ASSIGNMENT 01

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Class: BE 09
Batch: Q9
Problem Statement: Study of Deep learning Packages: Tensorflow, Keras, Theano and PyTorch.
Document the distinct features and functionality of the packages.

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

1. Tensorflow

In [1]:
```
import tensorflow as tf
```

In [2]:
```
print(tf.__version__)
```

```
2.9.2
```

2. Keras

In [3]:
```
from keras import datasets
# Load MNIST datasets from keras
(train_images, train_labels), (test_images, test_labels) = datasets.mnis
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-ker
as-datasets/mnist.npz (https://storage.googleapis.com/tensorflow/tf-ke
ras-datasets/mnist.npz)
11490434/11490434 [==============================] - 0s 0us/step
```

In [4]:
```
train_images.shape
```

Out[4]:
```
(60000, 28, 28)
```

In [5]:
```
test_images.shape
```

Out[5]:
```
(10000, 28, 28)
```

3. Theano

In [6]:
```
!pip install Theano
```

```
Looking in indexes: https://pypi.org/simple, (https://pypi.org/simpl
e,) https://us-python.pkg.dev/colab-wheels/public/simple/ (https://us-
python.pkg.dev/colab-wheels/public/simple/)
Collecting Theano
  Downloading Theano-1.0.5.tar.gz (2.8 MB)
     |████████████████████████████████| 2.8 MB 5.1 MB/s
Requirement already satisfied: numpy>=1.9.1 in /usr/local/lib/python3.
7/dist-packages (from Theano) (1.21.6)
Requirement already satisfied: scipy>=0.14 in /usr/local/lib/python3.
7/dist-packages (from Theano) (1.7.3)
Requirement already satisfied: six>=1.9.0 in /usr/local/lib/python3.7/
dist-packages (from Theano) (1.15.0)
Building wheels for collected packages: Theano
  Building wheel for Theano (setup.py) ... done
  Created wheel for Theano: filename=Theano-1.0.5-py3-none-any.whl siz
e=2668111 sha256=4fcf8567a04ffbbc8687bec651425846dacba37939e919162cb93
80cdf9dd5e8
  Stored in directory: /root/.cache/pip/wheels/26/68/6f/745330367ce782
2fe0cd863712858151f5723a0a5e322cc144
Successfully built Theano
Installing collected packages: Theano
Successfully installed Theano-1.0.5
```

In [7]:
```
import theano.tensor as T
from theano import function
```

In [8]:
```
# Declaring 2 variables
x = T.dscalar('x')
y = T.dscalar('y')
```

In [10]:
```
# Summing up the 2 numbers
z = x + y
```

In [12]:
```
# Converting it to a callable object so that it takes matrix as paramete
f = function([x, y], z)
```

In [13]:
```
f(5, 7)
```

Out[13]:
```
array(12.)
```

4. PyTorch

In [14]:
```
!pip3 install torch torchvision torchaudio --extra-index-url https://dow
```

```
Looking in indexes: https://pypi.org/simple, (https://pypi.org/simpl
e,) https://us-python.pkg.dev/colab-wheels/public/simple/, (https://us
-python.pkg.dev/colab-wheels/public/simple/,) https://download.pytorc
h.org/whl/cu115 (https://download.pytorch.org/whl/cu115)
Requirement already satisfied: torch in /usr/local/lib/python3.7/dist-
packages (1.12.1+cu113)
Requirement already satisfied: torchvision in /usr/local/lib/python3.
7/dist-packages (0.13.1+cu113)
Requirement already satisfied: torchaudio in /usr/local/lib/python3.7/
dist-packages (0.12.1+cu113)
Requirement already satisfied: typing-extensions in /usr/local/lib/pyt
hon3.7/dist-packages (from torch) (4.1.1)
Requirement already satisfied: pillow!=8.3.*,>=5.3.0 in /usr/local/li
b/python3.7/dist-packages (from torchvision) (7.1.2)
Requirement already satisfied: numpy in /usr/local/lib/python3.7/dist-
packages (from torchvision) (1.21.6)
Requirement already satisfied: requests in /usr/local/lib/python3.7/di
st-packages (from torchvision) (2.23.0)
Requirement already satisfied: urllib3!=1.25.0,!=1.25.1,<1.26,>=1.21.1
in /usr/local/lib/python3.7/dist-packages (from requests->torchvision)
(1.24.3)
Requirement already satisfied: chardet<4,>=3.0.2 in /usr/local/lib/pyt
hon3.7/dist-packages (from requests->torchvision) (3.0.4)
Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.
7/dist-packages (from requests->torchvision) (2.10)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/py
thon3.7/dist-packages (from requests->torchvision) (2022.9.24)
```

In [15]:
```
import torch
import torch.nn as nn
```

In [17]:
```
print(torch.__version__)
```

```
1.12.1+cu113
```

In [18]:
```
torch.cuda.is_available()
```

Out[18]:
```
False
```