

Title: **Assignment 1: Study of Deep learning Packages: Tensorflow, Keras, Theano and PyTorch. Document the distinct features and functionality of the packages.**

Name: Zahir Mulla

```
In [ ]: #Rollno: B512012  
#class: BE-IT(B)
```

```
In [1]: import numpy as np
```

### 1. Tensorflow

```
In [ ]: !pip install tensorflow
```

```
In [3]: import tensorflow as tf
```

```
c:\Users\prave\AppData\Local\Programs\Python\Python310\lib\site-packages\scipy\__i  
nit__.py:169: UserWarning: A NumPy version >=1.18.5 and <1.26.0 is required for th  
is version of SciPy (detected version 1.26.0  
  warnings.warn(f"A NumPy version >={np_minversion} and <{np_maxversion}")
```

```
In [4]: print(tf.__version__)
```

2.14.0

### 2. Keras

```
In [5]: from keras import datasets  
# Load MNIST datasets from keras  
(train_images, train_labels), (test_images, test_labels) = datasets.mnist.load_data
```

```
In [6]: train_images.shape
```

```
Out[6]: (60000, 28, 28)
```

```
In [7]: test_images.shape
```

```
Out[7]: (10000, 28, 28)
```

### 3. Theano

```
In [7]: !pip install Theano
```

```
Requirement already satisfied: Theano in c:\users\prave\appdata\local\programs\pyt  
hon\python310\lib\site-packages (1.0.5)  
Requirement already satisfied: numpy>=1.9.1 in c:\users\prave\appdata\local\progra  
ms\python\python310\lib\site-packages (from Theano) (1.25.2)  
Requirement already satisfied: scipy>=0.14 in c:\users\prave\appdata\local\program  
s\python\python310\lib\site-packages (from Theano) (1.9.3)  
Requirement already satisfied: six>=1.9.0 in c:\users\prave\appdata\local\programs  
\python\python310\lib\site-packages (from Theano) (1.16.0)
```

```
In [ ]: import theano.tensor as T  
from theano import function
```

```
In [ ]: # Declaring 2 variables  
x = T.dscalar('x')
```

```
y = T.dscalar('y')
```

```
In [ ]: # Summing up the 2 numbers  
z = x + y
```

```
In [ ]: # Converting it to a callable object so that it takes matrix as parameters  
f = function([x, y], z)
```

```
In [ ]: f(5, 7)
```

#### 4. PyTorch

```
In [1]: !pip3 install torch torchvision torchaudio --extra-index-url https://download.pytor
```

Looking in indexes: <https://pypi.org/simple>, <https://download.pytorch.org/whl/cu115>

Requirement already satisfied: torch in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (2.1.0)

Requirement already satisfied: torchvision in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (0.16.0)

Collecting torchaudio

Obtaining dependency information for torchaudio from [https://files.pythonhosted.org/packages/6b/ba/0e26883fd90f280452bed7edc7906ef9253255f395702751f65fa02afb5c/torchaudio-2.1.0-cp310-cp310-win\\_amd64.whl.metadata](https://files.pythonhosted.org/packages/6b/ba/0e26883fd90f280452bed7edc7906ef9253255f395702751f65fa02afb5c/torchaudio-2.1.0-cp310-cp310-win_amd64.whl.metadata)

Downloading torchaudio-2.1.0-cp310-cp310-win\_amd64.whl.metadata (5.7 kB)

Requirement already satisfied: filelock in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from torch) (3.12.4)

Requirement already satisfied: typing-extensions in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from torch) (4.4.0)

Requirement already satisfied: sympy in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from torch) (1.12)

Requirement already satisfied: networkx in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from torch) (2.8.8)

Requirement already satisfied: jinja2 in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from torch) (3.1.2)

Requirement already satisfied: fsspec in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from torch) (2023.9.2)

Requirement already satisfied: numpy in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from torchvision) (1.25.2)

Requirement already satisfied: requests in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from torchvision) (2.28.1)

Requirement already satisfied: pillow!=8.3.\*,>=5.3.0 in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from torchvision) (9.3.0)

Requirement already satisfied: MarkupSafe>=2.0 in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from jinja2->torch) (2.1.3)

Requirement already satisfied: charset-normalizer<3,>=2 in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from requests->torchvision) (2.1.1)

Requirement already satisfied: idna<4,>=2.5 in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from requests->torchvision) (3.4)

Requirement already satisfied: urllib3<1.27,>=1.21.1 in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from requests->torchvision) (1.26.12)

Requirement already satisfied: certifi>=2017.4.17 in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from requests->torchvision) (2022.9.24)

Requirement already satisfied: mpmath>=0.19 in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from sympy->torch) (1.3.0)

Downloading torchaudio-2.1.0-cp310-cp310-win\_amd64.whl (2.3 MB)

----- 2.3/2.3 MB 6.2 MB/s eta 0:00:00

Installing collected packages: torchaudio

Successfully installed torchaudio-2.1.0

```
In [2]: import torch
import torch.nn as nn
```

```
In [3]: print(torch.__version__)

2.1.0+cpu
```

```
In [4]: torch.cuda.is_available()
```

```
Out[4]: False
```