**Python libraries**

1. **PANDAS**

* Pandas is a powerful and open-source Python library.
* Pandas library is used for data manipulation and analysis.
* Pandas consist of data structures and functions to perform efficient operations on data.
* Pandas is well-suited for working with tabulardata, such as spreadsheets or SQLtables.
* The Pandas library is an essential tool for data analysts, scientists, and engineers working with structured data in Python.
* It is built on top of the NumPy library which means that a lot of the structures of NumPy are used or replicated in Pandas.
* The data produced by Pandas is often used as input for plotting functions in Matplotlib, statistical analysis in SciPy, and machine learning algorithms in Scikit-learn.
* It is mainly used for :

1. Data set cleaning, merging, and joining.
2. Easy handling of missing data (represented as NaN) in floating point as well as non-floating point data.
3. Columns can be inserted and deleted from DataFrame and higher-dimensional objects.
4. Pandas generally provide two data structures for manipulating data. They are:
5. **Series**
6. **DataFrame**

* The Pandas program can be run from any text editor, but it is recommended to use Jupyter Notebook for this, as Jupyter gives you the ability to execute code in a particular cell rather than the entire file.

1. **NumPy**

* NumPy stands for Numerical Python, is an open-source Python library that provides support for large, multi-dimensional arrays and matrices.
* It also have a collection of high-level mathematical functions to operate on arrays.
* It provides a high-performance multidimensional array object and tools for working with these arrays.
* It is the fundamental package for scientific computing with Python. It is open-source software.
* important features include:

1. A powerful N-dimensional array object
2. Sophisticated (broadcasting) functions
3. Tools for integrating C/C++ and Fortran code
4. Useful linear algebra, Fourier transform, and random number capabilities

* can also be used as an efficient multi-dimensional container of generic data.
* Arbitrary data types can be defined using Numpy which allows NumPy to seamlessly and speedily integrate with a wide variety of databases.

1. **Tensorflow**

* TensorFlow is an open-source machine learning library developed by Google
* used to build and train deep learning models as it facilitates the creation of computational graphs and efficient execution on various hardware platforms.
* software library for numerical computation using data flow graphs where:

1. nodes in the graph represent mathematical operations.
2. edges in the graph represent the multidimensional data arrays (called tensors) communicated between them. (tensor is the central unit of data in TensorFlow).

* TensorFlow provides multiple APIs (Application Programming Interfaces). These can be classified into 2 major categories:

1. Low level API
2. High level API
3. **Keras**

* Keras is an open-source deep-learning framework that gained attention due to its user-friendly interface
* offers ease of use, flexibility, and the ability to run seamlessly on top of TensorFlow.
* is a high-level, user-friendly API used for building and training neural networks.
* It is designed to be user-friendly, modular, and easy to extend
* allows you to build, train, and deploy deep learning models with minimal code.
* provides a high-level API that is intuitive and easy to use, making it ideal for beginners and experts alike.

Key Features:

1. Simplicity
2. Extensible for creating custom layers, loss functions, and preprocessing tasks.
3. Adapts well to various use cases and research scenarios
4. Runs on top of popular deep learning frameworks like TensorFlow, Theano, and CNTK.
5. Provides a consistent experience across platforms, whether using a GPU or CPU.
6. Suitable for both small-scale experiments and large-scale production systems.
7. Rapid prototyping and testing of different neural network architectures.
8. High-level abstractions allow quick iteration on ideas, ideal for exploratory work.

* Commonly used in : Image and Video Processing, Natural Language Processing (NLP),

Time Series Forecasting, Game Development and Reinforcement Learning , Autonomous Systems.

1. **Pytorch**

* The most commonly used libraries in deep learning are Tensorflow and PyTorch
* Pytorch is an open-source deep learning framework available with a Python and C++ interface**.**
* The PyTorch resides inside the torch module. In PyTorch, the data that has to be processed is input in the form of a tensor.
* The Pytorch is used to process the tensors. [Tensors](https://www.geeksforgeeks.org/deep-learning-with-pytorch-an-introduction/) are multidimensional arrays like n-dimensional NumPy array.
* PyTorch accelerates the scientific computation of tensors as it has various inbuilt functions
* The PyTorch library modules are essential to create and train neural networks. The three main library modules are Autograd, Optim, and nn.
* Usually, PyTorch is used either as:
* A replacement for NumPy to use the power of GPUs.
* A deep learning research platform that provides maximum flexibility and speed.

1. **Sklearn**

* Scikit-learn has emerged as a powerful and user-friendly Python library.
* Its simplicity and versatility make it a better choice for both beginners and seasoned data scientists to build and implement machine learning models.
* Scikit-learn is an open-source[Python](https://www.geeksforgeeks.org/python-programming-language/) library that implements a range of machine learning, pre-processing, cross-validation, and visualization algorithms using a unified interface
* It is an open-source machine-learning library that provides a plethora of tools for various machine-learning tasks such as Classification, Regression, Clustering, and many more.
* Scikit-learn requires:

1. NumPy
2. SciPy as its dependencies.

* Simple and efficient tools for data mining and data analysis. It features various classification, regression, and clustering algorithms including support vector machines, random forests, gradient boosting, k-means, etc.
* Accessible to everybody and reusable in various contexts.
* Built on the top of NumPy, SciPy, and matplotlib.
* Open source, commercially usable – BSD license.