

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

In [1]:

In [2]: `import numpy as np`

### 1. Tensorflow

In [3]: `pip install tensorflow`

In [4]: `import tensorflow as tf`

In [5]: `print(tf.__version__)`

2.14.0

### 2. Keras

In [6]: `from keras import datasets`  
*# Load MNIST datasets from keras*  
`(train_images, train_labels), (test_images, test_labels) = datasets.mnist.load_data()`

In [7]: `train_images.shape`

Out[7]: (60000, 28, 28)

In [8]: `test_images.shape`

Out[8]: (10000, 28, 28)

### 3. Theano

In [9]: `pip install Theano`

Requirement already satisfied: Theano in  
c:\users\piyush\appdata\roaming\python\python310\site-packages (1.0.5)  
Requirement already satisfied: numpy>=1.9.1 in c:\users\piyush\appdata\roaming\python\python310\site-packages (from Theano) (1.25.2)  
Requirement already satisfied: scipy>=0.14 in  
c:\users\piyush\appdata\roaming\python\python310\site-packages (from Theano) (1.9.3)  
Requirement already satisfied: six>=1.9.0 in  
c:\users\piyush\appdata\roaming\python\python310\site-packages (from Theano) (1.16.0)

In [10]: `import theano.tensor as T from`  
`theano import function`

```
In [11]: # Declaring 2 variables
x = T.dscalar('x')
y = T.dscalar('y')
```

```
In [12]: # Summing up the 2 numbers
z = x + y
```

```
In [13]: # Converting it to a callable object so that it takes matrix as parameters
f = function([x, y] z)
f(5, 7)
```

#### 4. PyTorch

```
In [14]: pip install torch torchvision torchaudio --extra-index-url https://download.pyto
```

```
Looking in indexes: https://pypi.org/simple, https://download.pytorch.org/whl/cu115
Requirement already satisfied: torch in c:\users\piyush\appdata\local\programs\python\python310\lib\site-packages (2.1.0)
Requirement already satisfied: torchvision in c:\users\piyush\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
  Downloading torchaudio-2.1.0-cp310-cp310-win_amd64.whl.metadata (5.7 kB)
Requirement already satisfied: filelock in c:\users\piyush\appdata\local\programs\python\python310\lib\site-packages (from torch) (3.12.4)
Requirement already satisfied: typing-extensions in c:\users\piyush\appdata\local\programs\python\python310\lib\site-packages (from torch) (4.4.0)
Requirement already satisfied: sympy in c:\users\piyush\appdata\local\programs\python\python310\lib\site-packages (from torch) (1.12)
Requirement already satisfied: networkx in c:\users\piyush\appdata\local\programs\python\python310\lib\site-packages (from torch) (2.8.8)
Requirement already satisfied: jinja2 in c:\users\piyush\appdata\local\programs\python\python310\lib\site-packages (from torch) (3.1.2)
Requirement already satisfied: fsspec in c:\users\piyush\appdata\local\programs\python\python310\lib\site-packages (from torch) (2023.9.2)
Requirement already satisfied: numpy in c:\users\piyush\appdata\local\programs\python\python310\lib\site-packages (from torchvision) (1.25.2)
Requirement already satisfied: requests in c:\users\piyush\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\piyush\appdata\local\programs\python\python310\lib\site-packages (from torchvision) (9.3.0)
Requirement already satisfied: MarkupSafe>=2.0 in c:\users\piyush\appdata\local\programs\python\python310\lib\site-packages (from jinja2->torch) (2.1.3)
Requirement already satisfied: charset-normalizer<3,>=2 in c:\users\piyush\appdata\local\programs\python\python310\lib\site-packages (from requests->torchvision) (2.1.1)
Requirement already satisfied: idna<4,>=2.5 in c:\users\piyush\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\piyush\appdata\local\programs\python\python310\lib\site-packages (from requests->torchvision) (1.26.12)
```

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

Requirement already satisfied: mpmath>=0.19 in c:\users\piyush\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

In [15]:

```
import torch
import torch.nn as nn
```

In [16]:

```
print(torch.__version__)
```

2.1.0+cu118

In [17]:

```
torch.cuda.is_available()
```

Out[17]: False