```
from keras.datasets import imdb
import numpy as np

vocabulary_size = 5000
(X_train, y_train), (X_test, y_test) =
imdb.load_data(num_words=vocabulary_size)
print('Loaded dataset with {} training samples, {} test
samples'.format(len(X_train), len(X_test)))

print('---review---')
print(X_train[6])
print('---label---')
print(y_train[6])

word2id = imdb.get_word_index()
id2word = {i: word for word, i in word2id.items()}
print('---review with words---')
print([id2word.get(i, '') for i in X_train[6]])
print('---label---')
print(y_train[6])

print('Maximum review length: {}'.format(
    len(max((X_train + X_test), key=len))))
print('Minimum review length: {}'.format(
    len(min((X_test + X_test), key=len))))

from keras.preprocessing import sequence
max_words = 500
X_train = sequence.pad_sequences(X_train, maxlen=max_words)
X_test = sequence.pad_sequences(X_test, maxlen=max_words)

from keras.models import Sequential
from keras.layers import Embedding, LSTM, Dense

embedding_size = 32
model = Sequential()
model.add(Embedding(vocabulary_size, embedding_size,
input_length=max_words))
model.add(LSTM(100))
model.add(Dense(1, activation='sigmoid'))
print(model.summary())

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

batch_size = 64
num_epochs = 3
X_valid, y_valid = X_train[:batch_size], y_train[:batch_size]
X_train2, y_train2 = X_train[batch_size:], y_train[batch_size:]
model.fit(X_train2, y_train2,
          validation_data=(X_valid, y_valid),
          batch_size=batch_size, epochs=num_epochs)
```

```python
scores = model.evaluate(X_test, y_test, verbose=0)
print('Test accuracy:', scores[1])
```

```
Loaded dataset with 25000 training samples, 25000 test samples
---review---
[1, 2, 365, 1234, 5, 1156, 354, 11, 14, 2, 2, 7, 1016, 2, 2, 356,
44, 4, 1349, 500, 746, 5, 200, 4, 4132, 11, 2, 2, 1117, 1831, 2, 5,
4831, 26, 6, 2, 4183, 17, 369, 37, 215, 1345, 143, 2, 5, 1838, 8,
1974, 15, 36, 119, 257, 85, 52, 486, 9, 6, 2, 2, 63, 271, 6, 196,
96, 949, 4121, 4, 2, 7, 4, 2212, 2436, 819, 63, 47, 77, 2, 180, 6,
227, 11, 94, 2494, 2, 13, 423, 4, 168, 7, 4, 22, 5, 89, 665, 71,
270, 56, 5, 13, 197, 12, 161, 2, 99, 76, 23, 2, 7, 419, 665, 40, 91,
85, 108, 7, 4, 2084, 5, 4773, 81, 55, 52, 1901]
---label---
1
---review with words---
['the', 'and', 'full', 'involving', 'to', 'impressive', 'boring',
'this', 'as', 'and', 'and', 'br', 'villain', 'and', 'and', 'need',
'has', 'of', 'costumes', 'b', 'message', 'to', 'may', 'of', 'props',
'this', 'and', 'and', 'concept', 'issue', 'and', 'to', "god's",
'he', 'is', 'and', 'unfolds', 'movie', 'women', 'like', "isn't",
'surely', "i'm", 'and', 'to', 'toward', 'in', "here's", 'for',
'from', 'did', 'having', 'because', 'very', 'quality', 'it', 'is',
'and', 'and', 'really', 'book', 'is', 'both', 'too', 'worked',
'carl', 'of', 'and', 'br', 'of', 'reviewer', 'closer', 'figure',
'really', 'there', 'will', 'and', 'things', 'is', 'far', 'this',
'make', 'mistakes', 'and', 'was', "couldn't", 'of', 'few', 'br',
'of', 'you', 'to', "don't", 'female', 'than', 'place', 'she', 'to',
'was', 'between', 'that', 'nothing', 'and', 'movies', 'get', 'are',
'and', 'br', 'yes', 'female', 'just', 'its', 'because', 'many',
'br', 'of', 'overly', 'to', 'descent', 'people', 'time', 'very',
'bland']
---label---
1
Maximum review length: 2697
Minimum review length: 14

Model: "sequential_1"

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━━━━━━━┓
┃ Layer (type)                    ┃ Output Shape           ┃
Param # ┃
┡━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━
━━━━━━━┩
│ embedding_1 (Embedding)         │ ?                      │    0
(unbuilt) │
├─────────────────────────────────┼────────────────────────┼────────
───────┤
│ lstm_1 (LSTM)                   │ ?                      │    0
(unbuilt) │
├─────────────────────────────────┼────────────────────────┼────────
───────┤
│ dense_1 (Dense)                 │ ?                      │    0
```

```
(unbuilt) │
└─────────────────────────────────┴────────────────────────┴────────
───────┘

 Total params: 0 (0.00 B)

 Trainable params: 0 (0.00 B)

 Non-trainable params: 0 (0.00 B)

None
Epoch 1/3
390/390 ━━━━━━━━━━━━━━━━━━━━ 84s 214ms/step - accuracy: 0.6745 -
loss: 0.5822 - val_accuracy: 0.8750 - val_loss: 0.3032
Epoch 2/3
390/390 ━━━━━━━━━━━━━━━━━━━━ 87s 223ms/step - accuracy: 0.8619 -
loss: 0.3349 - val_accuracy: 0.9219 - val_loss: 0.2043
Epoch 3/3
390/390 ━━━━━━━━━━━━━━━━━━━━ 85s 219ms/step - accuracy: 0.8925 -
loss: 0.2710 - val_accuracy: 0.9531 - val_loss: 0.2025
Test accuracy: 0.8650400042533875
```