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

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```
In [ ]: #Rollno: B512024
        #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_dat
```

```
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.pyto
```

```
Looking in indexes: https://pypi.org/simple, https://download.pytorch.org/whl/cu11
5
Requirement already satisfied: torch in c:\users\prave\appdata\local\programs\pyth
on\python310\lib\site-packages (2.1.0)
Requirement already satisfied: torchvision in c:\users\prave\appdata\local\program
s\python\python310\lib\site-packages (0.16.0)
Collecting torchaudio
  Obtaining dependency information for torchaudio from https://files.pythonhosted.
org/packages/6b/ba/0e26883fd90f280452bed7edc7906ef9253255f395702751f65fa02afb5c/to
rchaudio-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\p
ython\python310\lib\site-packages (from torch) (3.12.4)
Requirement already satisfied: typing-extensions in c:\users\prave\appdata\local\p
rograms\python\python310\lib\site-packages (from torch) (4.4.0)
Requirement already satisfied: sympy in c:\users\prave\appdata\local\programs\pyth
on\python310\lib\site-packages (from torch) (1.12)
Requirement already satisfied: networkx in c:\users\prave\appdata\local\programs\p
ython\python310\lib\site-packages (from torch) (2.8.8)
Requirement already satisfied: jinja2 in c:\users\prave\appdata\local\programs\pyt
hon\python310\lib\site-packages (from torch) (3.1.2)
Requirement already satisfied: fsspec in c:\users\prave\appdata\local\programs\pyt
hon\python310\lib\site-packages (from torch) (2023.9.2)
Requirement already satisfied: numpy in c:\users\prave\appdata\local\programs\pyth
on\python310\lib\site-packages (from torchvision) (1.25.2)
Requirement already satisfied: requests in c:\users\prave\appdata\local\programs\p
ython\python310\lib\site-packages (from torchvision) (2.28.1)
Requirement already satisfied: pillow!=8.3.*,>=5.3.0 in c:\users\prave\appdata\loc
al\programs\python\python310\lib\site-packages (from torchvision) (9.3.0)
Requirement already satisfied: MarkupSafe>=2.0 in c:\users\prave\appdata\local\pro
grams\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\progra
ms\python\python310\lib\site-packages (from requests->torchvision) (3.4)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in c:\users\prave\appdata\loc
al\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\progra
ms\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
```

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

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

2.1.0+cpu

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

Out[4]: False