

# Beginner's Python Cheat Sheet — Pygal

## What is Pygal?

Data visualization involves exploring data through visual representations. Pygal helps you make visually appealing representations of the data you're working with. Pygal is particularly well suited for visualizations that will be presented online, because it supports interactive elements.

## Installing Pygal

*Pygal can be installed using pip.*

### Pygal on Linux and OS X

```
$ pip install --user pygal
```

### Pygal on Windows

```
> python -m pip install --user pygal
```

## Line graphs, scatter plots, and bar graphs

*To make a plot with Pygal, you specify the kind of plot and then add the data.*

### Making a line graph

*To view the output, open the file squares.svg in a browser.*

```
import pygal

x_values = [0, 1, 2, 3, 4, 5]
squares = [0, 1, 4, 9, 16, 25]

chart = pygal.Line()
chart.force_uri_protocol = 'http'
chart.add('x^2', squares)
chart.render_to_file('squares.svg')
```

### Adding labels and a title

```
--snip--
chart = pygal.Line()
chart.force_uri_protocol = 'http'
chart.title = "Squares"
chart.x_labels = x_values
chart.x_title = "Value"
chart.y_title = "Square of Value"
chart.add('x^2', squares)
chart.render_to_file('squares.svg')
```

## Line graphs, scatter plots, and bar graphs (cont.)

### Making a scatter plot

*The data for a scatter plot needs to be a list containing tuples of the form (x, y). The stroke=False argument tells Pygal to make an XY chart with no line connecting the points.*

```
import pygal

squares = [
    (0, 0), (1, 1), (2, 4), (3, 9),
    (4, 16), (5, 25),
]

chart = pygal.XY(stroke=False)
chart.force_uri_protocol = 'http'
chart.add('x^2', squares)
chart.render_to_file('squares.svg')
```

### Using a list comprehension for a scatter plot

*A list comprehension can be used to efficiently make a dataset for a scatter plot.*

```
squares = [(x, x**2) for x in range(1000)]
```

### Making a bar graph

*A bar graph requires a list of values for the bar sizes. To label the bars, pass a list of the same length to x\_labels.*

```
import pygal

outcomes = [1, 2, 3, 4, 5, 6]
frequencies = [18, 16, 18, 17, 18, 13]

chart = pygal.Bar()
chart.force_uri_protocol = 'http'
chart.x_labels = outcomes
chart.add('D6', frequencies)
chart.render_to_file('rolling_dice.svg')
```

### Making a bar graph from a dictionary

*Since each bar needs a label and a value, a dictionary is a great way to store the data for a bar graph. The keys are used as the labels along the x-axis, and the values are used to determine the height of each bar.*

```
import pygal

results = {
    1:18, 2:16, 3:18,
    4:17, 5:18, 6:13,
}

chart = pygal.Bar()
chart.force_uri_protocol = 'http'
chart.x_labels = results.keys()
chart.add('D6', results.values())
chart.render_to_file('rolling_dice.svg')
```

## Multiple plots

*You can add as much data as you want when making a visualization.*

### Plotting squares and cubes

```
import pygal

x_values = list(range(11))
squares = [x**2 for x in x_values]
cubes = [x**3 for x in x_values]

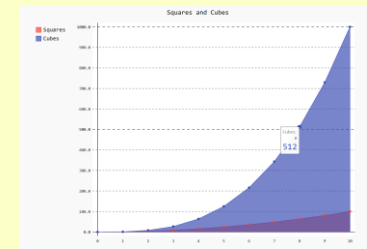
chart = pygal.Line()
chart.force_uri_protocol = 'http'
chart.title = "Squares and Cubes"
chart.x_labels = x_values

chart.add('Squares', squares)
chart.add('Cubes', cubes)
chart.render_to_file('squares_cubes.svg')
```

### Filling the area under a data series

*Pygal allows you to fill the area under or over each series of data. The default is to fill from the x-axis up, but you can fill from any horizontal line using the zero argument.*

```
chart = pygal.Line(fill=True, zero=0)
```



## Online resources

*The documentation for Pygal is available at <http://www.pygal.org/>.*

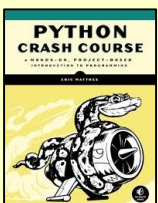
## Enabling interactive features

*If you're viewing svg output in a browser, Pygal needs to render the output file in a specific way. The force\_uri\_protocol attribute for chart objects needs to be set to 'http'.*

## Python Crash Course

*Covers Python 3 and Python 2*

[nostarchpress.com/pythoncrashcourse](http://nostarchpress.com/pythoncrashcourse)



## Styling plots

*Pygal lets you customize many elements of a plot. There are some excellent default themes, and many options for styling individual plot elements.*

### Using built-in styles

*To use built-in styles, import the style and make an instance of the style class. Then pass the style object with the style argument when you make the chart object.*

```
import pygal
from pygal.style import LightGreenStyle
```

```
x_values = list(range(11))
squares = [x**2 for x in x_values]
cubes = [x**3 for x in x_values]
```

```
chart_style = LightGreenStyle()
chart = pygal.Line(style=chart_style)
chart.force_uri_protocol = 'http'
chart.title = "Squares and Cubes"
chart.x_labels = x_values
```

```
chart.add('Squares', squares)
chart.add('Cubes', cubes)
chart.render_to_file('squares_cubes.svg')
```

### Parametric built-in styles

*Some built-in styles accept a custom color, then generate a theme based on that color.*

```
from pygal.style import LightenStyle

--snip--
chart_style = LightenStyle('#336688')
chart = pygal.Line(style=chart_style)
--snip--
```

### Customizing individual style properties

*Style objects have a number of properties you can set individually.*

```
chart_style = LightenStyle('#336688')
chart_style.plot_background = '#CCCCCC'
chart_style.major_label_font_size = 20
chart_style.label_font_size = 16
--snip--
```

### Custom style class

*You can start with a bare style class, and then set only the properties you care about.*

```
chart_style = Style()
chart_style.colors = [
    '#CCCCCC', '#AAAAAA', '#888888']
chart_style.plot_background = '#EEEEEE'
```

```
chart = pygal.Line(style=chart_style)
--snip--
```

## Styling plots (cont.)

### Configuration settings

*Some settings are controlled by a Config object.*

```
my_config = pygal.Config()
my_config.show_y_guides = False
my_config.width = 1000
my_config.dots_size = 5
```

```
chart = pygal.Line(config=my_config)
--snip--
```

### Styling series

*You can give each series on a chart different style settings.*

```
chart.add('Squares', squares, dots_size=2)
chart.add('Cubes', cubes, dots_size=3)
```

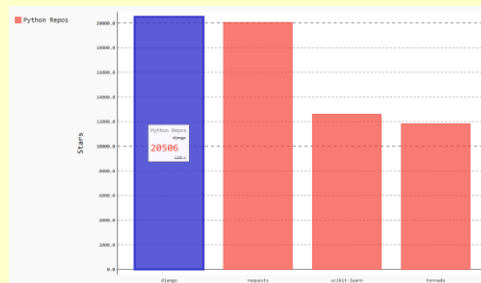
### Styling individual data points

*You can style individual data points as well. To do so, write a dictionary for each data point you want to customize. A 'value' key is required, and other properties are optional.*

```
import pygal

repos = [
    {
        'value': 20506,
        'color': '#3333CC',
        'xlink': 'http://djangoproject.com/',
    },
    20054,
    12607,
    11827,
]
```

```
chart = pygal.Bar()
chart.force_uri_protocol = 'http'
chart.x_labels = [
    'django', 'requests', 'scikit-learn',
    'tornado',
]
chart.y_title = 'Stars'
chart.add('Python Repos', repos)
chart.render_to_file('python_repos.svg')
```



## Plotting global datasets

*Pygal can generate world maps, and you can add any data you want to these maps. Data is indicated by coloring, by labels, and by tooltips that show data when users hover over each country on the map.*

### Installing the world map module

*The world map module is not included by default in Pygal 2.0. It can be installed with pip:*

```
$ pip install --user pygal_maps_world
```

### Making a world map

*The following code makes a simple world map showing the countries of North America.*

```
from pygal.maps.world import World

wm = World()
wm.force_uri_protocol = 'http'
wm.title = 'North America'
wm.add('North America', ['ca', 'mx', 'us'])

wm.render_to_file('north_america.svg')
```

### Showing all the country codes

*In order to make maps, you need to know Pygal's country codes. The following example will print an alphabetical list of each country and its code.*

```
from pygal.maps.world import COUNTRIES

for code in sorted(COUNTRIES.keys()):
    print(code, COUNTRIES[code])
```

### Plotting numerical data on a world map

*To plot numerical data on a map, pass a dictionary to add() instead of a list.*

```
from pygal.maps.world import World

populations = {
    'ca': 34126000,
    'us': 309349000,
    'mx': 113423000,
}

wm = World()
wm.force_uri_protocol = 'http'
wm.title = 'Population of North America'
wm.add('North America', populations)

wm.render_to_file('na_populations.svg')
```

*More cheat sheets available at*  
[ehmatthes.github.io/pcc/](http://ehmatthes.github.io/pcc/)