

Aim: Make a list of any 6 libraries of python with their functionalities in brief. And, also write the steps required for installing any new library in a given environment.

1. NumPy

NumPy is a numerical Python library. It contains a multi-dimensional matrix and array data structures. And it is used to perform various mathematical operations on arrays.

- Interactive: Numpy is very interactive and easy to use.
- Mathematics: Makes complex mathematical implementations very simple.
- Intuitive: Makes coding real easy and grasping the concepts is easy.
- Lot of Interaction: Widely used, hence a lot of open source contribution.

2. Pandas

Pandas is a machine learning library in Python that provides data structures of high-level and a wide variety of tools for analysis.

- Pandas make sure that the entire process of manipulating data will be easier.
- Ability to translate complex operations with data using one or two commands.
- Support for operations such as Re-indexing, Iteration, Sorting, Aggregations, Concatenations and Visualizations.

3. SciKit-Learn

It is a Python library is associated with NumPy and SciPy. It is considered as one of the best libraries for working with complex data.

- Cross-validation: There are various methods to check the accuracy of supervised models on unseen data.
- Unsupervised learning algorithms: Again there is a large spread of algorithms in the offering – starting from clustering, factor analysis, and principal component analysis to unsupervised neural networks.
- Feature extraction: Useful for extracting features from images and text.

4. Keras

Keras provides an easier mechanism to express neural networks. It also provides some of the best utilities for compiling models, processing data-sets, visualization of graphs, etc. In the backend, Keras uses either Theano or TensorFlow internally.

- It runs smoothly on both CPU and GPU.
- Keras supports almost all the models of a neural network – fully connected, convolutional, pooling, recurrent, embedding, etc. Furthermore, these models can be combined to build more complex models.

- Keras, being modular in nature, is incredibly expressive, flexible, and apt for innovative research.
- Keras is a completely Python-based framework, which makes it easy to debug and explore.

5. TensorFlow

TensorFlow works like a computational library for writing new algorithms that involve a large number of tensor operations, since neural networks can be easily expressed as computational graphs they can be implemented using TensorFlow as a series of operations on Tensors. Plus, tensors are N-dimensional matrices which represent your data.

- With TensorFlow, we can easily visualize each and every part of the graph which is not an option while using Numpy or SciKit.
- It is flexible in its operability.
- It is easily trainable on CPU as well as GPU for distributed computing.
- TensorFlow offers pipelining in the sense that you can train multiple neural networks and multiple GPUs which makes the models very efficient on large-scale systems.

6. Theano

Theano is a computational framework machine learning library in Python for computing multidimensional arrays. Theano works similar to TensorFlow, but it is not as efficient as TensorFlow because of its inability to fit into production environments.

- Tight integration with NumPy – Ability to use completely NumPy arrays in Theano-compiled functions.
- Transparent use of a GPU – Perform data-intensive computations much faster than on a CPU.
- Efficient symbolic differentiation – Theano does your derivatives for functions with one or many inputs.
- Speed and stability optimizations – Get the right answer for $\log(1+x)$ even when x is very tiny. This is just one of the examples to show the stability of Theano.
- Dynamic C code generation – Evaluate expressions faster than ever before, thereby, increasing efficiency by a lot.
- Extensive unit-testing and self-verification – Detect and diagnose multiple types of errors and ambiguities in the model.

Steps to install a new library and package in Anaconda IDE:

1. Open Anaconda Command prompt as administrator.
2. Use `$ cd\` to come out of set directory or path.
3. Run `$ pip install` command.