In [1]:

```
!pip install tensorflow
```

Collecting tensorflow
  Downloading
https://files.pythonhosted.org/packages/f7/08/25e47a53692c2e0dcd2211a493ddfe9007a5cd92e175d6dffa616
392/tensorflow-1.14.0-cp37-cp37m-win_amd64.whl (68.3MB)
Collecting keras-applications>=1.0.6 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/71/e3/19762fdfc62877ae9102edf6342d71b28fbfd9dea3d2f96a882ce
03f/Keras_Applications-1.0.8-py3-none-any.whl
Collecting keras-preprocessing>=1.0.5 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/28/6a/8c1f62c37212d9fc441a7e26736df51ce6f0e38455816445471f1
f0a/Keras_Preprocessing-1.1.0-py2.py3-none-any.whl
Collecting protobuf>=3.6.1 (from tensorflow)
  Downloading
https://files.pythonhosted.org/packages/49/cd/608edf77e6b7cbc6a79dfc33039ee78afac29dfa8e6c894b9ef95
c8c/protobuf-3.8.0-cp37-cp37m-win_amd64.whl (1.0MB)
Collecting google-pasta>=0.1.6 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/d0/33/376510eb8d6246f3c30545f416b2263eee461e40940c2a4413c71
62d/google_pasta-0.1.7-py3-none-any.whl
Requirement already satisfied: wrapt>=1.11.1 in c:\users\abhay\anaconda3\lib\site-packages (from
tensorflow) (1.11.1)
Collecting astor>=0.6.0 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/d1/4f/950dfae467b384fc96bc6469de25d832534f6b4441033c39f914e
418/astor-0.8.0-py2.py3-none-any.whl
Requirement already satisfied: wheel>=0.26 in c:\users\abhay\anaconda3\lib\site-packages (from
tensorflow) (0.33.1)
Requirement already satisfied: six>=1.10.0 in c:\users\abhay\anaconda3\lib\site-packages (from
tensorflow) (1.12.0)
Collecting tensorboard<1.15.0,>=1.14.0 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/91/2d/2ed263449a078cd9c8a9ba50ebd50123adf1f8cfbea1492f90841
9d9/tensorboard-1.14.0-py3-none-any.whl
Collecting gast>=0.2.0 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/4e/35/11749bf99b2d4e3cceb4d55ca22590b0d7c2c62b9de38ac4a4a7f
421/gast-0.2.2.tar.gz
Collecting tensorflow-estimator<1.15.0rc0,>=1.14.0rc0 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/3c/d5/21860a5b11caf0678fbc8319341b0ae21a07156911132e0e71bff
10d/tensorflow_estimator-1.14.0-py2.py3-none-any.whl
Collecting termcolor>=1.1.0 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/8a/48/a76be51647d0eb9f10e2a4511bf3ffb8cc1e6b14e9e4fab46173a
981/termcolor-1.1.0.tar.gz
Requirement already satisfied: numpy<2.0,>=1.14.5 in c:\users\abhay\anaconda3\lib\site-packages
(from tensorflow) (1.16.2)
Collecting absl-py>=0.7.0 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/da/3f/9b0355080b81b15ba6a9ffcf1f5ea39e307a2778b2f2dc8694724
d5b/absl-py-0.7.1.tar.gz
Collecting grpcio>=1.8.6 (from tensorflow)
  Downloading
https://files.pythonhosted.org/packages/7a/f5/fe046577387a3589ab3092096ca423fcf9a8c7ac876f56c6f3b4c
533/grpcio-1.22.0-cp37-cp37m-win_amd64.whl (1.6MB)
Requirement already satisfied: h5py in c:\users\abhay\anaconda3\lib\site-packages (from keras-
applications>=1.0.6->tensorflow) (2.9.0)
Requirement already satisfied: setuptools in c:\users\abhay\anaconda3\lib\site-packages (from
protobuf>=3.6.1->tensorflow) (40.8.0)
Collecting markdown>=2.6.8 (from tensorboard<1.15.0,>=1.14.0->tensorflow)
  Using cached
https://files.pythonhosted.org/packages/c0/4e/fd492e91abdc2d2fcb70ef453064d980688762079397f779758e0
575/Markdown-3.1.1-py2.py3-none-any.whl
Requirement already satisfied: werkzeug>=0.11.15 in c:\users\abhay\anaconda3\lib\site-packages
(from tensorboard<1.15.0,>=1.14.0->tensorflow) (0.14.1)
Building wheels for collected packages: gast, termcolor, absl-py
  Building wheel for gast (setup.py): started
  Building wheel for gast (setup.py): finished with status 'done'
  Stored in directory:

```
  Stored in directory:
C:\Users\Abhay\AppData\Local\pip\Cache\wheels\5c\2e\7e\a1d4d4fcebe6c381f378ce7743a3ced3699feb89bcfk
dd
  Building wheel for termcolor (setup.py): started
  Building wheel for termcolor (setup.py): finished with status 'done'
  Stored in directory:
C:\Users\Abhay\AppData\Local\pip\Cache\wheels\7c\06\54\bc84598ba1daf8f970247f550b175aaaee85f68b4b0c
c6
  Building wheel for absl-py (setup.py): started
  Building wheel for absl-py (setup.py): finished with status 'done'
  Stored in directory:
C:\Users\Abhay\AppData\Local\pip\Cache\wheels\ee\98\38\46cbcc5a93cfea5492d19c38562691ddb23b940176c1
48
Successfully built gast termcolor absl-py
Installing collected packages: keras-applications, keras-preprocessing, protobuf, google-pasta, as
tor, absl-py, grpcio, markdown, tensorboard, gast, tensorflow-estimator, termcolor, tensorflow
Successfully installed absl-py-0.7.1 astor-0.8.0 gast-0.2.2 google-pasta-0.1.7 grpcio-1.22.0
keras-applications-1.0.8 keras-preprocessing-1.1.0 markdown-3.1.1 protobuf-3.8.0 tensorboard-
1.14.0 tensorflow-1.14.0 tensorflow-estimator-1.14.0 termcolor-1.1.0
```

```
tensorboard 1.14.0 has requirement setuptools>=41.0.0, but you'll have setuptools 40.8.0 which is
incompatible.
```

In [6]:

```python
import tensorflow as tf
```

In [8]:

```python
!pip install keras
```

```
Collecting keras
  Using cached
https://files.pythonhosted.org/packages/5e/10/aa32dad071ce52b5502266b5c659451cfd6ffcbf14e6c8c4f16c0
aab/Keras-2.2.4-py2.py3-none-any.whl
Requirement already satisfied: numpy>=1.9.1 in c:\users\abhay\anaconda3\lib\site-packages (from
keras) (1.16.2)
Requirement already satisfied: h5py in c:\users\abhay\anaconda3\lib\site-packages (from keras)
(2.9.0)
Requirement already satisfied: keras-preprocessing>=1.0.5 in c:\users\abhay\anaconda3\lib\site-pac
kages (from keras) (1.1.0)
Requirement already satisfied: six>=1.9.0 in c:\users\abhay\anaconda3\lib\site-packages (from
keras) (1.12.0)
Requirement already satisfied: keras-applications>=1.0.6 in c:\users\abhay\anaconda3\lib\site-
packages (from keras) (1.0.8)
Requirement already satisfied: scipy>=0.14 in c:\users\abhay\anaconda3\lib\site-packages (from
keras) (1.2.1)
Requirement already satisfied: pyyaml in c:\users\abhay\anaconda3\lib\site-packages (from keras) (
5.1)
Installing collected packages: keras
Successfully installed keras-2.2.4
```

In [7]:

```python
import tensorflow.keras as keras
```

In [8]:

```python
import numpy as np
```

In [9]:

```python
from keras.datasets import cifar10
```

```
Using TensorFlow backend.
```

In [10]:

```python
print(tf.__version__)
```

```
1.14.0
```

In [11]:
```
(x_train, y_train), (x_test, y_test) = cifar10.load_data()
```

In [12]:
```
x_train.shape
```

Out[12]:
```
(50000, 32, 32, 3)
```

In [13]:
```
len(x_train)
```

Out[13]:
```
50000
```

In [14]:
```
x_train = x_train/255.0
x_test = x_test/255.0
```

In [15]:
```
model = keras.Sequential([
    keras.layers.Flatten(input_shape = (32,32,3)),
    keras.layers.Dense(213,activation = tf.nn.relu),
    keras.layers.Dense(10,activation = tf.nn.softmax)
])
```

```
WARNING: Logging before flag parsing goes to stderr.
W0704 07:25:50.640368  8636 deprecation.py:506] From C:\Users\Abhay\Anaconda3\lib\site-
packages\tensorflow\python\ops\init_ops.py:1251: calling VarianceScaling.__init__ (from
tensorflow.python.ops.init_ops) with dtype is deprecated and will be removed in a future version.
Instructions for updating:
Call initializer instance with the dtype argument instead of passing it to the constructor
```

In [18]:
```
model.compile(optimizer = 'adam', loss = 'sparse_categorical_crossentropy',
              metrics = ['accuracy'])
```

In [20]:
```
model.fit(x_train, y_train, epochs = 25)
```

```
Epoch 1/25
50000/50000 [==============================] - 11s 219us/sample - loss: 1.5976 - acc: 0.4299
Epoch 2/25
50000/50000 [==============================] - 11s 214us/sample - loss: 1.5791 - acc: 0.4361
Epoch 3/25
50000/50000 [==============================] - 11s 217us/sample - loss: 1.5671 - acc: 0.4408
Epoch 4/25
50000/50000 [==============================] - 11s 221us/sample - loss: 1.5550 - acc: 0.4458
Epoch 5/25
50000/50000 [==============================] - 11s 218us/sample - loss: 1.5490 - acc: 0.4470
Epoch 6/25
50000/50000 [==============================] - 11s 218us/sample - loss: 1.5388 - acc: 0.4513
Epoch 7/25
50000/50000 [==============================] - 11s 227us/sample - loss: 1.5316 - acc: 0.4536
Epoch 8/25
50000/50000 [==============================] - 11s 221us/sample - loss: 1.5291 - acc: 0.4530
```

```
Epoch 9/25
50000/50000 [==============================] - 11s 224us/sample - loss: 1.5209 - acc: 0.4559 - los
s: 1.5211 - acc:
Epoch 10/25
50000/50000 [==============================] - 11s 227us/sample - loss: 1.5123 - acc: 0.4626
Epoch 11/25
50000/50000 [==============================] - 11s 224us/sample - loss: 1.5067 - acc: 0.4616
Epoch 12/25
50000/50000 [==============================] - 11s 223us/sample - loss: 1.5026 - acc: 0.4635
Epoch 13/25
50000/50000 [==============================] - 11s 225us/sample - loss: 1.5033 - acc: 0.4624
Epoch 14/25
50000/50000 [==============================] - 11s 227us/sample - loss: 1.4937 - acc: 0.4672
Epoch 15/25
50000/50000 [==============================] - 11s 227us/sample - loss: 1.4931 - acc: 0.4677
Epoch 16/25
50000/50000 [==============================] - 11s 229us/sample - loss: 1.4877 - acc: 0.4699
Epoch 17/25
50000/50000 [==============================] - 12s 232us/sample - loss: 1.4832 - acc: 0.4706
Epoch 18/25
50000/50000 [==============================] - 11s 229us/sample - loss: 1.4827 - acc: 0.4703
Epoch 19/25
50000/50000 [==============================] - 11s 229us/sample - loss: 1.4764 - acc: 0.4744
Epoch 20/25
50000/50000 [==============================] - 12s 230us/sample - loss: 1.4750 - acc: 0.4755
Epoch 21/25
50000/50000 [==============================] - 11s 229us/sample - loss: 1.4709 - acc: 0.4752
Epoch 22/25
50000/50000 [==============================] - 13s 250us/sample - loss: 1.4684 - acc: 0.4754
Epoch 23/25
50000/50000 [==============================] - 14s 274us/sample - loss: 1.4642 - acc: 0.4792
Epoch 24/25
50000/50000 [==============================] - 13s 263us/sample - loss: 1.4640 - acc: 0.4789
Epoch 25/25
50000/50000 [==============================] - 13s 263us/sample - loss: 1.4638 - acc: 0.4785 - los
s: 1.4624
```

Out[20]:

```
<tensorflow.python.keras.callbacks.History at 0x2068530f438>
```

In [ ]: