

```
pip install tensorflow
```

```
Requirement already satisfied: tensorflow in /usr/local/lib/python3.10/dist-packages (2.15.0)
Requirement already satisfied: absl-py>=1.0.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.4.0)
Requirement already satisfied: astunparse>=1.6.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.6.3)
Requirement already satisfied: flatbuffers>=23.5.26 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (24.3.25)
Requirement already satisfied: gast!=0.5.0,!0.5.1,!0.5.2,>=0.2.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (0.5.4)
Requirement already satisfied: google-pasta>=0.1.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (0.2.0)
Requirement already satisfied: h5py>=2.9.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (3.9.0)
Requirement already satisfied: libclang>=13.0.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (18.1.1)
Requirement already satisfied: ml-dtypes~0.2.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (0.2.0)
Requirement already satisfied: numpy<2.0.0,>=1.23.5 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.25.2)
Requirement already satisfied: opt-einsum>=2.3.2 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (3.3.0)
Requirement already satisfied: packaging in /usr/local/lib/python3.10/dist-packages (from tensorflow) (24.0)
Requirement already satisfied: protobuf!=4.21.0,!4.21.1,!4.21.2,!4.21.3,!4.21.4,!4.21.5,<5.0.0dev,>=3.20.3 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (3.20.3)
Requirement already satisfied: setuptools in /usr/local/lib/python3.10/dist-packages (from tensorflow) (67.7.2)
Requirement already satisfied: six>=1.12.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.16.0)
Requirement already satisfied: termcolor>=1.1.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.4.0)
Requirement already satisfied: typing-extensions>=3.6.6 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (4.10.0)
Requirement already satisfied: wrapt<1.15,>=1.11.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.14.1)
Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (0.36.0)
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Requirement already satisfied: tensorboard<2.16,>=2.15 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.15.2)
Requirement already satisfied: tensorflow-estimator<2.16,>=2.15.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.15.0)
Requirement already satisfied: keras<2.16,>=2.15.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.15.0)
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Requirement already satisfied: google-auth<3,>=1.6.3 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.6.3)
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Requirement already satisfied: werkzeug>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (3.0.3)
Requirement already satisfied: cachetools<6.0,>=2.0.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (5.3.1)
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Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.2.1)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2024.2.2)
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Requirement already satisfied: pyasn1<0.7.0,>=0.4.6 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (0.6.0)
Requirement already satisfied: oauthlib>=3.0.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (3.2.0)
```

```
import tensorflow as tf
```

```
from tensorflow.keras import layers, models
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

```
import matplotlib.pyplot as plt
```

```
(train_images, train_labels), (test_images, test_labels) = tf.keras.datasets.cifar10.load_data()
train_images, test_images = train_images/255.0, test_images/255.0
```

```
model = models.Sequential()
```

```
model.add(layers.Conv2D(32, (3, 3), activation='relu', input_shape=(32, 32, 3)))
```

```
model.add(layers.MaxPooling2D((2, 2)))
```

```
model.add(layers.Conv2D(64, (3, 3), activation='relu'))
```

```
model.add(layers.MaxPooling2D((2, 2)))
```

```
model.add(layers.Conv2D(64, (3, 3), activation='relu'))
```

```
model.add(layers.Flatten())
```

```
model.add(layers.Dense(64, activation='relu'))
```

```
model.add(layers.Dense(64, activation='relu'))
```

```
model.add(layers.Dense(1, activation="sigmoid"))
```

```
model.compile(optimizer='adam', loss='binary_crossentropy', metrics=['accuracy'])
```

```
datagen = ImageDataGenerator(rotation_range=40, width_shift_range=0.2, height_shift_range=0.2, shear_range=8.2, zoom_range=8.2, horizontal_flip=True)
history = model.fit(datagen.flow(train_images, train_labels, batch_size=32), epochs=10, validation_data=(test_images, test_labels))
```

```
test_loss, test_acc =model.evaluate(test_images, test_labels, verbose=2)
```

```
print(f'\nTest accuracy: {test_acc}')
```

```
plt.plot(history.history['accuracy'], label='accuracy')
```

```
plt.plot(history.history['val_accuracy'], label='val_accuracy')
```

```
plt.xlabel('Epoch')
```

```
plt.ylabel('Accuracy')
```

```
plt.legend(loc='lower right')
```

```
plt.show()
```

```
Epoch 1/10
1563/1563 [=====] - 102s 64ms/step - loss: -2250528637583360.0000 - accuracy: 0.1000 - val_loss: -1488999663271
Epoch 2/10
1563/1563 [=====] - 97s 62ms/step - loss: -173590517836152832.0000 - accuracy: 0.1000 - val_loss: -526406000844
Epoch 3/10
1563/1563 [=====] - 96s 61ms/step - loss: -1688483035697119232.0000 - accuracy: 0.1000 - val_loss: -35375261051
Epoch 4/10
1563/1563 [=====] - 95s 61ms/step - loss: -7541658007055106048.0000 - accuracy: 0.1000 - val_loss: -13062335576
Epoch 5/10
1563/1563 [=====] - 97s 62ms/step - loss: -22910759083456856064.0000 - accuracy: 0.1000 - val_loss: -3555268429
Epoch 6/10
1563/1563 [=====] - 95s 61ms/step - loss: -55761050505450618880.0000 - accuracy: 0.1000 - val_loss: -8050497474
Epoch 7/10
1563/1563 [=====] - 95s 61ms/step - loss: -117297932348631810048.0000 - accuracy: 0.1000 - val_loss: -161179327
Epoch 8/10
1563/1563 [=====] - 102s 65ms/step - loss: -223176196193693728768.0000 - accuracy: 0.1000 - val_loss: -29514139
Epoch 9/10
1563/1563 [=====] - 98s 63ms/step - loss: -393582554469208424448.0000 - accuracy: 0.1000 - val_loss: -505471918
Epoch 10/10
788/1563 [=====>.....] - ETA: 46s - loss: -574256310654569807872.0000 - accuracy: 0.0985
```