(B.TECH) Semester-VII AY 2023-24
DL Lab Assignment No. 02

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Date: 06-10-2023 **Faculty: Prof. Anita**

Problem Statement: To study the features of Tensorflow and implement the tensors in TensorBoard.

Objectives:

1. To understand the features of TensorFlow.
2. To perform installation of TensorFlow.
3. To implement arithmetic operations using the tensors of type constants and variable.

Theory: (describe the following)

TensorFlow Features:

- TensorFlow offers flexibility for various machine learning tasks.
- It's a powerful deep learning framework.
- TensorBoard for model visualization.
- Supports CPU and GPU acceleration.
- Has a rich ecosystem and active community.

Installation Steps for TensorFlow:

CPU Installation:

- Install Python (3.x).
- Install pip.
- Optionally, create a virtual environment.
- Install TensorFlow with pip install tensorflow.
- Verify installation by importing TensorFlow.

GPU Installation:

- Install NVIDIA GPU drivers.
- Install CUDA Toolkit.
- Install cuDNN library.
- Install TensorFlow-GPU with pip install tensorflow-gpu.
- Verify GPU usage by checking available GPUs in TensorFlow.

Operations to be performed:

1. Download the necessary package for TensorFlow with anaconda environment.
2. Perform the installation steps using Anaconda cmd prompt.
3. Run a small program to of 'Hello World' to test the installation of the library.
4. Implement few examples using TensorFlow.

Program code: (paste your program code)

In [1]:
```
import tensorflow as tf
%load_ext tensorboard
#load tensorBoard extension

with tf.compat.v1.Session() as session:
    a = tf.constant(4,name="input_A")
    b = tf.constant(6,name="input_b")
    c = tf.add(a,b,name="Result")
    writer = tf.compat.v1.summary.FileWriter("./logs",session.graph)
    print(session.run(c))
    session.close()
```

```
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```

Output: **(paste output screen & graphs plotted)**

FAQs:

1) State the building blocks of TensorFlow.
2) Explain the terms with the help of examples:
    a. Constant
    b. Variable
    c. Placeholder
    d. Tensor
    e. Session

Conclusion:

The features of TensorFlow were studied and the installation was performed successfully.

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FAQ

Q1. State the building blocks of TensorFlow.

Ans. Tensorflow is an open-source machine learning framework.

1. Constant
2. Variable
3. Placeholder
4. Tensor
5. Session

Q2. Explain the terms with the help of examples.

i) Constant
ii) Variable.
iii) Placeholder
iv) Tensor
v) Session

Ans

1. Constants: Constant are Tensorflow objects that hold fixed values (scalars, vectors, or matrices). They are used to store data that doesn't change during the computation.

eg. constant_tensor = tf.constant([1,2,3]).

2. Variables: Variables are Tensorflow objects that hold mutable state. They are used to store model parameters that need to be learned during training.

eg. variable = tf.Variable(constant_tensor)

3. Placeholders: Placeholders are used to feed data into Tensorflow computation graph. They act as input points where data is provided when executing a session.

eg. input_data = tf.placeholder(tf.float32, shape=(None, 784))
labels = tf.placeholder(tf.int32, shape=(None,))

4. Tensors: Tensors are the ~~foundations~~ fundamental data structures in Tensorflow. They represent multi-dimensional arrays or data flows in the computation graph.

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Tensors can be constants, variables, or the results of operations.

eg. constant_tensor = tf.constant([1,2,3])
variable = tf.variables[4,5,6])

5. Sessions : A session in Tensorflow is responsible for executing operations and evaluating tensors in a computation graph.

eg. with tf.session() as sess:
result = sess.run(some_operations)

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