

Python is the most popular language for Machine Learning (ML) and Artificial Intelligence (AI) developers for a long time. ML is essentially mathematical in nature (optimization, statistics and probability). Python libraries make it easy for researchers who don't have a lot of coding experience to "do ML." The following are some of the features that make Python one of the best programming languages for ML and AI:

- Free and open-source nature makes it community friendly and guarantees improvements in the long run.
- Exhaustive libraries ensure there's a solution for every existing problem.
- Smooth implementation and integration make it accessible for people with the varying skill level to adapt it.
- Increased productivity by reducing the time to code and debug.
- Useful for traditional and also ML programming.

Here is a list of some important libraries of python which are required for ML:

- **NumPy** is a popular Python library that allows you to process large multi-dimensional arrays and matrices using high-level mathematical functions. It comes in handy for basic scientific computations in ML. It's particularly useful for linear algebra, the Fourier transform, and random number generation. For more details refer to [Numpy](#).
- **SciPy** is a widely used ML library that includes modules for optimization, linear algebra, integration, and statistics. It facilitates signal processing and is ideal for image manipulation. It also facilitates the execution of mathematical operations. It requires numerical integration and optimization as well as efficient numerical routines. However, there is both a stack and a library named SciPy. The library is part of the stack. Beginners who don't know the difference may become confused. For more details refer to [documentation](#).
- **Pandas** is a well known Python library for data analysis which is not directly related to ML. The dataset must be prepared before training, as we all know. Pandas comes in handy in this case because it was designed specifically for data extraction and preparation. It offers high-level data structures as well as a wide range of data analysis methods. It has a lot of built-in data grouping, merging, and filtering methods. For more details refer to [Pandas](#).
- **Scikit-learn** is one of the most popular ML libraries for classical ML algorithms that is built on top of two basic Python libraries, viz., NumPy and SciPy. Scikit-learn supports most of the supervised and unsupervised learning algorithms. Scikit-learn can also be used for data-mining and data-analysis, which makes it a great tool who is starting out with ML. For more details refer to [documentation](#).

- **Matplotlib** is a very popular Python library for data visualization which is not directly related to ML. It's especially useful when a programmer needs to see how data patterns are represented. A module named pyplot makes it easy for programmers for plotting as it provides features to control line styles, font properties, formatting axes, etc. It offers various kinds of graphs and plots for data visualization, viz., histogram, error charts, bar charts, etc. More details and examples can be found in this [documentation](#).

## ***Environment for Coding in Python***

In this workshop we will use **Google Colab**. Google Colab is a Google Research product, which allows developers to write and execute Python code through their browser. Google Colab is an excellent tool for ML tasks. It is an interactive hosted Jupyter notebook. Jupyter Notebooks are a powerful way to write and iterate on the Python code for data analysis. Rather than writing and rewriting an entire program, you can write lines of code and run them one at a time. Colab requires no setup and has an excellent free version, which gives free access to Google computing resources such as GPUs. There are several reasons to choose Google Colab:

- Pre-Installed Libraries : such as numpy, pandas, matplotlib,...
- Cloud Backup: Codes are saved on the Cloud
- Collaboration: Ability to share the codes and resources with others
- Free GPU and TPU Use
- Data versatility: Ability to 'mount' Google Drive data onto your notebook.

Here is the link to a tutorial for using Colab for the first time.

<https://towardsdatascience.com/getting-started-with-google-colab-f2ff97f594c>

## ***References***

- <https://towardsdatascience.com/best-python-libraries-for-machine-learning-and-deep-learning-b0bd40c7e8c>
- <https://www.freecodecamp.org/news/essential-libraries-for-machine-learning-in-python-82a9ada57aeb/>
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