TensorFlow

- **TensorFlow** is a free and open-source software library for machine learning and artificial intelligence.
- It can be used across a range of tasks but has a particular focus on training and inference of deep neural networks.
- TensorFlow was developed by the Google Brain team for internal Google use in research and production.
- TensorFlow is Google Brain's second-generation system.
- It can be used in a wide variety of programming languages, most notably Python, as well as Javascript, C++, and Java.
- TensorFlow is available on 64-bit Linux, macOS, Windows, and mobile computing platforms including Android and iOS.
- TensorFlow serves as the core platform and library for machine learning. TensorFlow’s APIs use Keras to allow users to make their own machine learning models.

- **History of TensorFlow**
- A couple of years ago, deep learning started to outperform all other machine
  massive amount of data. Google saw it could use these deep neural networks to
- Gmail
- Photo
- Google search engine
- They build a framework called **Tensorflow** to let researchers and developers work
  Once developed and scaled, it allows lots of people to use it.
- It was first made public in late 2015, while the first stable version appeared in
- It is open source under Apache Open Source license. You can use it, modify it and
  version for a fee without paying anything to Google.

- In addition to building and training their model, TensorFlow can also help load the data to train the model, and deploy it using TensorFlow Serving.
- **TensorFlow** is an open-source end-to-end platform for creating Machine Learning applications.
- It is a symbolic math library that uses dataflow and differentiable programming to on training and inference of deep neural networks.
- It allows developers to create machine learning applications using various tools, resources.
- **Currently, the most famous deep learning library in the world is Google's TensorFlow.**

How TensorFlow Works???

- TensorFlow enables you to build dataflow graphs and structures to define how data taking inputs as a multi-dimensional array called Tensor.
- It allows you to construct a flowchart of operations that can be performed on these and comes at the other end as output.

TensorFlow Architecture

Tensorflow architecture works in three parts:

- Preprocessing the data
- Build the model
- Train and estimate the model

→It is called Tensorflow because it takes input as a multi-dimensional array, also known

- We can construct a sort of **flowchart** of operations (called a Graph) that we want to
- The input goes in at one end, and then it flows through this system of multiple end as output.
- This is why it is called TensorFlow because the tensor goes in it flows through a list of comes out the other side.

Where can Tensorflow run?

TensorFlow hardware, and software requirements can be classified into

1)**Development Phase:** This is when you train the mode. Training is usually done on your

2)**Run Phase or Inference Phase:** Once training is done Tensorflow can be run on many

You can run it on:

- Desktop running Windows, macOS or Linux
- Cloud as a web service
- Mobile devices like iOS and Android

❑ You can train it on multiple machines then you can run it on a different machine, once

❑ TensorFlow is a library developed by the Google Brain Team to accelerate machine network research.

TensorFlow Components

Tensor

- Tensorflow’s name is directly derived from its core framework: **Tensor**.
- In Tensorflow, all the computations involve tensors. A tensor is represents all types of data.
- All values in a tensor hold identical data type with a known (or partially data is the dimensionality of the matrix or array.
- A tensor can be originated from the input data or the result of a computation.
- In TensorFlow, all the operations are conducted inside a **graph**.
- The graph is a set of computation that takes place successively. Each operation are connected to each other.
- The graph outlines the ops and connections between the nodes. However, it The edge of the nodes is the tensor, i.e., a way to populate the operation with

Graphs

- TensorFlow makes use of a graph framework. The graph gathers and computations done during the training. The graph has lots of advantages:

•It was done to run on multiple CPUs or GPUs and even mobile operating

•The portability of the graph allows to preserve the computations for graph can be saved to be executed in the future.

•All the computations in the graph are done by connecting tensors together

  - A tensor has a node and an edge. The node carries the mathematical endpoints outputs. The edges the edges explain the input/output

CPU AND GPU

Central Processing Unit (CPU):

CPU is known as brain for every ingrained system.

CPU comprises the arithmetic logic unit (ALU) accustomed quickly to store the information and perform calculations and Control Unit (CU) for performing instruction sequencing as well as branching.

CPU interacts with more computer components such as memory, input and output for performing instruction.

Graphics Processing Unit (GPU):

GPU is used to provide the images in computer games.

GPU is faster than CPU’s speed and it emphasis on high throughput.

It’s generally incorporated with electronic equipment for sharing RAM with electronic equipment that is nice for the foremost computing task.

It contains more ALU units than CPU.

Why is TensorFlow Popular?

- TensorFlow is the best library of all because it is built to be accessible for everyone.
- Tensorflow library incorporates different API to built at scale deep learning
- TensorFlow is based on graph computation
- it allows the developer to visualize the construction of the neural network with
- This tool is helpful to debug the program.
- Finally, Tensorflow is built to be deployed at scale.
- It runs on CPU and GPU.

TensorFlow Algorithms

Below are the algorithms supported by TensorFlow:

Currently, TensorFlow 1.10 has a built-in API for:

- Linear regression: tf.estimator.LinearRegressor
- Classification:tf.estimator.LinearClassifier
- Deep learning classification: tf.estimator.DNNClassifier
- Deep learning wipe and deep: tf.estimator.DNNLinearCombinedClassifier
- Booster tree regression: tf.estimator.BoostedTreesRegressor
- Boosted tree classification: tf.estimator.BoostedTreesClassifier