Experiment No. 1

Title: Installation of Tensorflow & Keras and many other pre-installed python libraries.

Aim: Installation of Tensorflow & Keras (Tensorflow(v1.0.0), TFLearn, Keras, and many other pre-installed python libraries (Numpy, pandas).

Theory:

TensorFlow:

TensorFlow is an open-source library developed by the Google Brain team primarily for deep learning applications. It also supports traditional machine learning. TensorFlow provides a comprehensive, flexible ecosystem of tools, libraries, and community resources that lets researchers push the state-of-the-art in ML, and developers easily build and deploy ML-powered applications.

TensorFlow's versatility, scalability, and comprehensive toolset make it a powerful library for both researchers and developers. Whether creating new machine learning models, fine-tuning pre-trained models, or deploying production pipelines, TensorFlow provides the necessary resources and support to achieve these goals effectively.

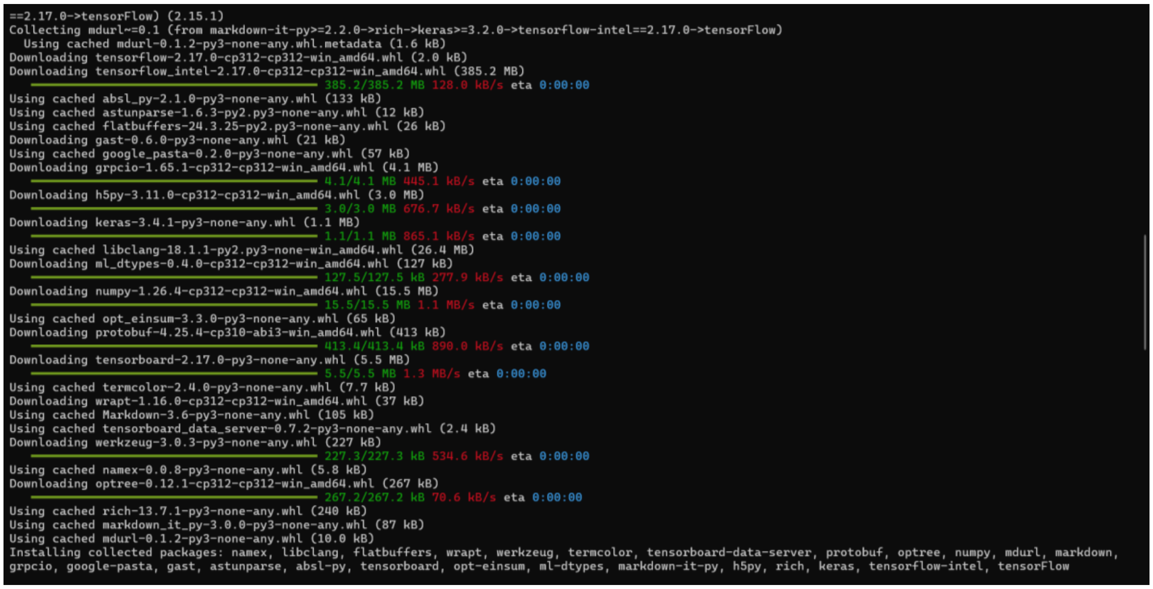
TensorFlow is-

1. **User-Friendly**: High-level APIs for easy model building.
2. **Production-Ready**: Deploy models on any platform.
3. **Scalable**: Train small to large-scale models.
4. **Flexible**: Supports both deep learning and traditional ML.
5. **Strong Community**: Extensive resources and support.

Installation of TensorFlow:

TensorFlow can install by using “pip”.

1. Open your command prompt or terminal.
2. Run the following command: **Pip install tensorflow.**



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Collecting mdurl~=0.1 (from markdown-it-py>=2.2.0->rich->keras>=3.2.0->tensorflow-intel==2.17.0->tensorFlow)
  Using cached mdurl-0.1.2-py3-none-any.whl.metadata (1.6 kB)
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Using cached libclang-18.1.1-py2.py3-none-win_amd64.whl (26.4 MB)
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Downloading tensorboard-2.17.0-py3-none-any.whl (5.5 MB)
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Using cached Markdown-3.6-py3-none-any.whl (105 kB)
Using cached tensorboard_data_server-0.7.2-py3-none-any.whl (2.4 kB)
Downloading werkzeug-3.0.3-py3-none-any.whl (227 kB)
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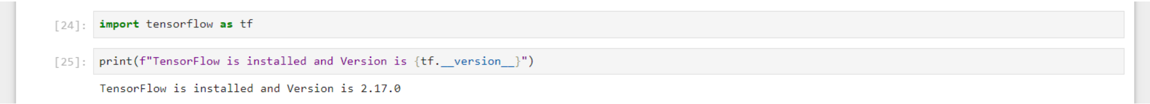
Using cached rich-13.7.1-py3-none-any.whl (240 kB)
Using cached markdown_it_py-3.0.0-py3-none-any.whl (87 kB)
Using cached mdurl-0.1.2-py3-none-any.whl (10.0 kB)
Installing collected packages: namex, libclang, flatbuffers, wrapt, werkzeug, termcolor, tensorboard-data-server, protobuf, optree, numpy, mdurl, markdown,
grpcio, google-pasta, gast, astunparse, absl-py, tensorboard, opt-einsum, ml-dtypes, markdown-it-py, h5py, rich, keras, tensorflow-intel, tensorFlow
```



```
[24]: import tensorflow as tf

[25]: print(f"TensorFlow is installed and Version is {tf.__version__}")

      TensorFlow is installed and Version is 2.17.0
```

Keras:

Keras is a high-level neural networks API written in Python. It can run on top of TensorFlow, Theano, or CNTK. Keras focuses on being user-friendly, modular, and extensible, which makes it an ideal choice for both beginners and experts.

Keras is-

1. **User-Friendly**: Simple and intuitive APIs.
2. **Modular**: Easily configurable building blocks.
3. **Extensible**: Add custom modules.
4. **Multiple Backends**: Runs on TensorFlow, Theano, or CNTK.
5. **Pre-Trained Models**: Access to models for common tasks.

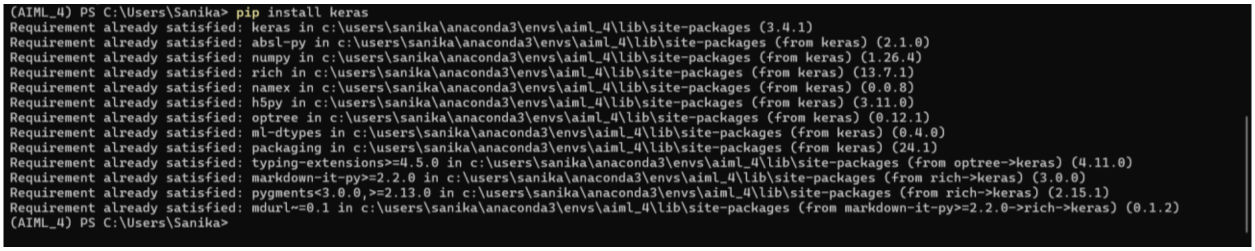
Installation of Keras:

Keras can install by using “pip”.

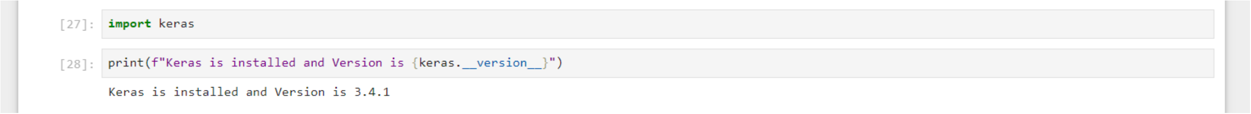
1. Open your command prompt or terminal.

2. Run the following command: **pip install keras**

In the new version of anaconda keras is already installed.



```
(AIML_4) PS C:\Users\Sanika> pip install keras
Requirement already satisfied: keras in c:\users\sanika\anaconda3\envs\aiml_4\lib\site-packages (3.4.1)
Requirement already satisfied: absl-py in c:\users\sanika\anaconda3\envs\aiml_4\lib\site-packages (from keras) (2.1.0)
Requirement already satisfied: numpy in c:\users\sanika\anaconda3\envs\aiml_4\lib\site-packages (from keras) (1.26.4)
Requirement already satisfied: rich in c:\users\sanika\anaconda3\envs\aiml_4\lib\site-packages (from keras) (13.7.1)
Requirement already satisfied: namex in c:\users\sanika\anaconda3\envs\aiml_4\lib\site-packages (from keras) (0.0.8)
Requirement already satisfied: h5py in c:\users\sanika\anaconda3\envs\aiml_4\lib\site-packages (from keras) (3.11.0)
Requirement already satisfied: optree in c:\users\sanika\anaconda3\envs\aiml_4\lib\site-packages (from keras) (0.12.1)
Requirement already satisfied: ml-dtypes in c:\users\sanika\anaconda3\envs\aiml_4\lib\site-packages (from keras) (0.4.0)
Requirement already satisfied: packaging in c:\users\sanika\anaconda3\envs\aiml_4\lib\site-packages (from keras) (24.1)
Requirement already satisfied: typing-extensions>=4.5.0 in c:\users\sanika\anaconda3\envs\aiml_4\lib\site-packages (from optree->keras) (4.11.0)
Requirement already satisfied: markdown-it-py>=2.2.0 in c:\users\sanika\anaconda3\envs\aiml_4\lib\site-packages (from rich->keras) (3.0.0)
Requirement already satisfied: pygments<3.0.0,>=2.13.0 in c:\users\sanika\anaconda3\envs\aiml_4\lib\site-packages (from rich->keras) (2.15.1)
Requirement already satisfied: mdurl~=0.1 in c:\users\sanika\anaconda3\envs\aiml_4\lib\site-packages (from markdown-it-py>=2.2.0->rich->keras) (0.1.2)
(AIML_4) PS C:\Users\Sanika>
```



```
[27]: import keras

[28]: print(f"Keras is installed and Version is {keras.__version__}")

      Keras is installed and Version is 3.4.1
```

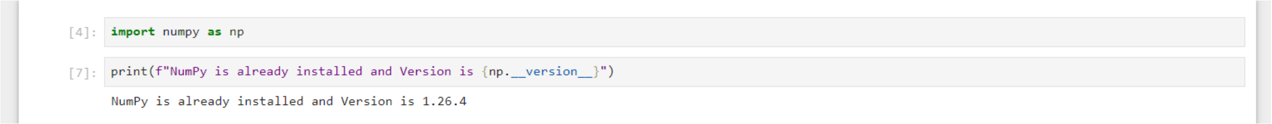
Pre-installed python libraries: There are many libraries that are pre-installed as follows.

NumPy:

NumPy is the foundational package for numerical computing in Python, providing support for arrays, matrices, and a collection of mathematical functions.

NumPy is use for

1. **N-Dimensional Array**: Provides a powerful N-dimensional array object.
2. **Mathematical Functions**: Large collection of high-level mathematical functions to operate on arrays.
3. **Broadcasting**: Supports broadcasting, a powerful mechanism for performing arithmetic operations on arrays of different shapes.



```
[4]: import numpy as np

[7]: print(f"NumPy is already installed and Version is {np.__version__}")

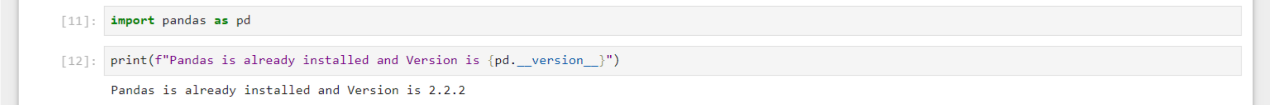
     NumPy is already installed and Version is 1.26.4
```

Pandas:

Pandas is a powerful data manipulation and analysis library for Python, providing data structures like DataFrame and Series.

Pandas is use for

1. **Data Manipulation**: Easy handling of missing data, merging, reshaping, and filtering datasets.
2. **Data Analysis**: Powerful group-by functionality for performing split-apply-combine operations on data sets.
3. **Time Series**: Tools for working with time-series data, including date range generation and frequency conversion.



```
[11]: import pandas as pd

[12]: print(f"Pandas is already installed and Version is {pd.__version__}")

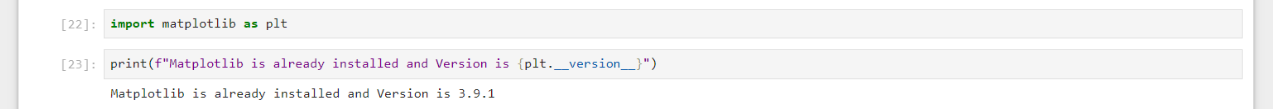
      Pandas is already installed and Version is 2.2.2
```

Matplotlib:

Matplotlib is a plotting library for creating static, interactive, and animated visualizations in Python.

Matplotlib is use for

1. **Plotting**: Simple interface for creating various types of plots and visualizations.
2. **Customization**: Extensive capabilities for customizing plots.
3. **Integration**: Works well with NumPy, Pandas, and other scientific computing tools.



```
[22]: import matplotlib as plt

[23]: print(f"Matplotlib is already installed and Version is {plt.__version__}")

      Matplotlib is already installed and Version is 3.9.1
```

Conclusion: Installed Tensorflow & Keras (Tensorflow(v1.0.0), TFLearn, Keras, and understand other pre-installed python libraries (Numpy, pandas).