



AI Master Class series – Day 9

Introduction to Deep Learning & its Libraries



Day-9 Agenda.

01.

Overview on Deep Learning

What is Deep Learning | Why DL |
CPU vs GPU

02.

Neurons & Activation Function

Overview about neurons &
Types of activation
function

03.

Deep Learning Libraries

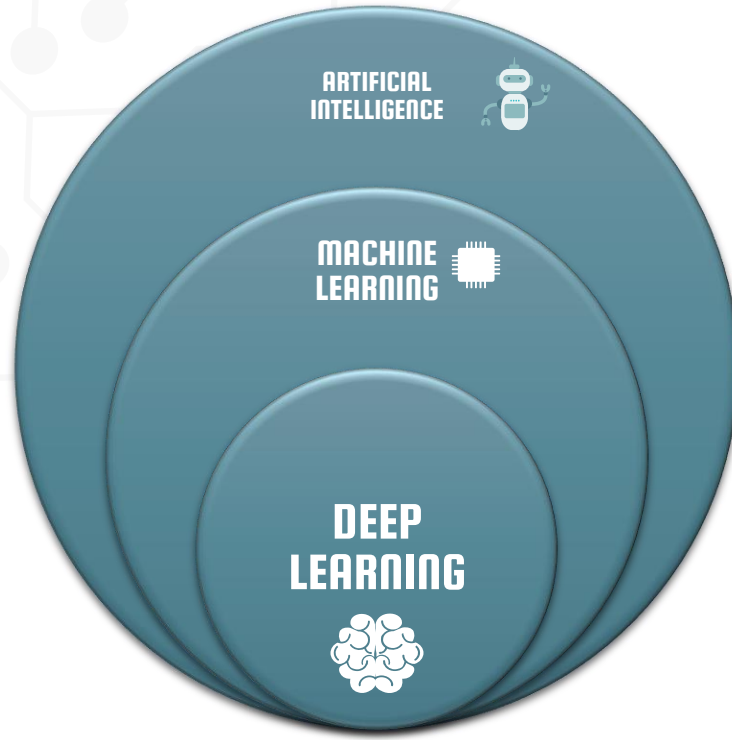
Overview on DL Libraries &
How to install it

04.

Applications of Deep Learning

DL application in various
domain

Deep Learning in AI.

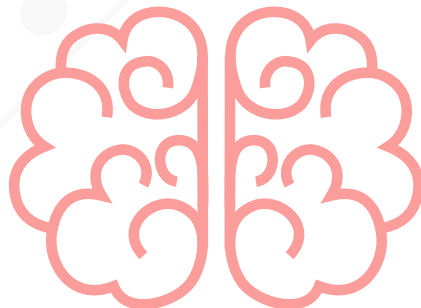


Deep Learning.

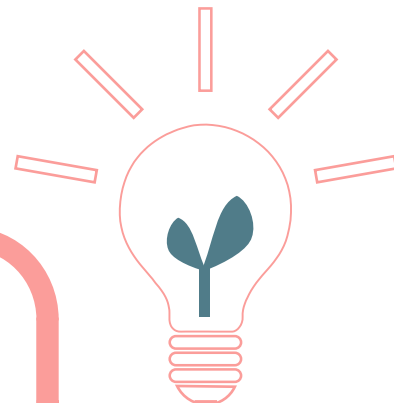
Vision



Brain



Recognition



Dataset

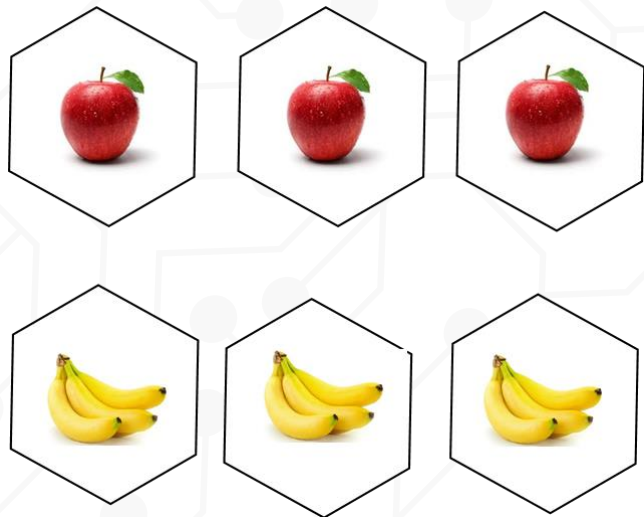
Training

Model

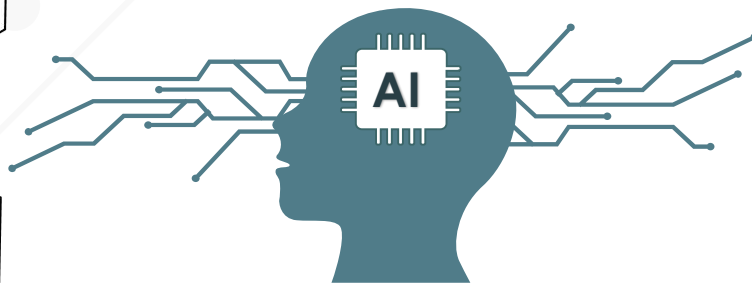
Recognition



Why Deep Learning ?



Input Data



Automatic Feature Extraction

Prediction



It's an apple

Why GPU ?

“It Can train more number of data in short time period & Better for real time AI based application”

100%

CPU – Central Processing Unit

Less Bandwidth | Latency Optimised | Not suitable for Real time application where performance is the main Factor



GPU – Graphical Processing Unit

High Bandwidth | Thread Parallelism | Easily programmable registers | Bandwidth Optimized

50%

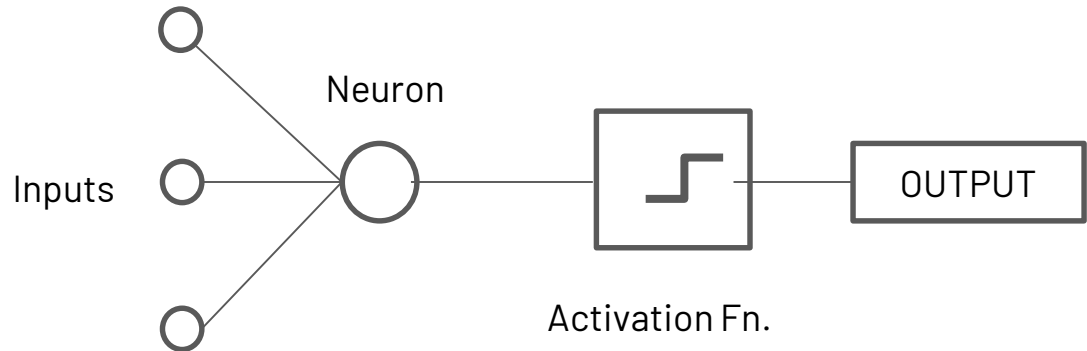
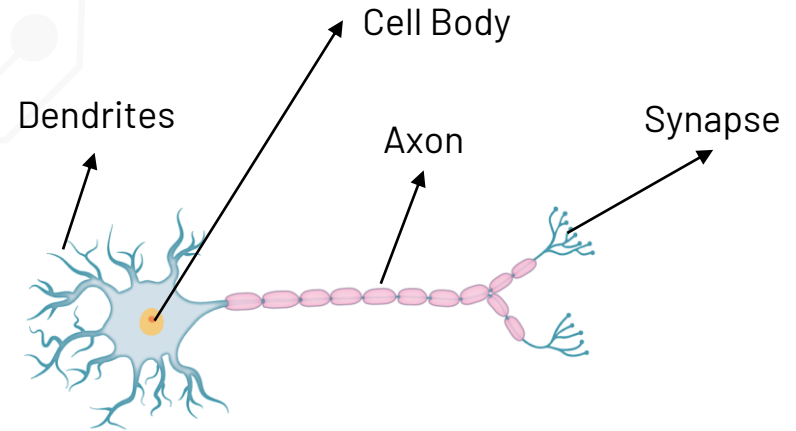
Neuron & Activation Function.

Neuron

- Like a Human Brain, here a Neuron takes input and do some function to give the output
- Function going to be the Mathematical function
- Those Function is known as ACTIVATION function

Activation Function

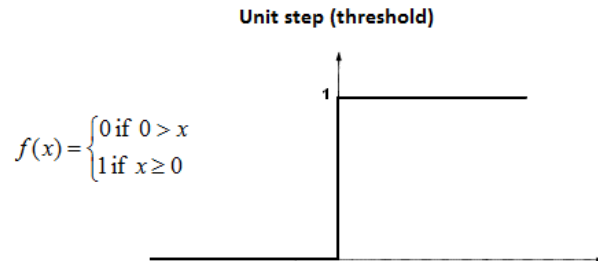
- Step Function
- Sigmoid Function
- Tanh Function
- ReLU Function



Activation Function.

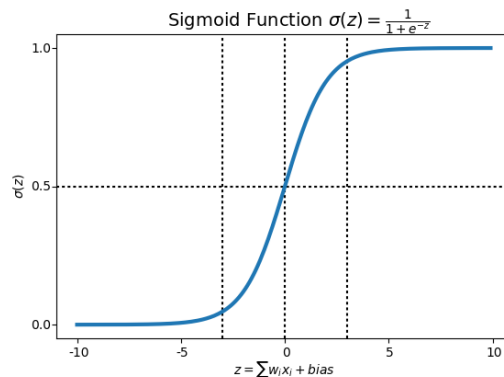
STEP Function

- If value of X is greater than or equal to 0, then output is 1, If value of X is less than 0, then output is 0
- Since step Function is non differentiable to zero, it can't do the gradient descent method, so it can't update weights.



SIGMOID Function

- If value of X is infinity, then output is 1, If value of X is negative infinity, then output is 0
- It captures non-linearity in the data
- It can use Gradient descent & Back propagation method to calculate weights.
- Output range [0,1]

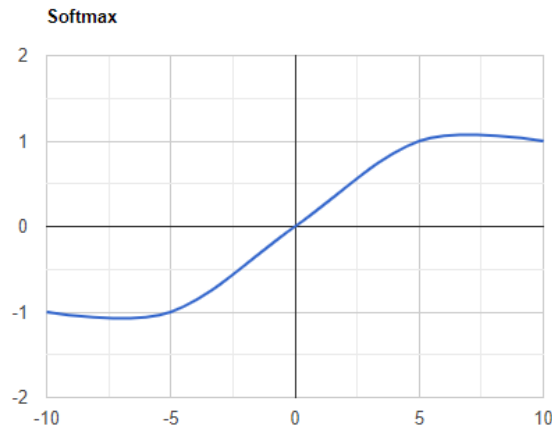


Activation Function.

SOFTMAX Function

- Softmax activation function will be applied in the last layer of Neural network, instead of ReLU, tanh, Sigmoid.
- It is used to map the non-normalized output of a network to a probability distribution over predicted output class. That is it converts output of last layer into a essential probability distribution.

$$\text{softmax}(L_n) = \frac{e^{L_n}}{\|e^L\|}$$



Deep Learning Libraries

Tensor Flow

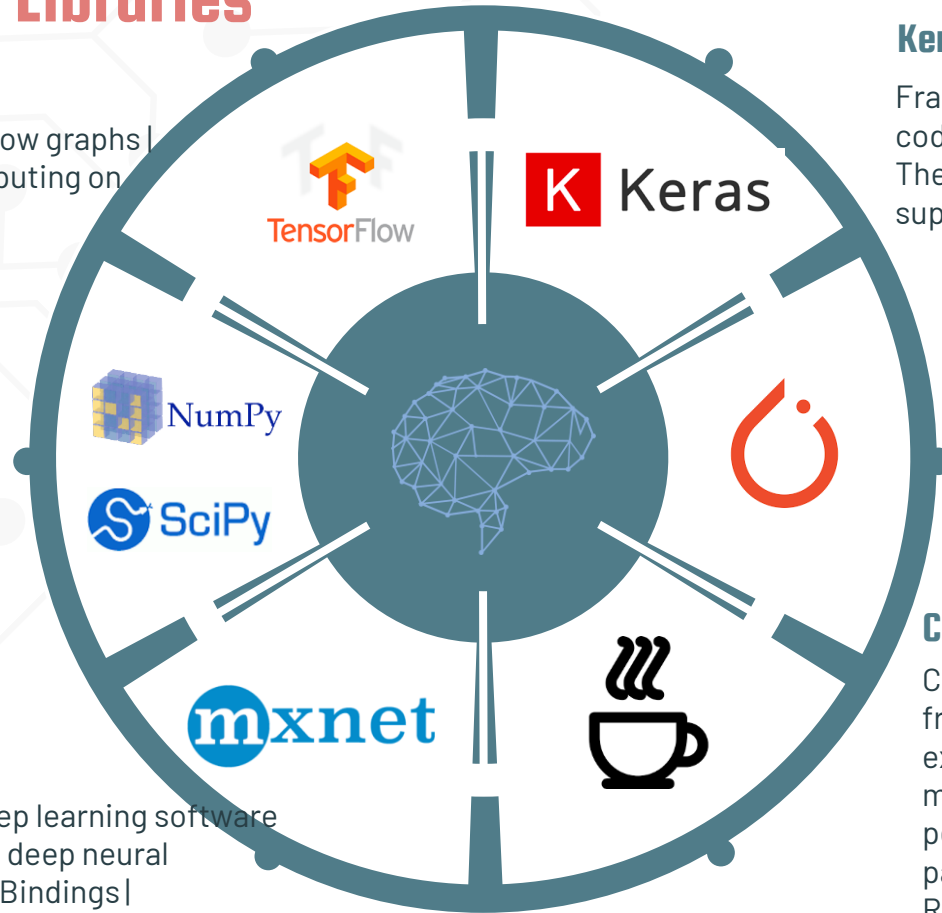
Numerical computation using data flow graphs | Backend for Keras | Distributed computing on multiple GPU

Numerical Python & Scientific Python

Basic operation such as Sorting, Reshaping, indexing | Scientific computing | Most new feature belong in SciPy rather than Numpy

Mxnet

Apache MXNet is an open-source deep learning software framework, used to train, and deploy deep neural networks | More number of Language Bindings | Distributed computing



Keras

Framework for Deep learning | Same code for CPU & GPU | Uses Theano/TF as Backend | CNN | not support multi GPU

Torch

Old ML & DL library | Supports CUDA - Compute Unified Device Architecture for parallel computation | Supervised image problem with CNN

Caffe

Caffe is a deep learning framework made with expression, speed, and modularity in mind. Very high performance | Tuning Hyper parameters | CNN & RNN (Facebook extends) | CPU & GPU

Practical session





Installing Libraries



TensorFlow: pip install tensorflow

```
Successfully built wrapt termcolor
Installing collected packages: wrapt, tensorboard-plugin-wit, werkzeug, grpcio, cachetools, pyasn1, pyasn1-modules, rsa,
google-auth, zipp, importlib-metadata, markdown, chardet, urllib3, idna, requests, numpy, oauthlib, requests-oauthlib,
google-auth-oauthlib, protobuf, absl-py, tensorboard, tensorflow-estimator, astunparse, h5py, opt-einsum, keras-preproce
ssing, termcolor, gast, google-pasta, tensorflow
  Attempting uninstall: numpy
    Found existing installation: numpy 1.19.2
    Uninstalling numpy-1.19.2:
      Successfully uninstalled numpy-1.19.2
Successfully installed absl-py-0.10.0 astunparse-1.6.3 cachetools-4.1.1 chardet-3.0.4 gast-0.3.3 google-auth-1.22.1 goog
le-auth-oauthlib-0.4.1 google-pasta-0.2.0 grpcio-1.32.0 h5py-2.10.0 idna-2.10 importlib-metadata-2.0.0 keras-preprocessi
ng-1.1.2 markdown-3.3 numpy-1.18.5 oauthlib-3.1.0 opt-einsum-3.3.0 protobuf-3.13.0 pyasn1-0.4.8 pyasn1-modules-0.2.8 req
uests-2.24.0 requests-oauthlib-1.3.0 rsa-4.6 tensorboard-2.3.0 tensorboard-plugin-wit-1.7.0 tensorflow-2.3.1 tensorflow-
estimator-2.3.0 termcolor-1.1.0 urllib3-1.25.10 werkzeug-1.0.1 wrapt-1.12.1 zipp-3.3.0
```



Installing Libraries



Keras: `pip install keras`

```
C:\Windows\system32>pip install keras
Collecting keras
  Using cached Keras-2.4.3-py2.py3-none-any.whl (36 kB)
Collecting pyyaml
  Downloading PyYAML-5.3.1-cp37-cp37m-win_amd64.whl (216 kB)
    |#####| 216 kB 2.2 MB/s
Requirement already satisfied: h5py in c:\program files (x86)\microsoft visual studio\shared\python37_64\lib\site-packages (from keras) (2.10.0)
Requirement already satisfied: scipy>=0.14 in c:\program files (x86)\microsoft visual studio\shared\python37_64\lib\site-packages (from keras) (1.5.2)
Requirement already satisfied: numpy>=1.9.1 in c:\program files (x86)\microsoft visual studio\shared\python37_64\lib\site-packages (from keras) (1.18.5)
Requirement already satisfied: six in c:\program files (x86)\microsoft visual studio\shared\python37_64\lib\site-packages (from h5py->keras) (1.15.0)
Installing collected packages: pyyaml, keras
Successfully installed keras-2.4.3 pyyaml-5.3.1
WARNING: You are using pip version 20.1.1, however version 20.2.2 is available.
```



Installing Libraries



pandas: `pip install pandas`

```
C:\Windows\system32>pip install pandas
Collecting pandas
  Downloading pandas-1.1.3-cp37-cp37m-win_amd64.whl (8.7 MB)
    |████████████████████| 8.7 MB 6.8 MB/s
Collecting pytz>=2017.2
  Using cached pytz-2020.1-py2.py3-none-any.whl (510 kB)
Requirement already satisfied: python-dateutil>=2.7.3 in c:\program files (x86)\microsoft visual studio\shared\python37_64\lib\site-packages (from pandas) (2.8.1)
Requirement already satisfied: numpy>=1.15.4 in c:\program files (x86)\microsoft visual studio\shared\python37_64\lib\site-packages (from pandas) (1.18.5)
Requirement already satisfied: six>=1.5 in c:\program files (x86)\microsoft visual studio\shared\python37_64\lib\site-packages (from python-dateutil>=2.7.3->pandas) (1.15.0)
Installing collected packages: pytz, pandas
Successfully installed pandas-1.1.3 pytz-2020.1
```



Installing Libraries



pandas: `pip install scipy==1.1.0`

```
C:\Windows\system32>pip install scipy==1.1.0
Requirement already satisfied: scipy==1.1.0 in c:\program files (x86)\microsoft visual studio\shared\python37_64\lib\site-packages (1.1.0)
Requirement already satisfied: numpy>=1.8.2 in c:\program files (x86)\microsoft visual studio\shared\python37_64\lib\site-packages (from scipy==1.1.0) (1.18.5)
```

Applications of Deep Learning.

- Fruit & vegetable classification
- AI in Cooking
- AI in Cooking
- AI in Autonomous Vehicle
- AI Doctor
- Prediction of Disease from Medical Image
- Voice recognition for ALS Patient



Ego Speed: 45.56 MPH
time: 1545.441322000
CAL P 0.60 Y 1.20 R 0.00 deg

Vision fps: 18.05 Draw fps: 17.67 Display fps: 21.34
NL(0.00), E(0.95), F(0.07), TF(0.00), S(0.00)
NRW: FLP(0.00), FRP(0.00)
CutInExcited (Prb 0.56)

+0.0001 AUTO_HIGH_Beam
+0.0000 BLINDED
+0.0002 RAINING
+0.0000 TIRE_SPRAY
+0.0013 WET_ROAD
0.7902 RESTRICTED
0.0934 CONTROLLED_ACCESS

L:0 R:0 F:2 ON:0
W:8.2 AP:1.0 I:0
VS: 46.7 MPH St: 1
merge: 1.0 1 150.2 R

MAIN -

AP 3

94 14

L C

4.0m

Today's Short Bytes – Success Mindset

- **Money Management**

TWCGO Method

T-Tax | W-Wealth | C-Charity | G-General | O-Operation



Thanks!

Connect with me on **LinkedIn:**
link in Description

Product & Project:
www.pantechsolutions.net

Course:
Learn.pantechsolutions.net

Tomorrow session

Designing your First Neural Network

