Data Viusalisation with Python Programming

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Matplotlib

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Learning outcomes:

Introduction to Matplotlib

Install Matplotlib with pip

Basic Plotting with Matplotlib

Plotting two or more lines on the same plot

Matplotlib

Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy.
It was conceived by John Hunter in 2002, originally as a patch to IPython for enabling interactive MATLAB-style plotting via gnu-plot from the IPython command line.

Matplotlib

One of Matplotlib's most important features is its ability to play well with many operating systems and graphics backends. Matplotlib supports dozens of backend and output types, which means you can count on it to work regardless of which operating system you are using or which output format you wish. This cross-platform, everything-to-everyone approach has been one of the great strengths of Matplotlib.

Install Matplotlib with pip

Matplotlib and its dependency packages are available in the form of wheel packages on the standard Python package repositories and can be installed on Windows, Linux as well as MacOS systems using the pip package manager.
Open the command prompt and change the directory to your current working directory and then try this and see if works on your system:

pip3 install matplotlib OR

python -m pip install matplotlib OR

pip install --user matplotlib

Basic Plotting with Matplotlib

We will learn how to create a simple plot with Matplotlib.

matplotlib.pyplot is a collection of command style functions that make Matplotlib work like MATLAB. Each Pyplot function makes some change to a figure. For example, a function creates a figure, a plotting area in a figure, plots some lines in a plotting area, decorates the plot with labels, etc.

Basic Plotting with Matplotlib

Generating visualizations with pyplot is very quick:

```
import matplotlib.pyplot as plt OR
from matplotlib import pyplot as plt
plt.plot([1, 2, 3, 4])
plt.show()
```

Basic Plotting with Matplotlib

You may be wondering why the x-axis ranges from 0-3 and the y-axis from 1-4. If you provide a single list or array to plot, matplotlib assumes it is a sequence of y values, and automatically generates the x values for you. Since python ranges start with 0, the default x vector has the same length as y but starts with 0. Hence the x data are [0, 1, 2, 3].

plot is a versatile function, and will take an arbitrary number of arguments. For example, to plot x versus y, you can write:

plt.plot([1, 2, 3, 4], [1, 4, 9, 16])

Basic Plotting with Matplotlib

You can also add the label for *x-axis* and label for *y-axis* and you can also provide the title to your plot. For Example:

```
X= [1,2,3,4,5]
Y= [50,85,80,75,45]
plt.plot(X,Y)
plt.xlabel("Roll_no")
plt.ylabel("Marks")
plt.title("Marks Distribution")
plt.show()
```

Plotting two or more lines on the same plot

We can add two or more lines on the same plot. Let's see the example for it.

In this example we differentiate between the lines by giving them a name(**label**) which is passed as an argument of .plot() function.

The small rectangular box giving information about the type of line and its color is called "legend". We can add a legend to our plot
using **.legend()** function. This will take the label's value.