Scatter plot and Color mapping in Python

I have a range of points x and y stored in numpy arrays. Those represent x(t) and y(t) where t=0...T-1

I am plotting a scatter plot using

```
import matplotlib.pyplot as plt

plt.scatter(x,y)
plt.show()
```

I would like to have a colormap representing the time (therefore coloring the points depending on the index in the numpy arrays)

What is the easiest way to do so?

python matplotlib

edited Jul 16 '13 at 18:46

Hooked
27.3k 12 91 143

asked Jul 16 '13 at 16:36

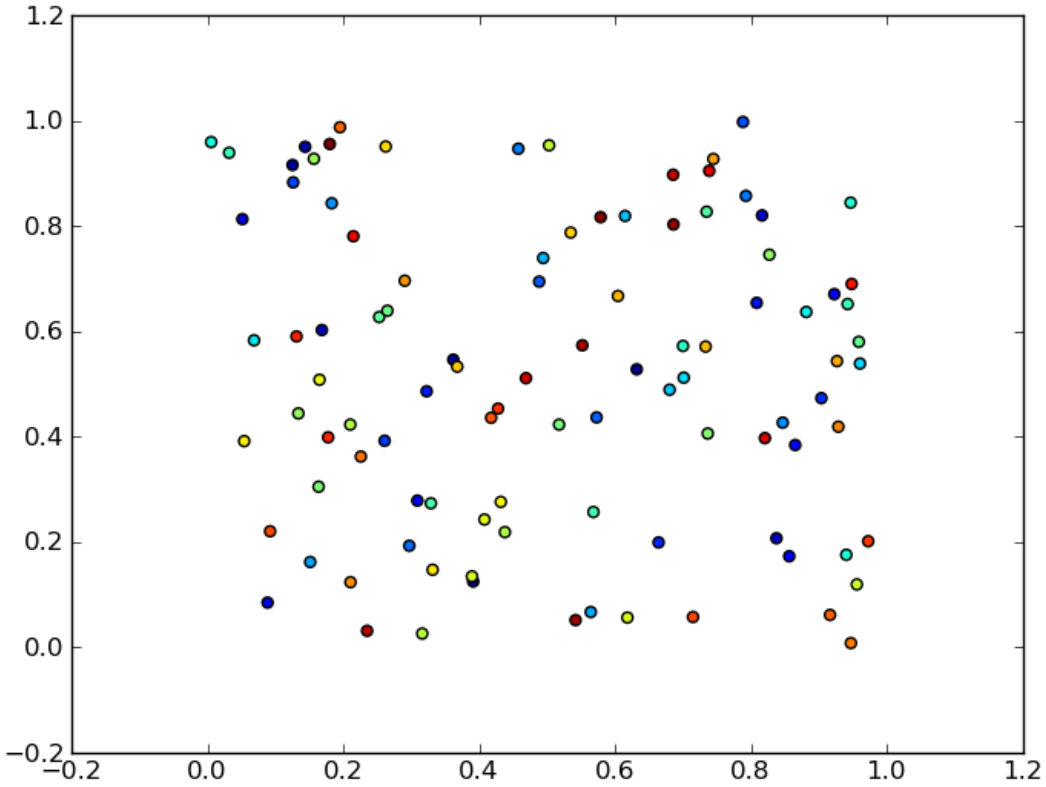
Vincent
184 1 1 13

2 Answers

Here is an example

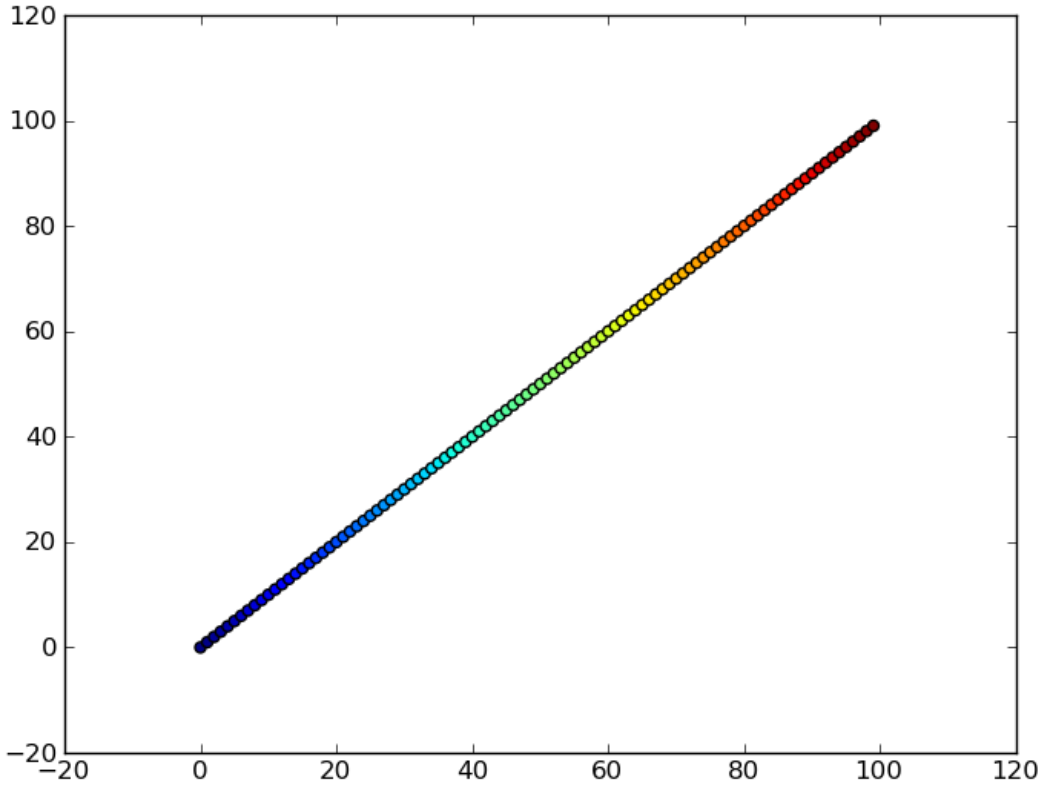
```
import numpy as np
import matplotlib.pyplot as plt

x = np.random.rand(100)
y = np.random.rand(100)
t = np.arange(100)

plt.scatter(x, y, c=t)
plt.show()
```

Here you are setting the color based on the index, `t`, which is just an array of `[1, 2, ..., 100]`.



Perhaps an easier-to-understand example is the slightly simpler

```
import numpy as np
import matplotlib.pyplot as plt

x = np.arange(100)
y = x
t = x
plt.scatter(x, y, c=t)
plt.show()
```



Note that the array you pass as `c` doesn't need to have any particular order or type, i.e. it doesn't need to be sorted or integers as in these examples. The plotting routine will scale the colormap such that the minimum/maximum values in `c` correspond to the bottom/top of the colormap.

Colormaps

You can change the colormap by adding

```
import matplotlib.cm as cm
plt.scatter(x, y, c=t, cmap=cm.cmap_name)
```

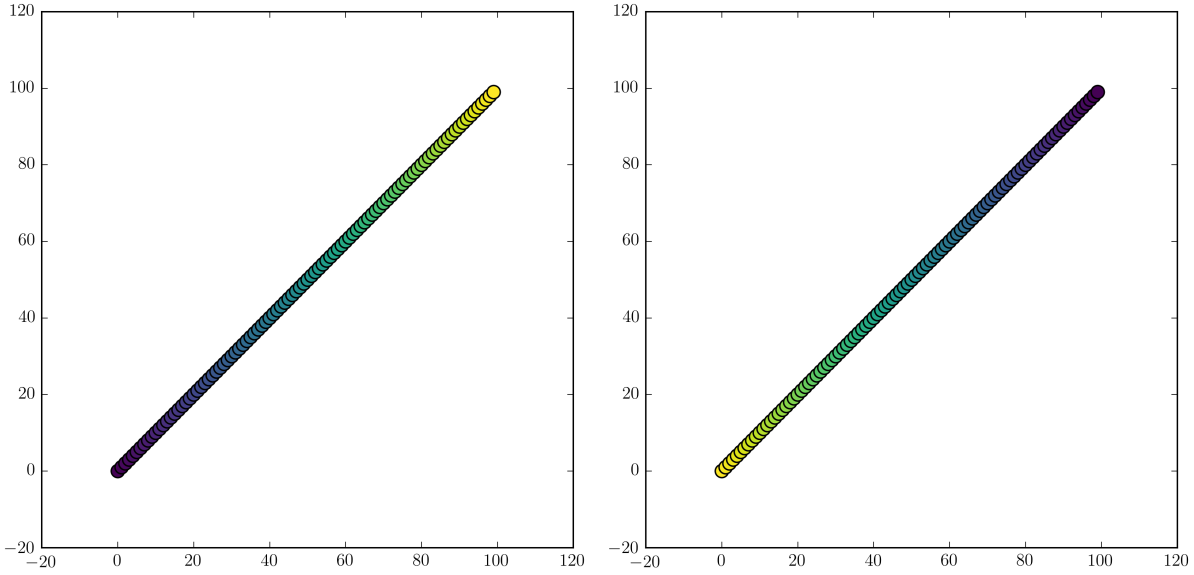
Importing `matplotlib.cm` is optional as you can call colormaps as `cmap="cmap_name"` just as well.

There is a reference page of colormaps showing what each looks like. Also know that you can reverse a colormap by simply calling it as `cmap_name_r` . So either

```
plt.scatter(x, y, c=t, cmap=cm.cmap_name_r)
# or
plt.scatter(x, y, c=t, cmap="cmap_name_r")
```

will work. Examples are `"jet_r"` or `cm.plasma_r` . Here's an example with the new 1.5 colormap viridis:

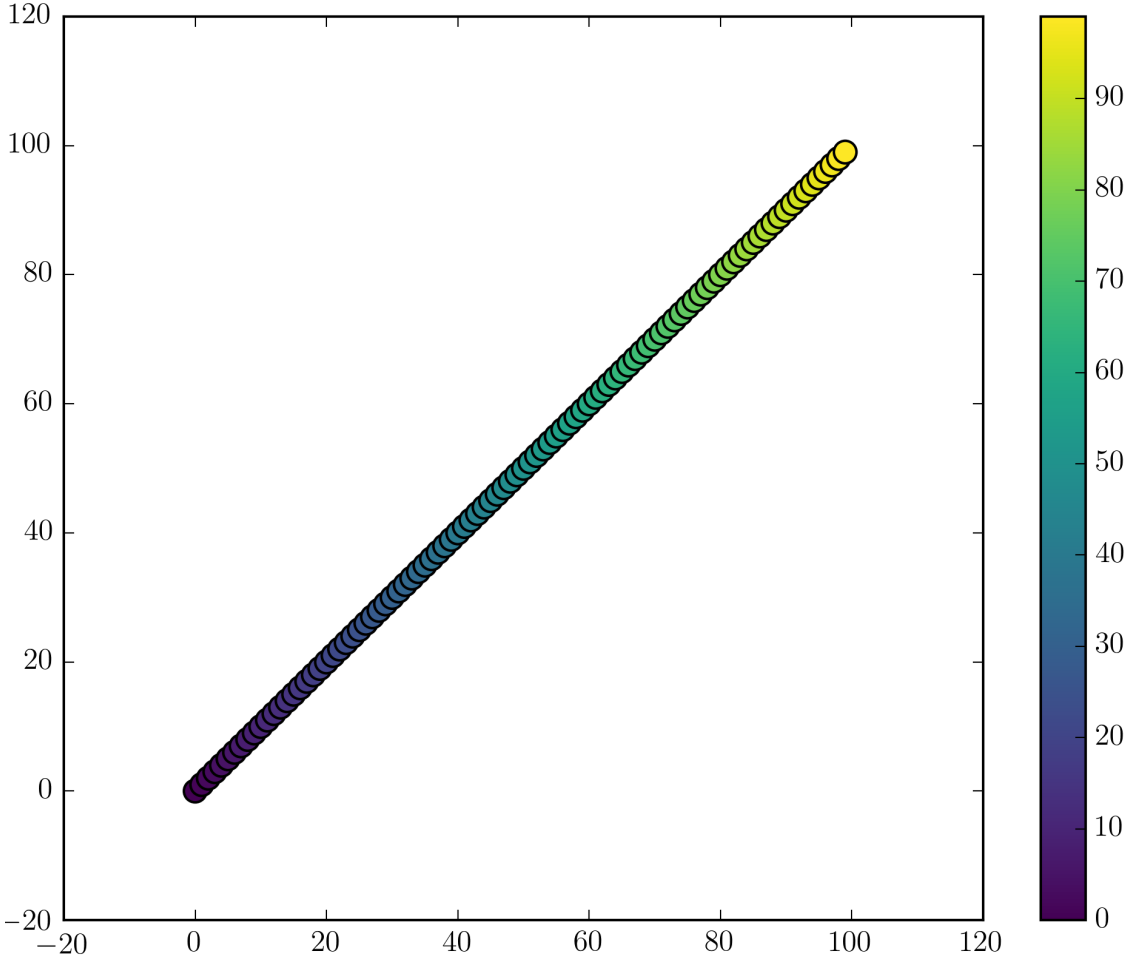
```
import numpy as np
import matplotlib.pyplot as plt

x = np.arange(100)
y = x
t = x
fig, (ax1, ax2) = plt.subplots(1, 2)
ax1.scatter(x, y, c=t, cmap='viridis')
ax2.scatter(x, y, c=t, cmap='viridis_r')
plt.show()
```



Colorbars

You can add a colorbar by using

```
plt.scatter(x, y, c=t, cmap='viridis')
plt.colorbar()
plt.show()
```



Note that if you are using figures and subplots explicitly (e.g. `fig, ax = plt.subplots()` or `ax = fig.add_subplot(111)`), adding a colorbar can be a bit more involved. Good examples can be found here for a single subplot colorbar and here for 2 subplots 1 colorbar.

edited May 31 at 15:28

answered Jul 16 '13 at 16:45

wflynny

6,647 15 27

1 You can get a legend for the colours with the `plt.colorbar()` command. – drevicko Jul 2 '15 at 7:03

The code appears to have changed here.cmap=cm.colormap_name should now be cmap=cm.cmapname. – cmarti1138 Nov 13 '15 at 16:35

@cmarti1138 I'm not sure what you mean, `cm.colormap_name` and `cm.cmapname` not actual variables in `matplotlib.cm` ; it's just pseudocode for `cm.jet` or `cm.veridis_r` , etc. – wflynny Nov 16 '15 at 4:35

To add to wflynny's answer above, you can find the available colormaps here

Example:

```
import matplotlib.cm as cm
plt.scatter(x, y, c=t, cmap=cm.jet)
```

or alternatively,

```
plt.scatter(x, y, c=t, cmap='jet')
```

answered Oct 30 '15 at 1:33

Nathan
65 6