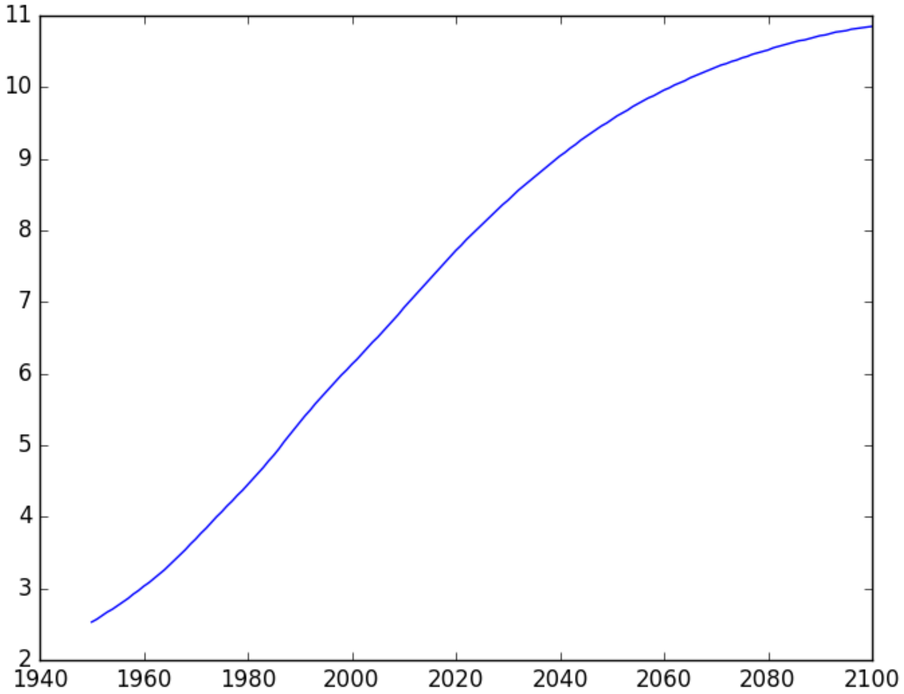
Data Visualization

- Many options
  - Different plot types
  - Many customizations
- Choice depends on
  - Data
  - Story you want to tell

Basic Plot

population.py

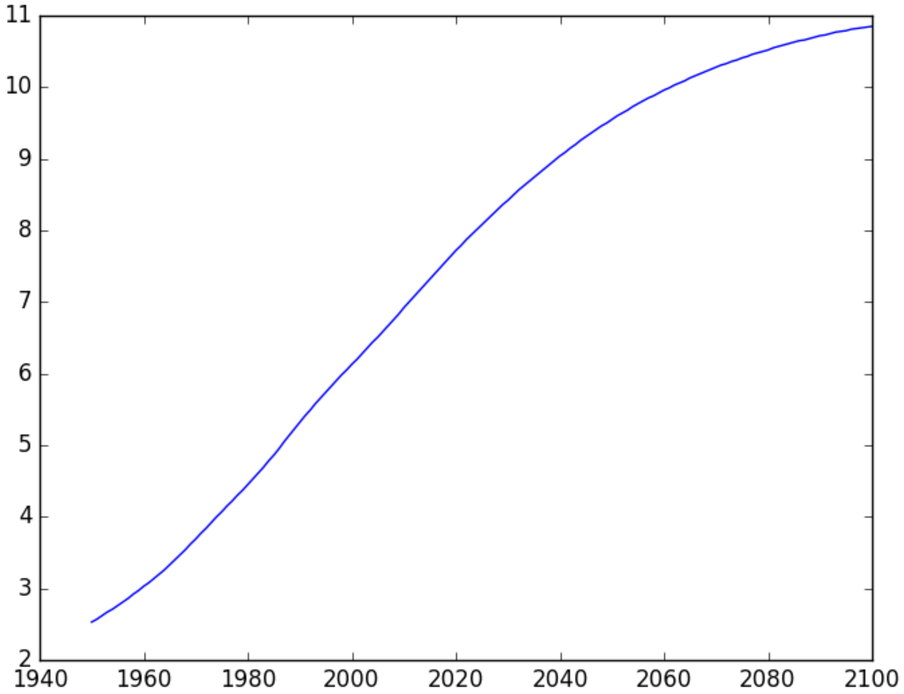
```
import matplotlib.pyplot as plt
year = [1950, 1951, 1952, ..., 2100]
pop = [2.538, 2.57, 2.62, ..., 10.85]

plt.plot(year, pop)

plt.show()
```



Axis labels

population.py

```
import matplotlib.pyplot as plt
year = [1950, 1951, 1952, ..., 2100]
pop = [2.538, 2.57, 2.62, ..., 10.85]

plt.plot(year, pop)

plt.xlabel('Year')
plt.ylabel('Population')

plt.show()
```



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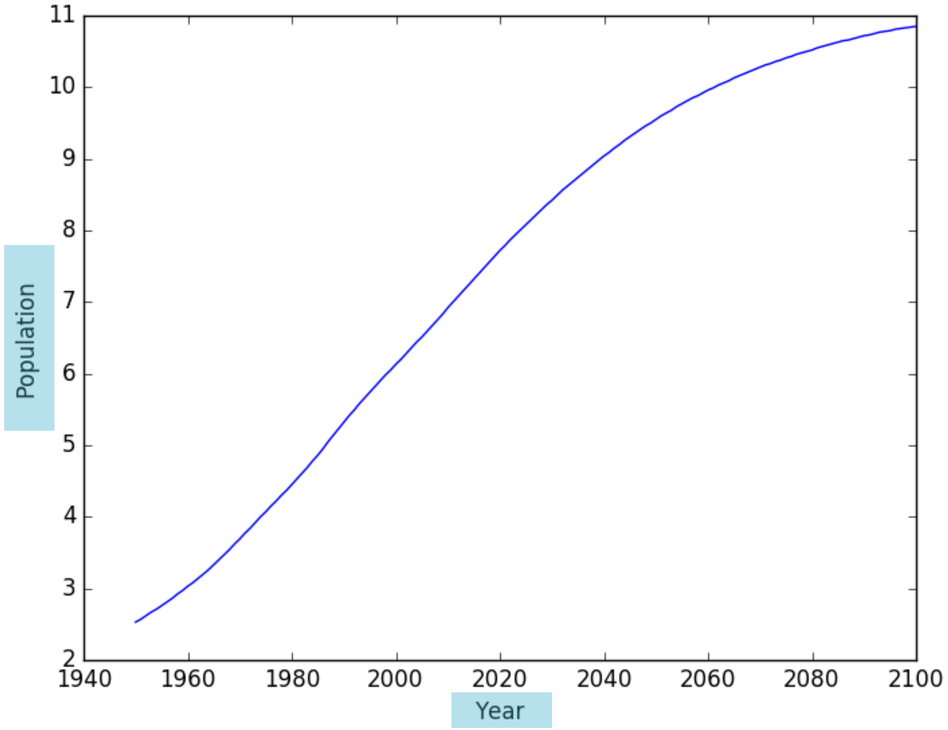

Title

population.py

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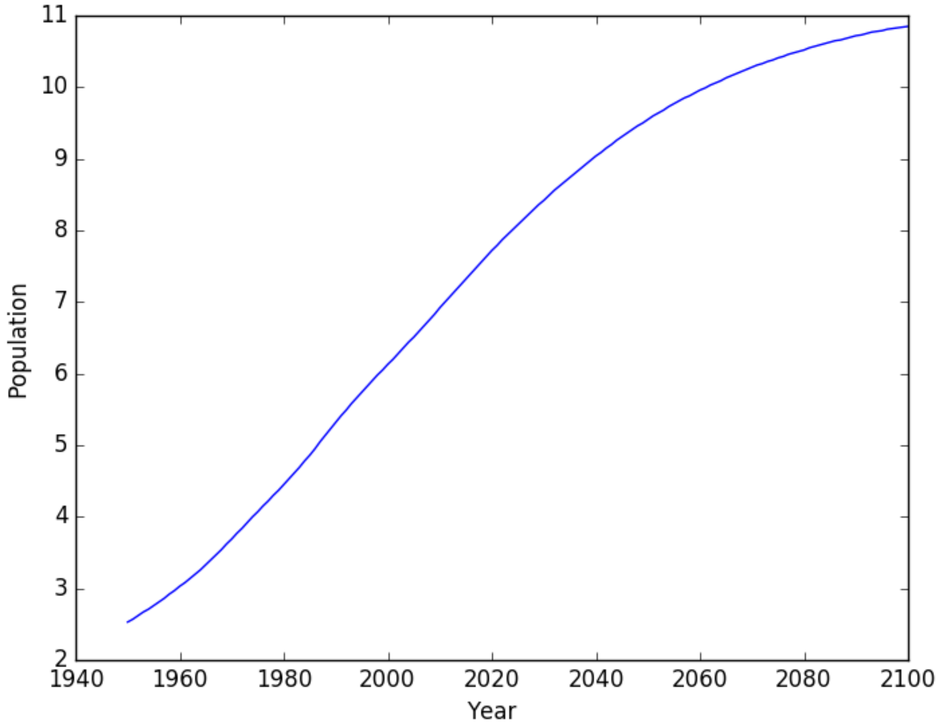
year = [1950, 1951, 1952, ..., 2100]
pop = [2.538, 2.57, 2.62, ..., 10.85]

plt.plot(year, pop)

plt.xlabel('Year')
plt.ylabel('Population')
plt.title('World Population Projections')

plt.show()
```



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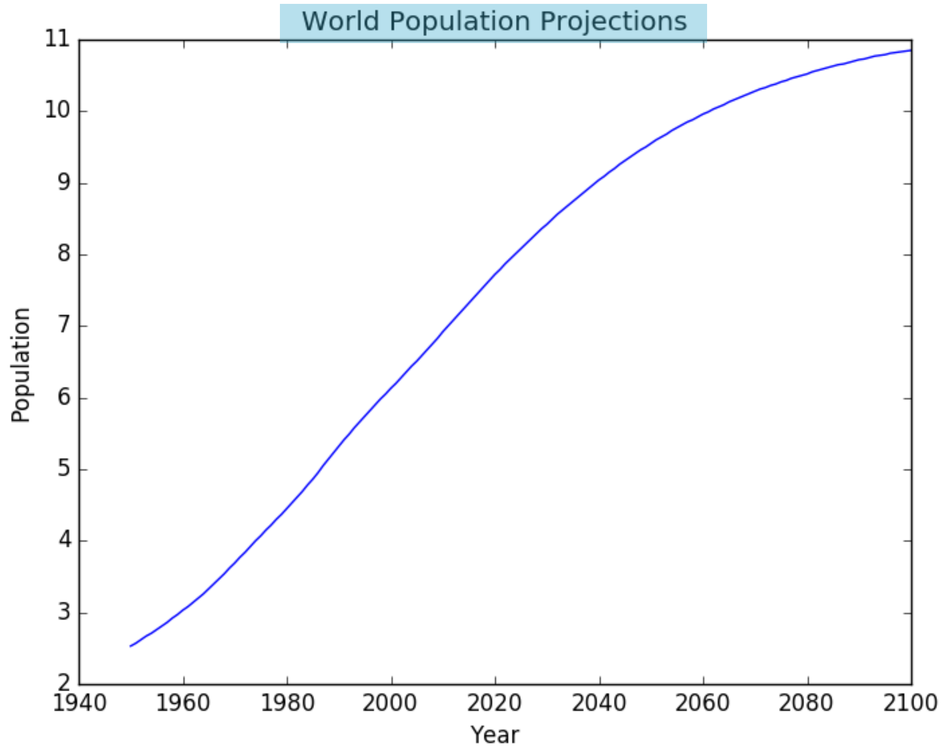

Ticks

population.py

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pop = [2.538, 2.57, 2.62, ..., 10.85]

plt.plot(year, pop)

plt.xlabel('Year')
plt.ylabel('Population')
plt.title('World Population Projections')
plt.yticks([0, 2, 4, 6, 8, 10])

plt.show()
```

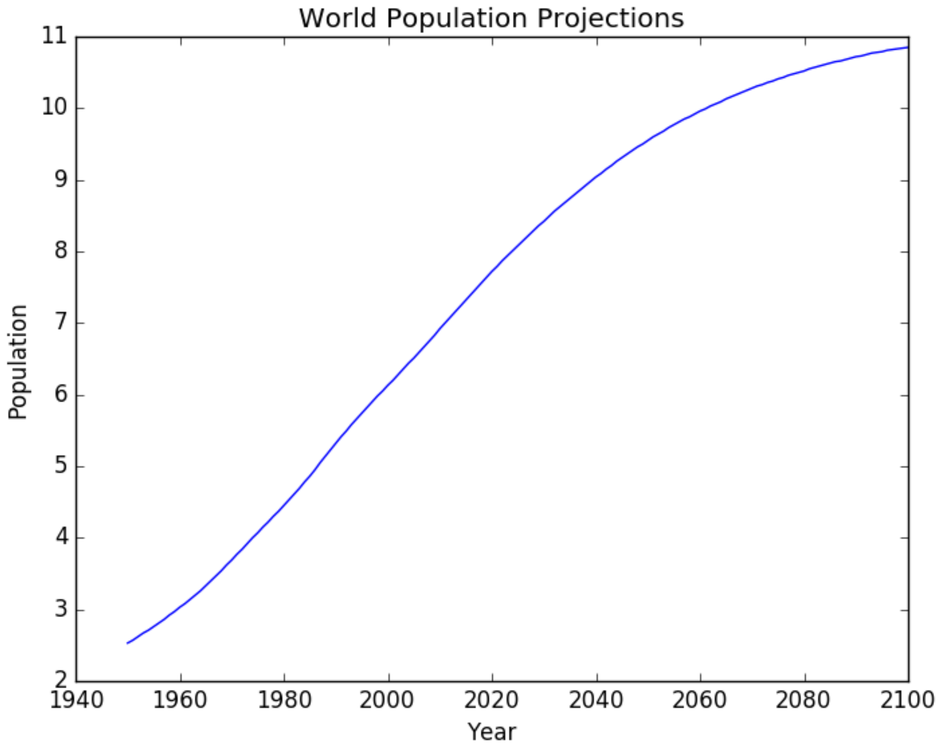

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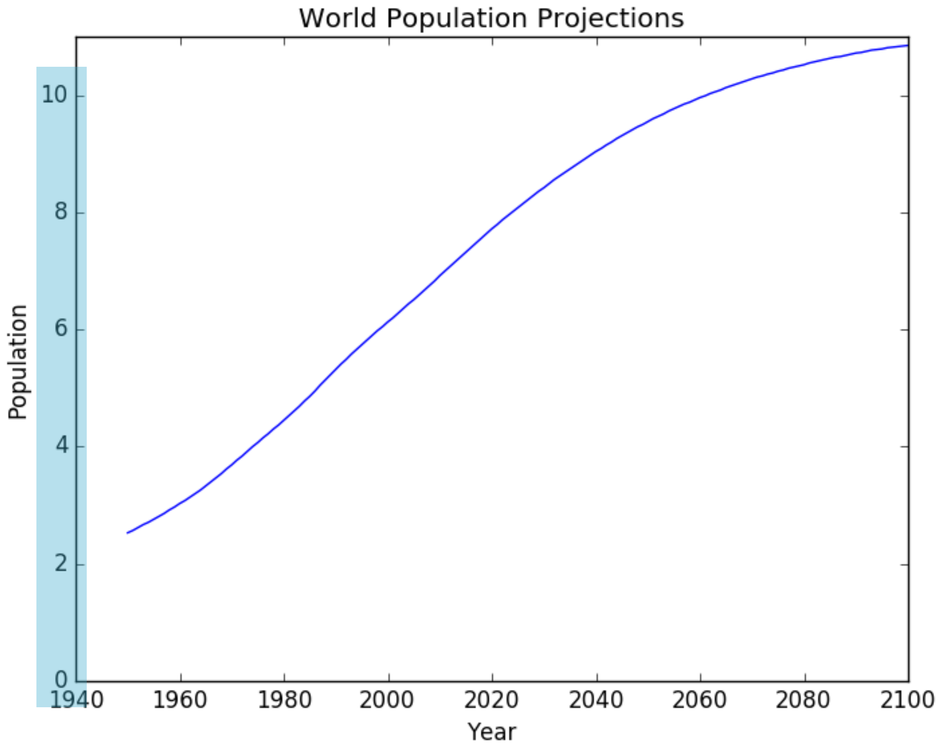

Ticks (2)

population.py

```
import matplotlib.pyplot as plt
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plt.plot(year, pop)

plt.xlabel('Year')
plt.ylabel('Population')
plt.title('World Population Projections')
plt.yticks([0, 2, 4, 6, 8, 10],
           ['0', '2B', '4B', '6B', '8B', '10B'])

plt.show()
```

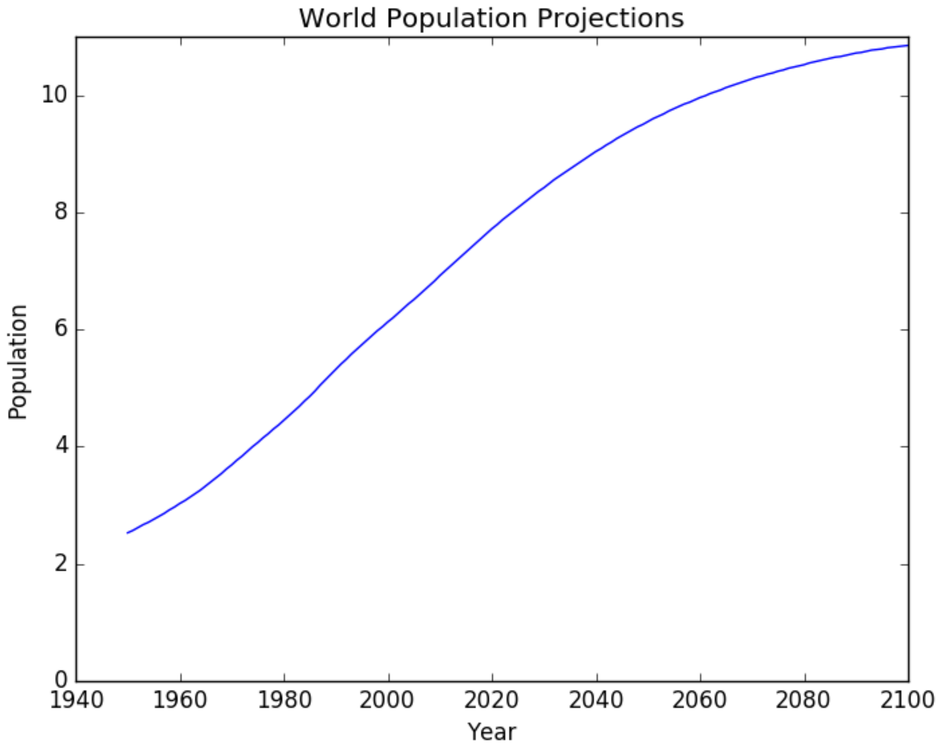

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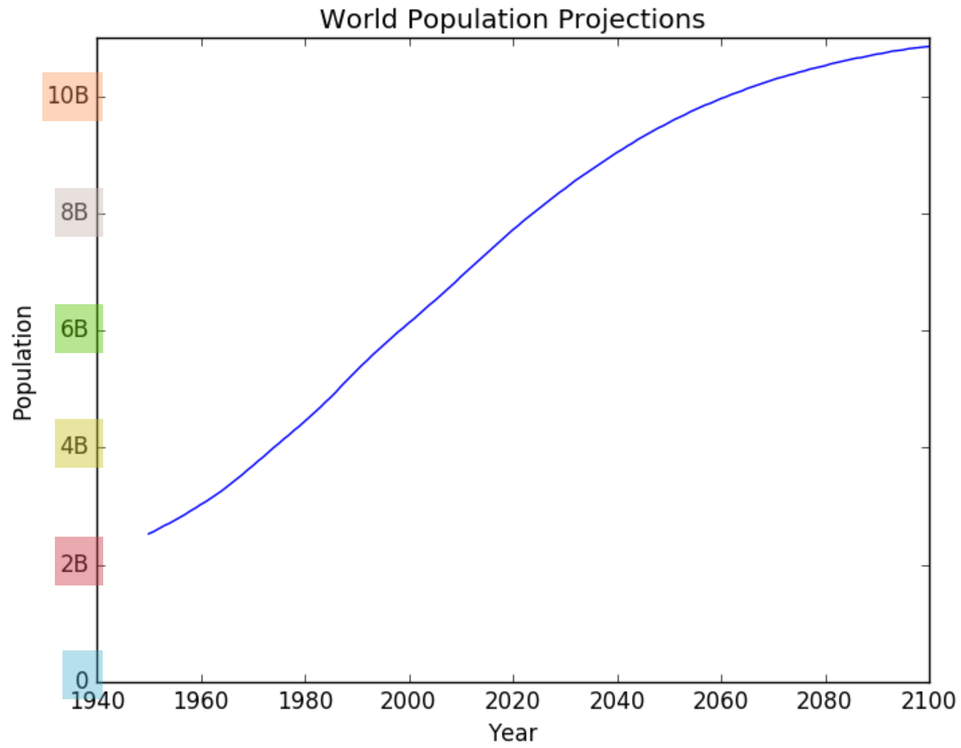


Add historical data

population.py

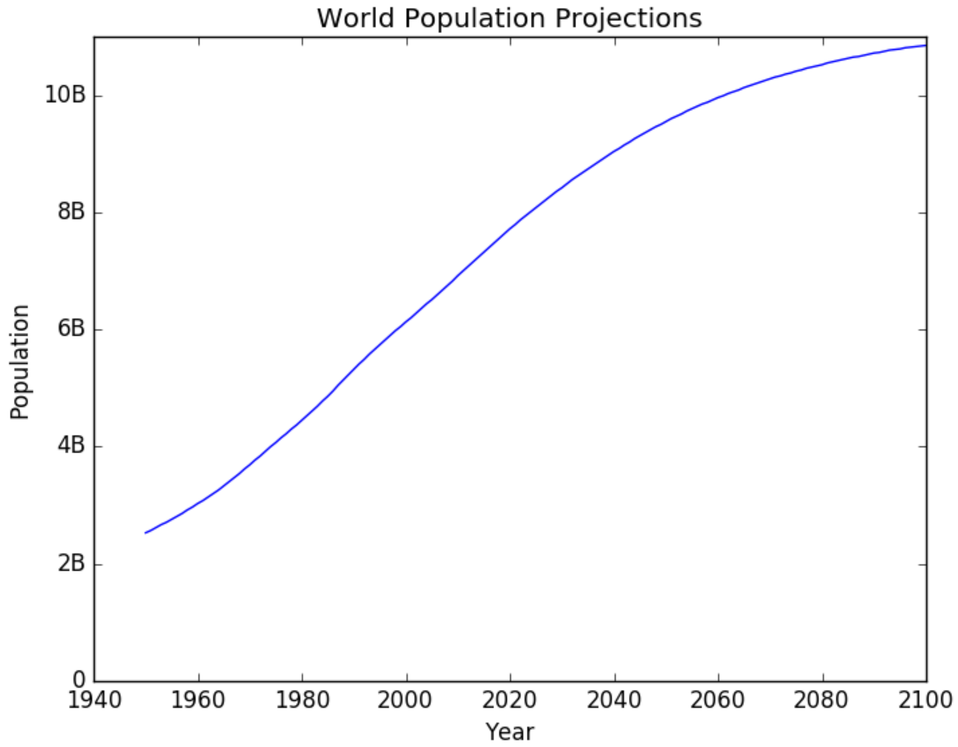
```
import matplotlib.pyplot as plt
year = [1950, 1951, 1952, ..., 2100]
pop = [2.538, 2.57, 2.62, ..., 10.85]

# Add more data
year = [1800, 1850, 1900] + year
pop = [1.0, 1.262, 1.650] + pop

plt.plot(year, pop)

plt.xlabel('Year')
plt.ylabel('Population')
plt.title('World Population Projections')
plt.yticks([0, 2, 4, 6, 8, 10],
           ['0', '2B', '4B', '6B', '8B', '10B'])

plt.show()
```



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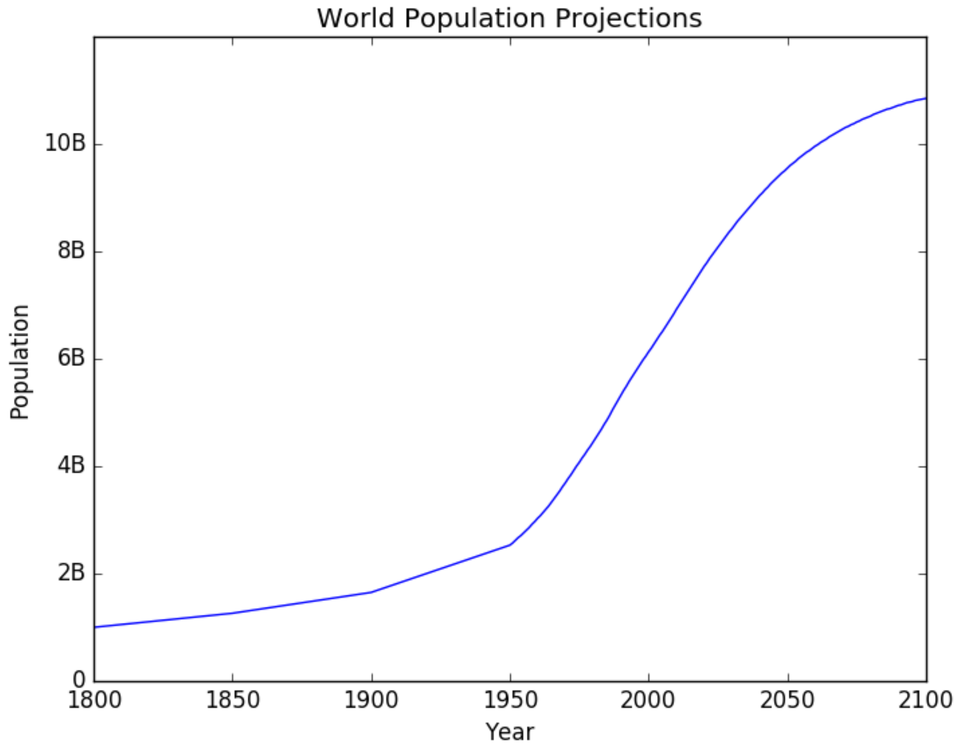
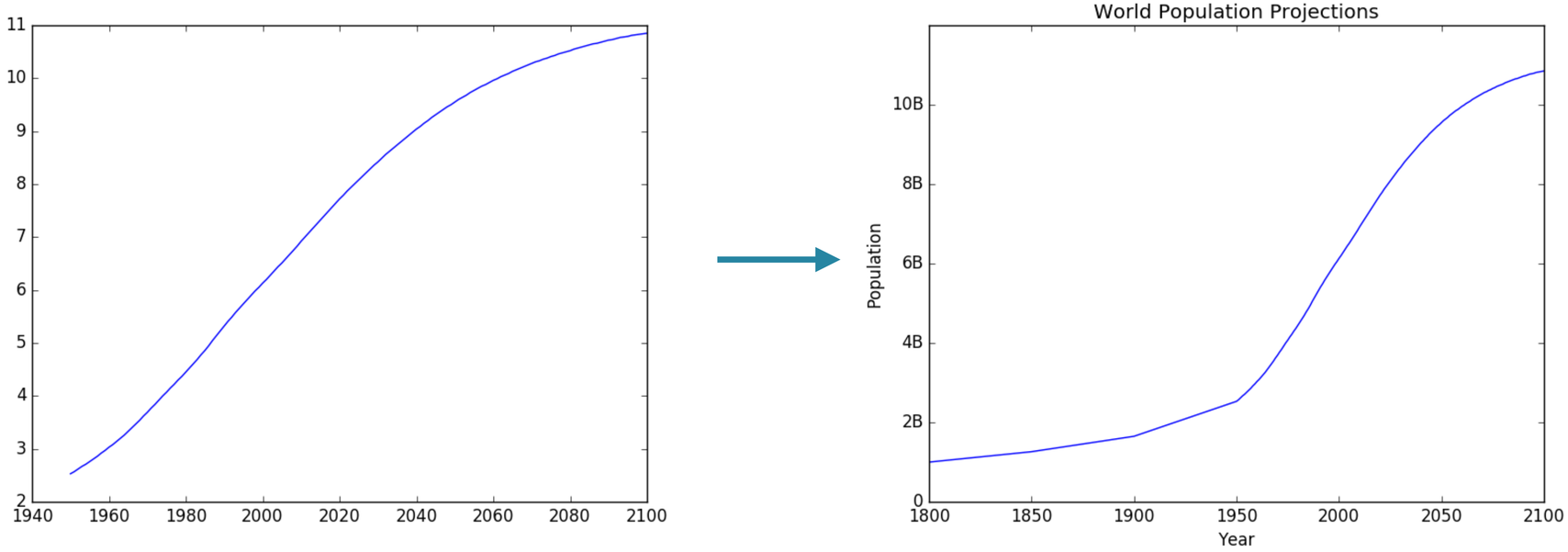


Before vs After



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