```
In [1]: pip install tensorflow numpy
```

Requirement already satisfied: tensorflow in /home/admin1/anaconda3/lib/python3.9/site-packages (2.19.0)
Requirement already satisfied: numpy in /home/admin1/anaconda3/lib/python3.9/site-packages (1.26.4)
Requirement already satisfied: absl-py>=1.0.0 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (1.4.0)
Requirement already satisfied: astunparse>=1.6.0 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (1.6.3)
Requirement already satisfied: flatbuffers>=24.3.25 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (25.2.10)
Requirement already satisfied: gast!=0.5.0,!=0.5.1,!=0.5.2,>=0.2.1 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (0.4.0)
Requirement already satisfied: google-pasta>=0.1.1 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (0.2.0)
Requirement already satisfied: libclang>=13.0.0 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (18.1.1)
Requirement already satisfied: opt-einsum>=2.3.2 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (3.3.0)
Requirement already satisfied: packaging in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (23.2)
Requirement already satisfied: protobuf!=4.21.0,!=4.21.1,!=4.21.2,!=4.21.3,!=4.21.4,!=4.21.5,<6.0.0dev,>=3.20.3 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (3.20.3)
Requirement already satisfied: requests<3,>=2.21.0 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (2.31.0)
Requirement already satisfied: setuptools in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (68.2.2)
Requirement already satisfied: six>=1.12.0 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (1.16.0)
Requirement already satisfied: termcolor>=1.1.0 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (2.1.0)
Requirement already satisfied: typing-extensions>=3.6.6 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (4.9.0)
Requirement already satisfied: wrapt>=1.11.0 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (1.14.1)
Requirement already satisfied: grpcio<2.0,>=1.24.3 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (1.48.2)
Requirement already satisfied: tensorboard~=2.19.0 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (2.19.0)
Requirement already satisfied: keras>=3.5.0 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (3.10.0)
Requirement already satisfied: h5py>=3.11.0 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (3.13.0)
Requirement already satisfied: ml-dtypes<1.0.0,>=0.5.1 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (0.5.1)
Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorflow) (0.37.1)
Requirement already satisfied: wheel<1.0,>=0.23.0 in /home/admin1/anaconda3/lib/python3.9/site-packages (from astunparse>=1.6.0->tensorflow) (0.41.2)
Requirement already satisfied: rich in /home/admin1/anaconda3/lib/python3.9/site-packages (from keras>=3.5.0->tensorflow) (13.3.5)
Requirement already satisfied: namex in /home/admin1/anaconda3/lib/python3.9/site-packages (from keras>=3.5.0->tensorflow) (0.0.8)
Requirement already satisfied: optree in /home/admin1/anaconda3/lib/python3.9/site-packages (from keras>=3.5.0->tensorflow) (0.14.1)
Requirement already satisfied: charset-normalizer<4,>=2 in /home/admin1/anaconda3/lib/python3.9/site-packages (from requests<3,>=2.21.0->tensorflow) (2.0.4)
Requirement already satisfied: idna<4,>=2.5 in /home/admin1/anaconda3/lib/python3.9/site-packages (from requests<3,>=2.21.0->tensorflow) (3.4)
Requirement already satisfied: urllib3<3,>=1.21.1 in /home/admin1/anaconda3/lib/python3.9/site-packages (from requests<3,>=2.21.0->tensorflow) (2.1.0)
Requirement already satisfied: certifi>=2017.4.17 in /home/admin1/anaconda3/lib/python3.9/site-packages (from requests<3,>=2.21.0->tensorflow) (2025.10.5)
Requirement already satisfied: markdown>=2.6.8 in /home/admin1/anaconda3/lib/python3.9/site-packages (from tensorboard~=2.19.0->tensorflow) (3.4.1)
Requirement already satisfied: tensorboard-data-server<0.8.0,>=0.7.0 in /home/admin1/a

```
naconda3/lib/python3.9/site-packages (from tensorboard~=2.19.0->tensorflow) (0.7.0)
Requirement already satisfied: werkzeug>=1.0.1 in /home/admin1/anaconda3/lib/python3.
9/site-packages (from tensorboard~=2.19.0->tensorflow) (2.2.3)
Requirement already satisfied: importlib-metadata>=4.4 in /home/admin1/anaconda3/lib/p
ython3.9/site-packages (from markdown>=2.6.8->tensorboard~=2.19.0->tensorflow) (7.0.1)
Requirement already satisfied: MarkupSafe>=2.1.1 in /home/admin1/anaconda3/lib/python
3.9/site-packages (from werkzeug>=1.0.1->tensorboard~=2.19.0->tensorflow) (2.1.3)
Requirement already satisfied: markdown-it-py<3.0.0,>=2.2.0 in /home/admin1/anaconda3/
lib/python3.9/site-packages (from rich->keras>=3.5.0->tensorflow) (2.2.0)
Requirement already satisfied: pygments<3.0.0,>=2.13.0 in /home/admin1/anaconda3/lib/p
ython3.9/site-packages (from rich->keras>=3.5.0->tensorflow) (2.15.1)
Requirement already satisfied: zipp>=0.5 in /home/admin1/anaconda3/lib/python3.9/site-
packages (from importlib-metadata>=4.4->markdown>=2.6.8->tensorboard~=2.19.0->tensorfl
ow) (3.17.0)
Requirement already satisfied: mdurl~=0.1 in /home/admin1/anaconda3/lib/python3.9/site
-packages (from markdown-it-py<3.0.0,>=2.2.0->rich->keras>=3.5.0->tensorflow) (0.1.0)
Note: you may need to restart the kernel to use updated packages.
```

In [3]:
```python
import tensorflow as tf
```

```
2026-01-07 21:29:40.227032: I tensorflow/core/util/port.cc:153] oneDNN custom operatio
ns are on. You may see slightly different numerical results due to floating-point roun
d-off errors from different computation orders. To turn them off, set the environment
variable `TF_ENABLE_ONEDNN_OPTS=0`.
2026-01-07 21:29:40.237629: I external/local_xla/xla/tsl/cuda/cudart_stub.cc:32] Could
not find cuda drivers on your machine, GPU will not be used.
2026-01-07 21:29:40.308497: I external/local_xla/xla/tsl/cuda/cudart_stub.cc:32] Could
not find cuda drivers on your machine, GPU will not be used.
2026-01-07 21:29:40.355052: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:
467] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT
when one has already been registered
WARNING: All log messages before absl::InitializeLog() is called are written to STDERR
E0000 00:00:1767801580.403012    9058 cuda_dnn.cc:8579] Unable to register cuDNN facto
ry: Attempting to register factory for plugin cuDNN when one has already been register
ed
E0000 00:00:1767801580.419654    9058 cuda_blas.cc:1407] Unable to register cuBLAS fac
tory: Attempting to register factory for plugin cuBLAS when one has already been regis
tered
W0000 00:00:1767801580.531676    9058 computation_placer.cc:177] computation placer al
ready registered. Please check linkage and avoid linking the same target more than onc
e.
W0000 00:00:1767801580.531719    9058 computation_placer.cc:177] computation placer al
ready registered. Please check linkage and avoid linking the same target more than onc
e.
W0000 00:00:1767801580.531723    9058 computation_placer.cc:177] computation placer al
ready registered. Please check linkage and avoid linking the same target more than onc
e.
W0000 00:00:1767801580.531726    9058 computation_placer.cc:177] computation placer al
ready registered. Please check linkage and avoid linking the same target more than onc
e.
2026-01-07 21:29:40.547914: I tensorflow/core/platform/cpu_feature_guard.cc:210] This
TensorFlow binary is optimized to use available CPU instructions in performance-critic
al operations.
To enable the following instructions: AVX2 AVX512F AVX512_VNNI FMA, in other operation
s, rebuild TensorFlow with the appropriate compiler flags.
```

In [5]:
```python
from tensorflow.keras.datasets import imdb
```

In [7]:
```python
from tensorflow.keras.models import Sequential
```

In [9]:
```python
from tensorflow.keras.layers import Embedding, LSTM, Dense
```

In [11]:
```python
from tensorflow.keras.preprocessing.sequence import pad_sequences
```

In [13]:
```python
vocab_size =
```

```
(X_train, y_train), (X_test, y_test) = imdb.load_data(num_words=vocab_size)

print("Training samples:", len(X_train))
print("Testing samples:", len(X_test))
```

Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/imdb.npz
17464789/17464789 ──────────────── **3s** 0us/step
Training samples: 25000
Testing samples: 25000

In [15]:
```python
max_length = 200
X_train = pad_sequences(X_train, maxlen=max_length)
X_test = pad_sequences(X_test, maxlen=max_length)
```

In [17]:
```python
model = Sequential([
    Embedding(input_dim=vocab_size, output_dim=128, input_length=max_length),
    LSTM(64),
    Dense(1, activation='sigmoid')
])

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

model.summary()
```

/home/admin1/anaconda3/lib/python3.9/site-packages/keras/src/layers/core/embedding.py:
97: UserWarning: Argument `input_length` is deprecated. Just remove it.
  warnings.warn(
2026-01-07 21:31:25.583887: E external/local_xla/xla/stream_executor/cuda/cuda_platform.cc:51] failed call to cuInit: INTERNAL: CUDA error: Failed call to cuInit: UNKNOWN ERROR (303)

Model: "sequential"

Layer (type)	Output Shape	Param #
embedding (Embedding)	?	0 (unbuilt)
lstm (LSTM)	?	0 (unbuilt)
dense (Dense)	?	0 (unbuilt)

Total params: 0 (0.00 B)

Trainable params: 0 (0.00 B)

Non-trainable params: 0 (0.00 B)

In [19]:
```python
history = model.fit(
    X_train,
    y_train,
    epochs=3,
    batch_size=64,
    validation_split=0.2
)
```

```
Epoch 1/3
313/313 ──────────────── 20s 59ms/step - accuracy: 0.7326 - loss: 0.5126 - val_acc
uracy: 0.8596 - val_loss: 0.3357
Epoch 2/3
313/313 ──────────────── 18s 59ms/step - accuracy: 0.9078 - loss: 0.2398 - val_acc
uracy: 0.8606 - val_loss: 0.3247
Epoch 3/3
313/313 ──────────────── 19s 60ms/step - accuracy: 0.9430 - loss: 0.1567 - val_acc
uracy: 0.8664 - val_loss: 0.3259
```

In [21]:
```python
loss, accuracy = model.evaluate(X_test, y_test)
print("Test Accuracy:", accuracy)
```

```
782/782 ──────────────── 8s 10ms/step - accuracy: 0.8599 - loss: 0.3402
Test Accuracy: 0.8619999885559082
```

In [23]:
```python
sample_review = X_test[0].reshape(1, -1)
prediction = model.predict(sample_review)

if prediction[0][0] > 0.5:
    print("Positive Review")
else:
    print("Negative Review")
```

```
1/1 ──────────────── 0s 99ms/step
Negative Review
```

In [ ]: