

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

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

## 1. Tensorflow

```
In [3]: !pip install tensorflow
```

```
Collecting tensorflow
  Downloading tensorflow-2.13.1-cp38-cp38-win_amd64.whl (1.9 kB)
  Downloading tensorflow-2.13.0-cp38-cp38-win_amd64.whl (1.9 kB)
Collecting tensorflow-intel==2.13.0
  Downloading tensorflow_intel-2.13.0-cp38-cp38-win_amd64.whl (276.5 MB)
Collecting astunparse>=1.6.0
  Downloading astunparse-1.6.3-py2.py3-none-any.whl (12 kB)
Requirement already satisfied: h5py>=2.9.0 in c:\users\mange\anaconda3\lib\site-packages (from tensorflow-intel==2.13.0->tensorflow) (2.10.0)
Collecting numpy<=1.24.3,>=1.22
  Downloading numpy-1.24.3-cp38-cp38-win_amd64.whl (14.9 MB)
Collecting tensorflow-io-gcs-filesystem>=0.23.1
  Downloading tensorflow_io_gcs_filesystem-0.31.0-cp38-cp38-win_amd64.whl (1.5 MB)
Collecting termcolor>=1.1.0
  Downloading termcolor-2.4.0-py3-none-any.whl (7.7 kB)
Requirement already satisfied: wrapt>=1.11.0 in c:\users\mange\anaconda3\lib\site-packages (from tensorflow-intel==2.13.0->tensorflow) (1.12.1)
Collecting libclang>=13.0.0
  Downloading libclang-18.1.1-py2.py3-none-win_amd64.whl (26.4 MB)
Requirement already satisfied: setuptools in c:\users\mange\anaconda3\lib\site-packages (from tensorflow-intel==2.13.0->tensorflow) (52.0.0.post20210125)
Requirement already satisfied: six>=1.12.0 in c:\users\mange\anaconda3\lib\site-packages (from tensorflow-intel==2.13.0->tensorflow) (1.15.0)
Collecting gast<=0.4.0,>=0.2.1
  Downloading gast-0.4.0-py3-none-any.whl (9.8 kB)
Collecting grpcio<2.0,>=1.24.3
  Downloading grpcio-1.65.0-cp38-cp38-win_amd64.whl (4.1 MB)
Collecting flatbuffers>=23.1.21
  Downloading flatbuffers-24.3.25-py2.py3-none-any.whl (26 kB)
Collecting tensorboard<2.14,>=2.13
  Downloading tensorboard-2.13.0-py3-none-any.whl (5.6 MB)
Requirement already satisfied: packaging in c:\users\mange\anaconda3\lib\site-packages (from tensorflow-intel==2.13.0->tensorflow) (20.9)
Collecting keras<2.14,>=2.13.1
  Downloading keras-2.13.1-py3-none-any.whl (1.7 MB)
Collecting protobuf!=4.21.0,!4.21.1,!4.21.2,!4.21.3,!4.21.4,!4.21.5,<5.0.0dev,>=3.20.3
  Downloading protobuf-4.25.3-cp38-cp38-win_amd64.whl (413 kB)
Collecting tensorflow-estimator<2.14,>=2.13.0
  Downloading tensorflow_estimator-2.13.0-py2.py3-none-any.whl (440 kB)
Collecting opt-einsum>=2.3.2
  Downloading opt_einsum-3.3.0-py3-none-any.whl (65 kB)
Collecting absl-py>=1.0.0
  Downloading absl_py-2.1.0-py3-none-any.whl (133 kB)
Requirement already satisfied: typing-extensions<4.6.0,>=3.6.6 in c:\users\mange\anaconda3\lib\site-packages (from tensorflow-intel==2.13.0->tensorflow) (3.7.4.3)
Collecting google-pasta>=0.1.1
```

```
ERROR: pip's dependency resolver does not currently take into account all the packages that are installed. This
behaviour is the source of the following dependency conflicts.
scipy 1.6.2 requires numpy<1.23.0,>=1.16.5, but you have numpy 1.24.3 which is incompatible.
```

```

Downloading google_pasta-0.2.0-py3-none-any.whl (57 kB)
Requirement already satisfied: wheel<1.0,>=0.23.0 in c:\users\mange\anaconda3\lib\site-packages (from astunparse
>=1.6.0->tensorflow-intel==2.13.0->tensorflow) (0.36.2)
Requirement already satisfied: werkzeug>=1.0.1 in c:\users\mange\anaconda3\lib\site-packages (from tensorboard<2
.14,>=2.13->tensorflow-intel==2.13.0->tensorflow) (1.0.1)
Collecting google-auth-oauthlib<1.1,>=0.5
  Downloading google_auth_oauthlib-1.0.0-py2.py3-none-any.whl (18 kB)
Collecting tensorboard-data-server<0.8.0,>=0.7.0
  Downloading tensorboard_data_server-0.7.2-py3-none-any.whl (2.4 kB)
Collecting markdown>=2.6.8
  Downloading Markdown-3.6-py3-none-any.whl (105 kB)
Collecting google-auth<3,>=1.6.3
  Downloading google_auth-2.32.0-py2.py3-none-any.whl (195 kB)
Requirement already satisfied: requests<3,>=2.21.0 in c:\users\mange\anaconda3\lib\site-packages (from tensorboa
rd<2.14,>=2.13->tensorflow-intel==2.13.0->tensorflow) (2.25.1)
Collecting cachetools<6.0,>=2.0.0
  Downloading cachetools-5.3.3-py3-none-any.whl (9.3 kB)
Collecting pyasn1-modules>=0.2.1
  Downloading pyasn1_modules-0.4.0-py3-none-any.whl (181 kB)
Collecting rsa<5,>=3.1.4
  Downloading rsa-4.9-py3-none-any.whl (34 kB)
Collecting requests-oauthlib>=0.7.0
  Downloading requests_oauthlib-2.0.0-py2.py3-none-any.whl (24 kB)
Collecting importlib-metadata>=4.4
  Downloading importlib_metadata-8.0.0-py3-none-any.whl (24 kB)
Requirement already satisfied: zipp>=0.5 in c:\users\mange\anaconda3\lib\site-packages (from importlib-metadata>
=4.4->markdown>=2.6.8->tensorboard<2.14,>=2.13->tensorflow-intel==2.13.0->tensorflow) (3.4.1)
Collecting pyasn1<0.7.0,>=0.4.6
  Downloading pyasn1-0.6.0-py2.py3-none-any.whl (85 kB)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in c:\users\mange\anaconda3\lib\site-packages (from request
s<3,>=2.21.0->tensorboard<2.14,>=2.13->tensorflow-intel==2.13.0->tensorflow) (1.26.4)
Requirement already satisfied: certifi>=2017.4.17 in c:\users\mange\anaconda3\lib\site-packages (from requests<3
,>=2.21.0->tensorboard<2.14,>=2.13->tensorflow-intel==2.13.0->tensorflow) (2020.12.5)
Requirement already satisfied: chardet<5,>=3.0.2 in c:\users\mange\anaconda3\lib\site-packages (from requests<3,
>=2.21.0->tensorboard<2.14,>=2.13->tensorflow-intel==2.13.0->tensorflow) (4.0.0)
Requirement already satisfied: idna<3,>=2.5 in c:\users\mange\anaconda3\lib\site-packages (from requests<3,>=2.2
1.0->tensorboard<2.14,>=2.13->tensorflow-intel==2.13.0->tensorflow) (2.10)
Collecting oauthlib>=3.0.0
  Downloading oauthlib-3.2.2-py3-none-any.whl (151 kB)
Requirement already satisfied: pyparsing>=2.0.2 in c:\users\mange\anaconda3\lib\site-packages (from packaging->t
ensorflow-intel==2.13.0->tensorflow) (2.4.7)
Installing collected packages: pyasn1, rsa, pyasn1-modules, oauthlib, cachetools, requests-oauthlib, importlib-m
etadata, google-auth, tensorboard-data-server, protobuf, numpy, markdown, grpcio, google-auth-oauthlib, absl-py,
termcolor, tensorflow-io-gcs-filesystem, tensorflow-estimator, tensorboard, opt-einsum, libclang, keras, google-
pasta, gast, flatbuffers, astunparse, tensorflow-intel, tensorflow
Attempting uninstall: importlib-metadata
  Found existing installation: importlib-metadata 3.10.0
  Uninstalling importlib-metadata-3.10.0:
    Successfully uninstalled importlib-metadata-3.10.0
Attempting uninstall: numpy
  Found existing installation: numpy 1.20.1
  Uninstalling numpy-1.20.1:
    Successfully uninstalled numpy-1.20.1
Successfully installed absl-py-2.1.0 astunparse-1.6.3 cachetools-5.3.3 flatbuffers-24.3.25 gast-0.4.0 google-aut
h-2.32.0 google-auth-oauthlib-1.0.0 google-pasta-0.2.0 grpcio-1.65.0 importlib-metadata-8.0.0 keras-2.13.1 libcl
ang-18.1.1 markdown-3.6 numpy-1.24.3 oauthlib-3.2.2 opt-einsum-3.3.0 protobuf-4.25.3 pyasn1-0.6.0 pyasn1-modules
-0.4.0 requests-oauthlib-2.0.0 rsa-4.9 tensorboard-2.13.0 tensorboard-data-server-0.7.2 tensorflow-2.13.0 tensor
flow-estimator-2.13.0 tensorflow-intel-2.13.0 tensorflow-io-gcs-filesystem-0.31.0 termcolor-2.4.0

```

## 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\python\python310\lib\site-packages (1.0.5)  
Requirement already satisfied: numpy>=1.9.1 in c:\users\prave\appdata\local\programs\python\python310\lib\site-packages (from Theano) (1.25.2)  
Requirement already satisfied: scipy>=0.14 in c:\users\prave\appdata\local\programs\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)

#### 4. PyTorch

```
In [1]: !pip3 install torch torchvision torchaudio --extra-index-url https://download.pytorch.org/whl/cu115
```

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  
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
```

```
In [ ]:
```