```
from tensorflow.keras.datasets import imdb
(train_data, train_labels), (test_data, test_labels) = imdb.load_data(num_words=10000)
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/imdb.npz
17465344/17464789 [==============================] - 0s 0us/step
17473536/17464789 [==============================] - 0s 0us/step
```

```
word_index = imdb.get_word_index()
reverse_word_index = dict([(value, key) for (key, value) in word_index.items()])
rn=0
decoded_review = ' '.join([reverse_word_index.get(i - 3, '?') for i in train_data[rn]])
print(train_labels[rn])
decoded_review
```

```
1
'? this film was just brilliant casting location scenery story direction everyon
e's really suited the part they played and you could just imagine being there robe
rt ? is an amazing actor and now the same being director ? father came from the sa
me scottish island as myself so i loved the fact there was a real connection with
this film the witty remarks throughout the film were great it was just brilliant s
o much that i bought the film as soon as it was released for ? and would recommend
it to everyone to watch and the fly fishing was amazing really cried at the end it
```

```
import numpy as np
def vectorize_sequences(sequences, dimension=10000):
  results = np.zeros((len(sequences), dimension))
  for i, sequence in enumerate(sequences):
    results[i, sequence] = 1.
  return results
x_train = vectorize_sequences(train_data)
x_test = vectorize_sequences(test_data)
y_train = np.asarray(train_labels).astype('float32')
y_test = np.asarray(test_labels).astype('float32')
```

```
from tensorflow import keras
from tensorflow.keras import models
from tensorflow.keras import layers

model = keras.Sequential([
  layers.Dense(5, activation='relu'),
  layers.Dense(5, activation='relu'),
```

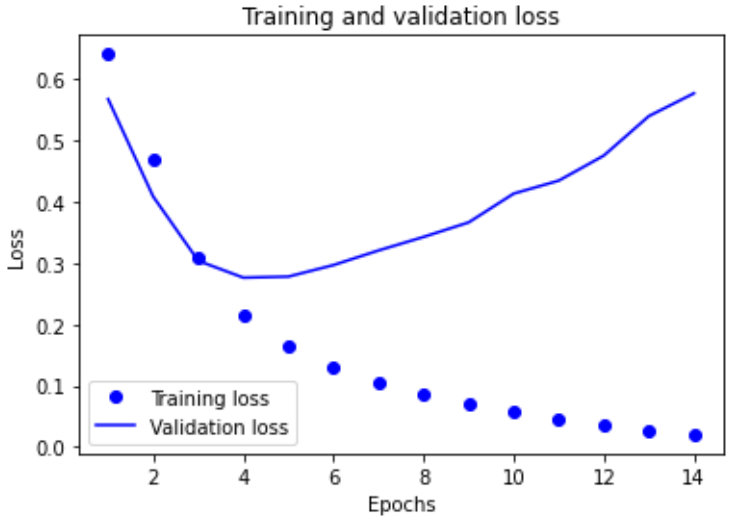
```
  layers.Dense(5, activation='relu'),
  layers.Dense(5, activation='relu'),
    layers.Dense(1, activation='sigmoid')
])
model.compile(optimizer='rmsprop',loss='binary_crossentropy',metrics=['accuracy'])

x_val = x_train[:10000]
partial_x_train = x_train[10000:]
y_val = y_train[:10000]
partial_y_train = y_train[10000:]


model.compile(optimizer='rmsprop',loss='binary_crossentropy',metrics=['acc'])
history = model.fit(partial_x_train,partial_y_train,epochs=14,batch_size=256,validation_data=(x_val, y_val))
results = model.evaluate(x_test, y_test)
results
```

```
    Epoch 1/14
    59/59 [==============================] - 3s 27ms/step - loss: 0.6405 - acc: 0.6897 - val_loss: 0.5670 - val_acc: 0.7914
    Epoch 2/14
    59/59 [==============================] - 1s 20ms/step - loss: 0.4694 - acc: 0.8598 - val_loss: 0.4082 - val_acc: 0.8796
    Epoch 3/14
    59/59 [==============================] - 1s 21ms/step - loss: 0.3091 - acc: 0.9133 - val_loss: 0.3036 - val_acc: 0.8900
    Epoch 4/14
    59/59 [==============================] - 1s 19ms/step - loss: 0.2137 - acc: 0.9306 - val_loss: 0.2760 - val_acc: 0.8909
    Epoch 5/14
    59/59 [==============================] - 1s 19ms/step - loss: 0.1633 - acc: 0.9453 - val_loss: 0.2777 - val_acc: 0.8901
    Epoch 6/14
    59/59 [==============================] - 1s 20ms/step - loss: 0.1299 - acc: 0.9572 - val_loss: 0.2966 - val_acc: 0.8872
    Epoch 7/14
    59/59 [==============================] - 1s 19ms/step - loss: 0.1063 - acc: 0.9666 - val_loss: 0.3203 - val_acc: 0.8822
    Epoch 8/14
    59/59 [==============================] - 1s 20ms/step - loss: 0.0859 - acc: 0.9749 - val_loss: 0.3424 - val_acc: 0.8819
    Epoch 9/14
    59/59 [==============================] - 1s 20ms/step - loss: 0.0703 - acc: 0.9799 - val_loss: 0.3661 - val_acc: 0.8810
    Epoch 10/14
    59/59 [==============================] - 1s 20ms/step - loss: 0.0569 - acc: 0.9843 - val_loss: 0.4131 - val_acc: 0.8764
    Epoch 11/14
    59/59 [==============================] - 1s 20ms/step - loss: 0.0452 - acc: 0.9892 - val_loss: 0.4342 - val_acc: 0.8778
    Epoch 12/14
    59/59 [==============================] - 1s 21ms/step - loss: 0.0357 - acc: 0.9920 - val_loss: 0.4751 - val_acc: 0.8756
    Epoch 13/14
    59/59 [==============================] - 1s 20ms/step - loss: 0.0273 - acc: 0.9945 - val_loss: 0.5394 - val_acc: 0.8685
    Epoch 14/14
    59/59 [==============================] - 1s 21ms/step - loss: 0.0205 - acc: 0.9963 - val_loss: 0.5765 - val_acc: 0.8701
    782/782 [==============================] - 2s 2ms/step - loss: 0.6480 - acc: 0.8533
    [0.6479699015617371, 0.8532800078392029]
```

```
import matplotlib.pyplot as plt
history_dict = history.history
loss_values = history_dict['loss']
val_loss_values = history_dict['val_loss']
epochs = range(1, len(loss_values) + 1)
plt.plot(epochs, loss_values, 'bo', label='Training loss')
plt.plot(epochs, val_loss_values, 'b', label='Validation loss')
plt.title('Training and validation loss')
plt.xlabel('Epochs')
plt.ylabel('Loss')
plt.legend()
plt.show()
```




```
plt.clf()
acc = history_dict['acc']
val_acc = history_dict['val_acc']
plt.plot(epochs, acc, 'bo', label='Training acc')
plt.plot(epochs, val_acc, 'b', label='Validation acc')
plt.title('Training and validation accuracy')
plt.xlabel('Epochs')
plt.ylabel('Accuracy')
plt.legend()
plt.show()
```