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# Welcome to Deep Learning Online Bootcamp

## Setting Up TensorFlow



Democratizing Data Science Learning

# TIP #0

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If you don't have context about Google Colab & Jupyter notebook, please refer optional slides provided about related topics under Day 0



# Learning Objectives

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**CPU, GPU and TPU**

**GPU Packages for  
Deep Learning**

**Setting Up  
TensorFlow**

**Importing  
TensorFlow and  
checking its  
version**



# TIP

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You **DON'T need to memorize** the below jargons!



# **CPU, GPU and TPU**

# CPUs

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The **CPU** or Central Processing Unit is the primary component of a computer that processes instructions. It's called the brain of the computer.



# GPUs

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**GPU** stands for graphics processing unit. You'll also see GPUs commonly referred to as **graphics cards** or **video cards**. Every PC uses a GPU to render images, video and 2D or 3D animations for display. A GPU performs quick math calculations and frees up the CPU to do other things.

The introduction of GPUs led to the rise of gaming industries and industries that provide high quality visuals. GPUs are not only used in machine learning related work but are also highly useful for content creators, digital artists and gamers.

GPUs play a crucial role while training Deep Learning models. To learn what makes them so important, we would recommend you to go through a very interesting article below that explains why GPUs are necessary for training Deep Learning models:

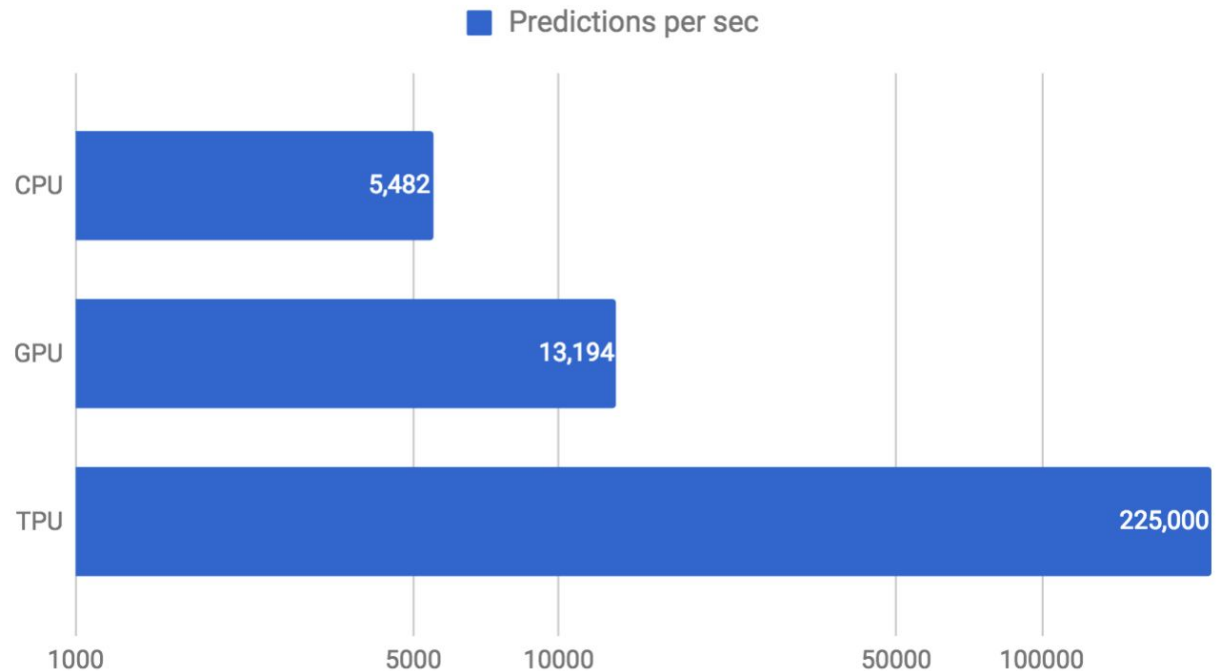
- [Why are GPUs necessary for training Deep Learning models?](#)



# TPUs

Tensor Processing Unit i.e **TPU** is a designated architecture for DL/ML computation which is designed by Google. It's not a generic processor, only Tensorflow models can run on it.

TPU outperforms CPU and GPU for various Deep Learning models in terms of predictions per second. Source: Sato et al. 2017.



If you wish to know more about TPUs, you can read the below article:

<https://cloud.google.com/tpu>



# Why GPU and TPU?

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CPU can be used to train the model where data is relatively small. The GPUs were introduced as the CPU were slower when dealing with data that contained required huge computations.

In nutshell, GPUs and TPUs are used for reducing the computation time to train efficiently a deep learning model when large datasets need to be processed.



# What GPU Packages are required for DL?

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For performing Deep Learning operations, 2 GPU Packages are configured while installing TensorFlow. These are:

1. **CUDA:**

CUDA is NVIDIA's language/API for programming on the graphics card. It is one of the easiest ways to write really high performance programs run on the GPU.

You can accelerate deep learning and other compute-intensive apps by taking advantage of CUDA and the parallel processing power of GPUs



# What GPU Packages are required for DL?

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**2. cuDNN:** The NVIDIA CUDA Deep Neural Network library (cuDNN) is a GPU-accelerated library for deep neural networks. It is built using CUDA and provides GPU accelerated functionality and highly tuned implementations for common operations in deep neural nets.

Deep learning researchers and framework developers worldwide rely on cuDNN for high-performance GPU acceleration. It allows them to focus on training neural networks and developing software applications rather than spending time on low-level GPU performance tuning.



# Setting up Tensorflow

# Setting up TensorFlow

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- **Option 1:**

**This is a virtual environment that doesn't need any installation on your device (besides Google Chrome browser).**

You just need to go to the following url:

<http://colab.research.google.com/> and configure your environment to run Deep Learning models

- **Option 2: Installing Tensorflow on device**



**Option 1: Google Colab (Virtual Environment - No  
installation required)**

# Tensorflow Setup - Google Colab

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- Google offers Google Colab notebooks (also called as online version of Jupyter notebook) that is **easy-to-use and interactive data science environment**.
  - Not just that, Google colab offers you upto 12 GB ram/GPU/TPU etc **for free** and 100 GB storage.
  - So, you don't need to worry about installing a bulky python local application on your laptop/computer
- **Google colab registration:** <https://colab.research.google.com/>



# Tensorflow Setup - Google Colab

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Colab gives you a decent GPU for free, which you can continuously run for 12 hours. For most data science folks, this is sufficient to meet their computation needs.

Google Colab gives us three types of runtime for our notebooks:

1. CPUs,
2. GPUs, and
3. TPUs

**Why GPU/TPU?** In nutshell, GPUs and TPUs are used for reducing the computation time to train efficiently a deep learning model when large datasets need to be processed.





# TPUs

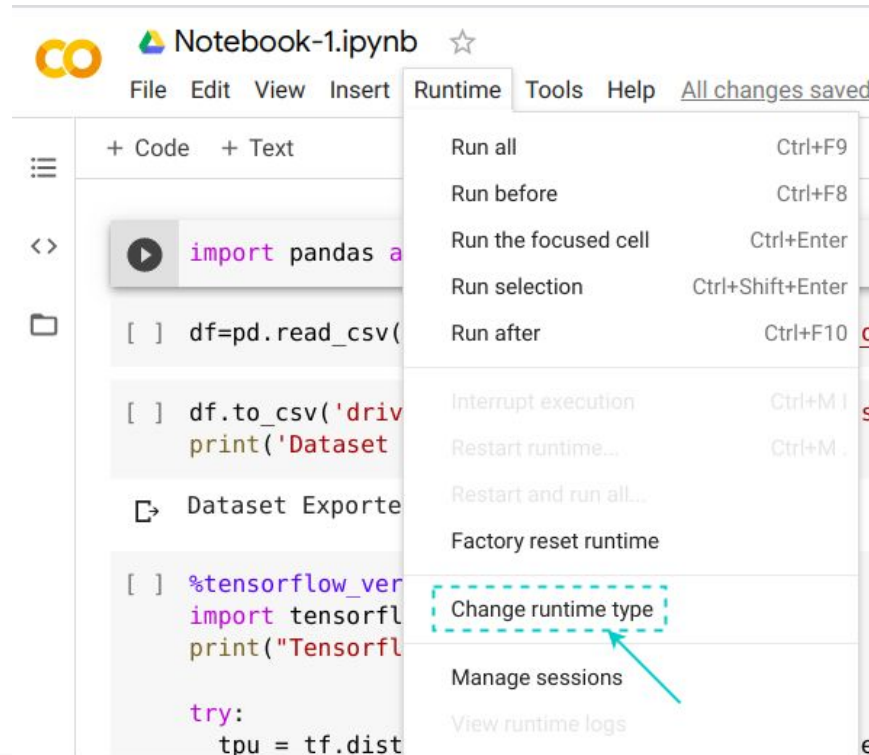
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Tensor Processing Unit i.e TPUs have been recently added to Google Colab, making it even more attractive for quick-and-dirty machine learning projects when your own local processing units are just not fast enough.

# Choosing the GPU or TPU Option

The ability to choose different types of runtimes is what makes Colab so popular and powerful. Here are the steps to change the runtime of your notebook:

**STEP 1:** Click 'Runtime' on the top menu and select 'Change Runtime Type':



# Choosing the GPU or TPU Option

**Step 2:** Here you can change the runtime according to your need:

## Notebook settings

Runtime type

Python 3

Hardware accelerator

None

☐ Omit code cell output

None



GPU

TPU

g this notebook

CANCEL

SAVE



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# To install Tensorflow on Colab

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- Open your Colab notebook
- Type the following command:

**`!pip install tensorflow`**

- Once the installation is done, run the below command to import tensorflow:

**`import tensorflow as tf`**



## **Option 2: Installing on Device**

# To install Tensorflow on device

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- Open your jupyter notebook
- Type the following command:

```
!pip install tensorflow
```

- Once the installation is done, run the below command to import tensorflow:

```
import tensorflow as tf
```

- A simple [video explanation of tensorflow installation](#) can be found on the next slide.



# To install Tensorflow on device



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# Checking the version of TensorFlow



# Check the version of Tensorflow

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- Open a Jupyter Notebook/Google Colab
- In a cell type and execute the following command:

```
import tensorflow as tf  
print(tf.__version__)
```

- Make sure the displayed version starts with 2 i.e ensure Tensorflow 2 has been installed. If not, you can upgrade Tensorflow:  
Pip upgrade: <https://stackoverflow.com/a/47342614>  
Conda upgrade: conda upgrade tensorflow-gpu
- Google Colab uses TensorFlow 2 by default.



# Additional Resources on Installation!

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- [Install Tensorflow GPU on Windows 10 with CUDA and cuDNN](#)

<**Intermediate/advanced Learners can explore this option.** For rest, we can gradually get there whenever required, for the moment, you can simply go with Google Colab or the device installation mentioned couple of slides earlier>



# Download Slides Link

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[https://docs.google.com/presentation/d/1IvIcSDuUj\\_kEH4XLiqtfsA0rNyhbI5vh-UB84JwqA8BQ/edit#slide=id.g910399512c\\_25\\_12](https://docs.google.com/presentation/d/1IvIcSDuUj_kEH4XLiqtfsA0rNyhbI5vh-UB84JwqA8BQ/edit#slide=id.g910399512c_25_12)



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# That's it for this unit. Thank you!

Feel free to post any queries in the #help channel on Slack or on the [Discuss](#) forum

