# Aprendizaje Automático Profundo

## Uso de GPUs en Google Colab

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POR LA CIENCIA Y POR LA PATRIA

# Entrenamiento con GPUs

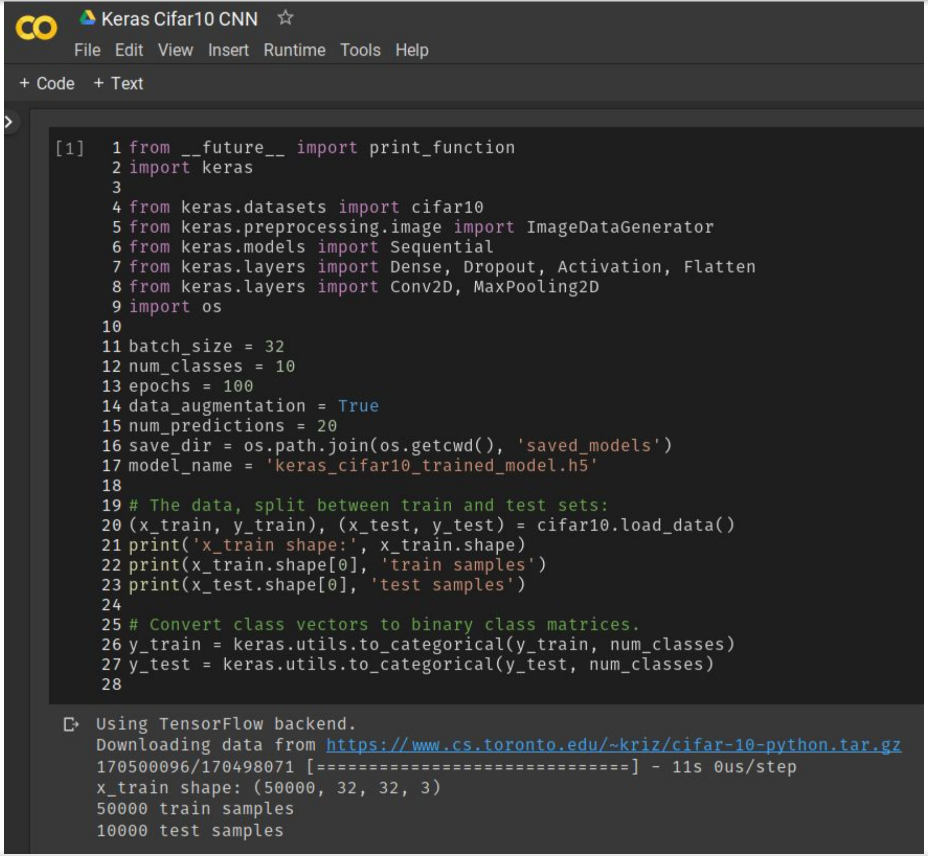
Con Google Colab

# GPU vs CPU

Tiempos de GPU vs CPU en entrenamiento [1]:

| Modelo | Tipo | Ejemplos por segundo |
|---|---|---|
| 2x Opteron 6168 (server) | CPU | 440 |
| i7 7500U (laptop) | CPU | 415 |
| GeForce 940mx (laptop) | GPU | 1190 |
| GeForce 1070 (discreta) | GPU | 6500 |

# Google Colab



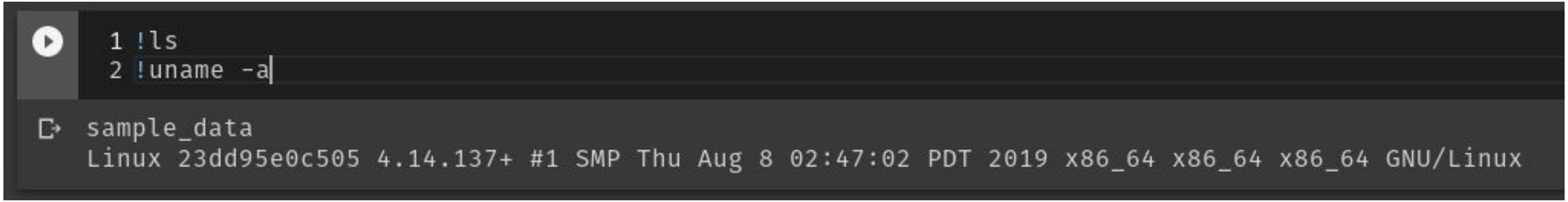
```
from __future__ import print_function
import keras

from keras.datasets import cifar10
from keras.preprocessing.image import ImageDataGenerator
from keras.models import Sequential
from keras.layers import Dense, Dropout, Activation, Flatten
from keras.layers import Conv2D, MaxPooling2D
import os

batch_size = 32
num_classes = 10
epochs = 100
data_augmentation = True
num_predictions = 20
save_dir = os.path.join(os.getcwd(), 'saved_models')
model_name = 'keras_cifar10_trained_model.h5'

# The data, split between train and test sets:
(x_train, y_train), (x_test, y_test) = cifar10.load_data()
print('x_train shape:', x_train.shape)
print(x_train.shape[0], 'train samples')
print(x_test.shape[0], 'test samples')

# Convert class vectors to binary class matrices.
y_train = keras.utils.to_categorical(y_train, num_classes)
y_test = keras.utils.to_categorical(y_test, num_classes)

```

```
Using TensorFlow backend.
Downloading data from https://www.cs.toronto.edu/~kriz/cifar-10-python.tar.gz
170500096/170498071 [==============================] - 11s 0us/step
x_train shape: (50000, 32, 32, 3)
50000 train samples
10000 test samples
```

- Interfaz similar a Jupyter Notebook
- Requiere cuenta de Google :(
- Notebooks se guardan en Google Drive
- https://colab.research.google.com
- Límite: 12 horas seguidas de uso
- No tenemos ninguna relación con Google (pero proveen tiempo de gpu gratis)

# Google Colab

- Con “!” se pueden ejecutar comandos de bash/sh
- Permisos limitados

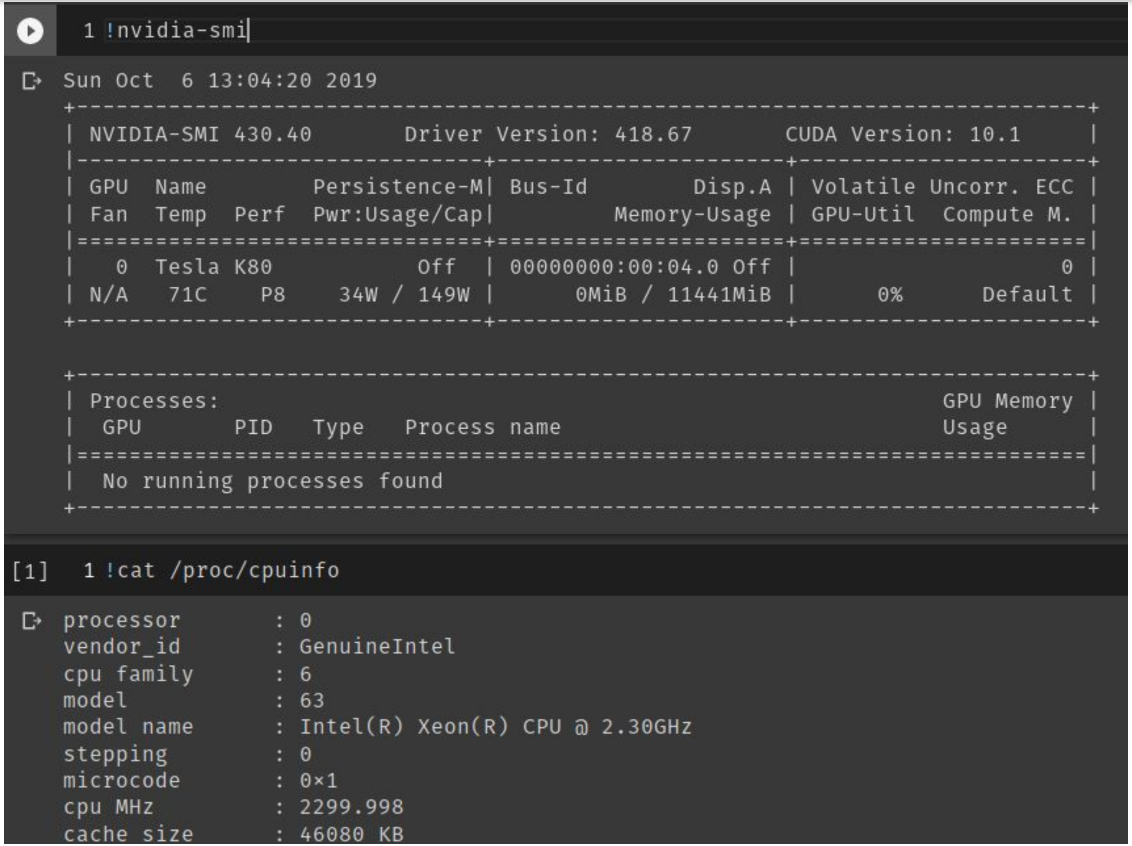


```
!ls
!uname -a
```

```
sample_data
Linux 23dd95e0c505 4.14.137+ #1 SMP Thu Aug 8 02:47:02 PDT 2019 x86_64 x86_64 x86_64 GNU/Linux
```

# Google Colab - Características

- 12gb de ram
- 300gb de disco
- GPU NVIDIA Tesla K80
  - 12gb vram
  - 2496 shading units
- CPU Intel Xeon @ 2.30ghz



```
!nvidia-smi
```

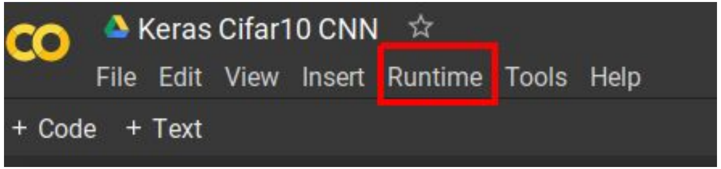
```
Sun Oct  6 13:04:20 2019
+-----------------------------------------------------------------------------+
| NVIDIA-SMI 430.40       Driver Version: 418.67       CUDA Version: 10.1     |
|-------------------------------+----------------------+----------------------+
| GPU  Name        Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap|         Memory-Usage | GPU-Util  Compute M. |
|===============================+======================+======================|
|   0  Tesla K80           Off  | 00000000:00:04.0 Off |                    0 |
| N/A   71C    P8    34W / 149W |      0MiB / 11441MiB |      0%      Default |
+-------------------------------+----------------------+----------------------+

+-----------------------------------------------------------------------------+
| Processes:                                                       GPU Memory |
|  GPU       PID   Type   Process name                             Usage      |
|=============================================================================|
|  No running processes found                                                 |
+-----------------------------------------------------------------------------+
```

```
!cat /proc/cpuinfo
```

```
processor       : 0
vendor_id       : GenuineIntel
cpu family      : 6
model           : 63
model name      : Intel(R) Xeon(R) CPU @ 2.30GHz
stepping        : 0
microcode       : 0x1
cpu MHz         : 2299.998
cache size      : 46080 KB
```

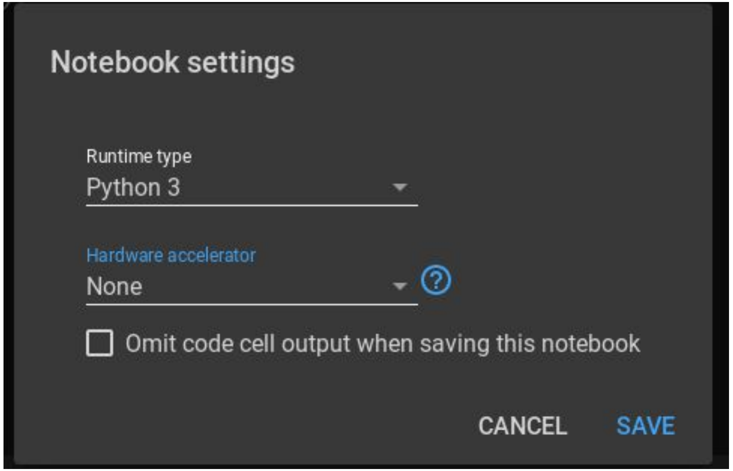
# Google Colab - Activar GPU

1



2 *Change runtime type*

3



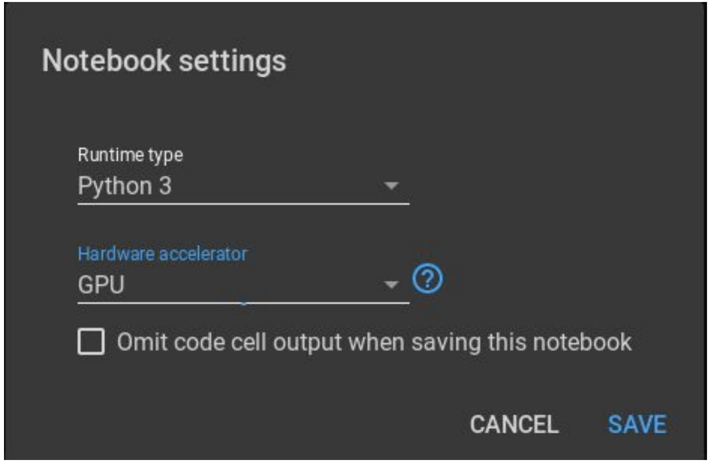
Notebook settings

Runtime type
Python 3

Hardware accelerator
None

□ Omit code cell output when saving this notebook

4



Notebook settings

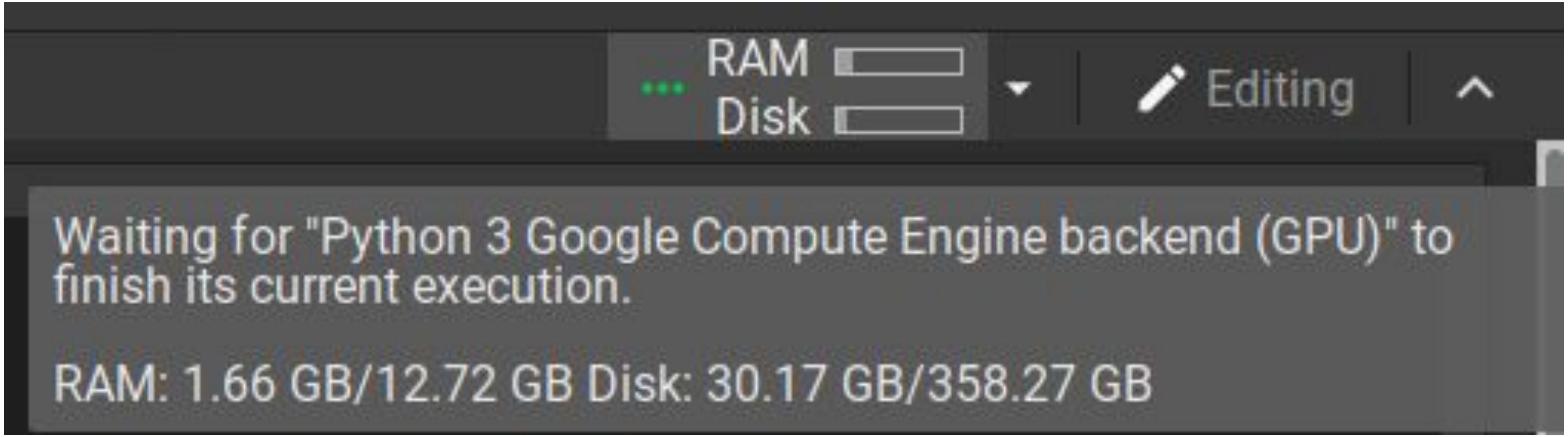
Runtime type
Python 3

Hardware accelerator
GPU

□ Omit code cell output when saving this notebook

# Google Colab - Activar GPU

- Verificar que diga GPU en el mouseover
- Alternativamente, correr **!nvidia-smi**
    - Si encuentra la GPU es que está activada



Waiting for "Python 3 Google Compute Engine backend (GPU)" to finish its current execution.

RAM: 1.66 GB/12.72 GB Disk: 30.17 GB/358.27 GB