

Updated on 08/10/2024

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## Matplotlib training

1 day (7 hours)

### Presentation

Matplotlib is a widely used Python library for 2D graphics. It lets you, the developer, visualize and analyze data in the form of curves, histograms, pie charts and more. Its flexibility makes it an essential tool for scientific and data analysis projects.

In this course, you'll learn how to create various types of graph, such as line, bar, scatter and pie charts. There are also [interactive graphs](#) with zoom and data point hover functions, as well as dynamic graph updating.

Your team will also discover advanced concepts, such as creating sub-graphs, exporting graphs in different formats (PNG, PDF), and managing logarithmic and linear scales. They will also use complementary libraries to enrich visualizations.

By the end of this course, you'll have mastered the use of Matplotlib to visualize data, adjust graphical aspects and interpret complex data. You'll develop practical skills in data analysis and the creation of clear, powerful visual reports.

This course will bring you up to date with the [latest developments](#) in Matplotlib.

### Objectives

- Understanding the basics of Matplotlib and its installation
- Create and customize simple plots with `plt.plot()`
- Master the different types of graphics and how to use them
- Design interactive graphics
- Learn to manage subplots and layouts
- Importing and visualizing data with pandas and matplotlib

# Target audience

- Data Scientists
- Data Analysts
- Engineers
- Developers

# Prerequisites

- Python language skills
  - Syntax
  - Data structures: lists, dictionaries, tuples, etc.
  - Functions
- Basic mathematical concepts
  - Curves, intervals, functions, etc.
  - Geometry

# Matplotlib training program

## Introduction to Matplotlib

- Presentation of the bookshop
- Installation (via pip)
- Basic structure of matplotlib (pyplot)

## Creating simple graphics

- Plotting with `plt.plot()`
- Add titles and legends (`plt.title()`, `plt.xlabel()`, `plt.ylabel()`, `plt.legend()`)
- Displaying and saving a graph (`plt.show()`, `plt.savefig()`)

## Customize graphics

- Modify colors, lines and styles (color, linestyle, marker)
- Axis management (limits, ticks)
- Add text and annotations (`plt.text()`, `plt.annotate()`)

## Chart types

- Lines: single and multiple line graphs
- Bars: vertical and horizontal bar charts (`plt.bar()`, `plt.barh()`)

- Histograms: distribution graphs (plt.hist())
- Scatter Plots: clouds of points (plt.scatter())
- Pie Charts: pie charts (plt.pie())
- Other types (boxplots, heatmaps, etc.)

## Subplots and layouts

- Create multiple graphics with plt.subplot() or plt.subplots()
- Layout of graphics on a grid
- Spacing and adjustment of graphics

## Themes and styles

- Application of predefined styles (plt.style.use())
- Creating custom themes

## Data management

- Import data from files (CSV, Excel) with pandas
- Data manipulation and visualization with pandas and matplotlib

## Advanced use of Matplotlib

- Creating complex figures with figures and axes
- 3D graphics (mpl\_toolkits.mplot3d)
- Adding interactivity with widgets

## Integration with other libraries

- Using seaborn for enhanced visualization
- Integration with plotly and dash for interactive graphics

## Companies concerned

This course is aimed at both individuals and companies, large or small, wishing to train their teams in a new advanced computer technology, or to acquire specific business knowledge or modern methods.

## Positioning on entry to training

Positioning at the start of training complies with Qualiopi quality criteria. As soon as enrolment is finalized, the learner receives a self-assessment questionnaire enabling us to assess his or her estimated level of proficiency in different types of technology, as well as his or her expectations and objectives.

This questionnaire also enables us to anticipate any connection or internal security problems (intra-company or virtual classroom) that could be problematic for the follow-up and smooth running of the training session. This questionnaire also enables us to anticipate any connection or internal security difficulties within the company (intra-company or virtual classroom) that could be problematic for the follow-up and smooth running of the training session.

## Teaching methods

Practical course: 60% Practical, 40% Theory. Training material distributed in digital format to all participants.

## Organization

The course alternates theoretical input from the trainer, supported by examples, with brainstorming sessions and group work.

## Validation

At the end of the session, a multiple-choice questionnaire verifies the correct acquisition of skills.

## Sanction

A certificate will be issued to each trainee who completes the course.