1) بررسی دیتاست نظرات کاربران سایت IMDB

In [2]:
```
import numpy
from keras.datasets import imdb
from matplotlib import pyplot
# load the dataset
(X_train, y_train), (X_test, y_test) = imdb.load_data()
X = numpy.concatenate((X_train, X_test), axis=0)
y = numpy.concatenate((y_train, y_test), axis=0)
```

```
Using TensorFlow backend.
```

In [3]:
```
# خلاصه کردن اندازه رکوردها
print("Training data: ")
print(X.shape)
print(y.shape)
```

```
Training data:
(50000,)
(50000,)
```

In [4]:
```
# مشخص کردن تعداد کلاس ها
print("Classes: ")
print(numpy.unique(y))
```

```
Classes:
[0 1]
```

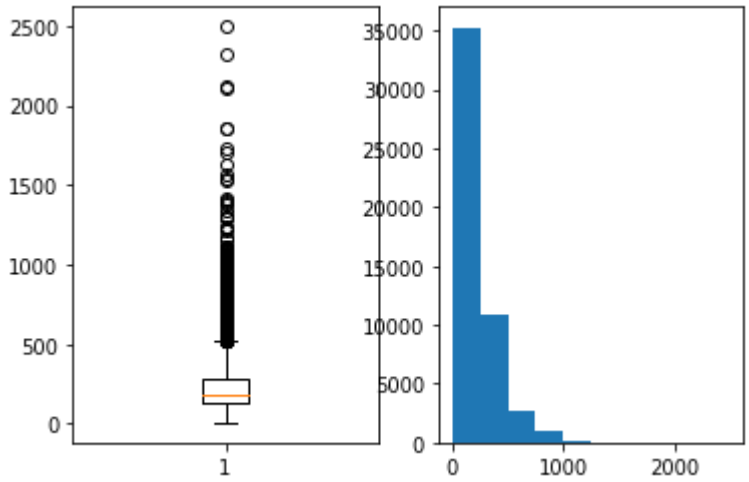
In [5]:
```
# مشخص کردن تعداد لغات منحصر بفرد
print("Number of words: ")
print(len(numpy.unique(numpy.hstack(X))))
```

```
Number of words:
88585
```

میانگین طول نظرات (از چند واژه در هر نظر استفاده شده است)

In [10]:
```
# محاسبه میانگین و انحراف استاندارد نظرات
print("Review length: ")
result = [len(x) for x in X]
print("Mean %.2f words (%f)" % (numpy.mean(result), numpy.std(result)))
# رسم طول نظرات با نمودارهای جعبه ای و هیستاگرام
pyplot.subplot(121)
pyplot.boxplot(result)
pyplot.subplot(122)
pyplot.hist(result)
pyplot.show()
```

```
Review length:
Mean 234.76 words (172.911495)
```



2) ساخت مدل شبکه عصبی MLP

In [11]:
```
import numpy
from keras.datasets import imdb
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Flatten
from keras.layers.embeddings import Embedding
from keras.preprocessing import sequence
```

In [12]:
```
seed = 7
numpy.random.seed(seed)
```

In [14]:
```
#Only Load the Top 5,000 words in the IMDB Review.
imdb.load_data(num_words=5000)
```

Out[14]:
```
((array([list([1, 14, 22, 16, 43, 530, 973, 1622, 1385, 65, 458, 4468, 66, 39
41, 4, 173, 36, 256, 5, 25, 100, 43, 838, 112, 50, 670, 2, 9, 35, 480, 284,
5, 150, 4, 172, 112, 167, 2, 336, 385, 39, 4, 172, 4536, 1111, 17, 546, 38, 1
3, 447, 4, 192, 50, 16, 6, 147, 2025, 19, 14, 22, 4, 1920, 4613, 469, 4, 22,
71, 87, 12, 16, 43, 530, 38, 76, 15, 13, 1247, 4, 22, 17, 515, 17, 12, 16, 62
6, 18, 2, 5, 62, 386, 12, 8, 316, 8, 106, 5, 4, 2223, 2, 16, 480, 66, 3785, 3
3, 4, 130, 12, 16, 38, 619, 5, 25, 124, 51, 36, 135, 48, 25, 1415, 33, 6, 22,
12, 215, 28, 77, 52, 5, 14, 407, 16, 82, 2, 8, 4, 107, 117, 2, 15, 256, 4, 2,
7, 3766, 5, 723, 36, 71, 43, 530, 476, 26, 400, 317, 46, 7, 4, 2, 1029, 13, 1
04, 88, 4, 381, 15, 297, 98, 32, 2071, 56, 26, 141, 6, 194, 2, 18, 4, 226, 2
2, 21, 134, 476, 26, 480, 5, 144, 30, 2, 18, 51, 36, 28, 224, 92, 25, 104, 4,
226, 65, 16, 38, 1334, 88, 12, 16, 283, 5, 16, 4472, 113, 103, 32, 15, 16, 2,
19, 178, 32]),
        list([1, 194, 1153, 194, 2, 78, 228, 5, 6, 1463, 4369, 2, 134, 26,
4, 715, 8, 118, 1634, 14, 394, 20, 13, 119, 954, 189, 102, 5, 207, 110, 3103,
21, 14, 69, 188, 8, 30, 23, 7, 4, 249, 126, 93, 4, 114, 9, 2300, 1523, 5, 64
7, 4, 116, 9, 35, 2, 4, 229, 9, 340, 1322, 4, 118, 9, 4, 130, 4901, 19, 4, 10
02, 5, 89, 29, 952, 46, 37, 4, 455, 9, 45, 43, 38, 1543, 1905, 398, 4, 1649,
26, 2, 5, 163, 11, 3215, 2, 4, 1153, 9, 194, 775, 7, 2, 2, 349, 2637, 148, 60
```

use the Keras utility to truncate or pad the dataset to a length of 500 for each observation using the sequence.pad sequences() function

In [15]:
```
X_train = sequence.pad_sequences(X_train, maxlen=500)
X_test = sequence.pad_sequences(X_test, maxlen=500)
```

In [16]:
```
#The output of this first layer would be a matrix with the size 32 * 500 for
Embedding(5000, 32, input_length=500)
```

Out[16]:
```
<keras.layers.embeddings.Embedding at 0x14062fc79b0>
```

In [17]:

```
# استفاده از MLP برای حل مسئله IMDB
import numpy
from keras.datasets import imdb
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Flatten
from keras.layers.embeddings import Embedding
from keras.preprocessing import sequence

# برای حفظ اعتبار مدل
seed = 7
numpy.random.seed(seed)

# با کار واژگان برتر
top_words = 5000
(X_train, y_train), (X_test, y_test) = imdb.load_data(nb_words=top_words)
max_words = 500
X_train = sequence.pad_sequences(X_train, maxlen=max_words)
X_test = sequence.pad_sequences(X_test, maxlen=max_words)
# create the model
model = Sequential()
model.add(Embedding(top_words, 32, input_length=max_words))
model.add(Flatten())
model.add(Dense(250, activation= 'relu' ))
model.add(Dense(1, activation= 'sigmoid' ))
model.compile(loss= 'binary_crossentropy' , optimizer= 'adam' , metrics=[ 'a
print(model.summary())
# Fit the model
model.fit(X_train, y_train, validation_data=(X_test, y_test), epochs=2, batc
verbose=1)
# Final evaluation of the model
scores = model.evaluate(X_test, y_test, verbose=0)
print("Accuracy: %.2f%%" % (scores[1]*100))
```

```
WARNING:tensorflow:From C:\Users\ShahinN\Anaconda3\lib\site-packages\tensorfl
ow\python\ops\nn_impl.py:180: add_dispatch_support.<locals>.wrapper (from ten
sorflow.python.ops.array_ops) is deprecated and will be removed in a future v
ersion.
Instructions for updating:
Use tf.where in 2.0, which has the same broadcast rule as np.where
Model: "sequential_1"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
embedding_2 (Embedding)      (None, 500, 32)           160000
_________________________________________________________________
flatten_1 (Flatten)          (None, 16000)             0
_________________________________________________________________
dense_1 (Dense)              (None, 250)               4000250
_________________________________________________________________
dense_2 (Dense)              (None, 1)                 251
=================================================================
Total params: 4,160,501
Trainable params: 4,160,501
Non-trainable params: 0
```

```
_________________________________________________________________
None
WARNING:tensorflow:From C:\Users\ShahinN\Anaconda3\lib\site-packages\keras\ba
ckend\tensorflow_backend.py:422: The name tf.global_variables is deprecated.
Please use tf.compat.v1.global_variables instead.

Train on 25000 samples, validate on 25000 samples
Epoch 1/2
25000/25000 [==============================] - 48s 2ms/step - loss: 0.5019 -
accuracy: 0.7175 - val_loss: 0.2940 - val_accuracy: 0.8743
Epoch 2/2
25000/25000 [==============================] - 39s 2ms/step - loss: 0.1815 -
accuracy: 0.9310 - val_loss: 0.3318 - val_accuracy: 0.8575
Accuracy: 85.75%
```

ساخت مدل شبکه عصبی کانولوشنی یک بعدی

In [1]:
```
# CNN for the IMDB problem
import numpy
from keras.datasets import imdb
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Flatten
from keras.layers.convolutional import Convolution1D
from keras.layers.convolutional import MaxPooling1D
from keras.layers.embeddings import Embedding
from keras.preprocessing import sequence
```

```
Using TensorFlow backend.
```

Load, Split and Pad IMDB Dataset

In [2]:
```
# load the dataset but only keep the top n words, zero the rest
top_words = 5000
test_split = 0.33
(X_train, y_train), (X_test, y_test) = imdb.load_data(nb_words=top_words)
# pad dataset to a maximum review length in words
max_words = 500
X_train = sequence.pad_sequences(X_train, maxlen=max_words)
X_test = sequence.pad_sequences(X_test, maxlen=max_words)
```

```
C:\Users\ShahinN\Anaconda3\lib\site-packages\keras\datasets\imdb.py:49: UserWar
ning: The `nb_words` argument in `load_data` has been renamed `num_words`.
  warnings.warn('The `nb_words` argument in `load_data` '

Downloading data from https://s3.amazonaws.com/text-datasets/imdb.npz (https://
s3.amazonaws.com/text-datasets/imdb.npz)
17465344/17464789 [==============================] - 324s 19us/step
```

In [4]:

```
# create the model
model = Sequential()
model.add(Embedding(top_words, 32, input_length= max_words))
model.add(Convolution1D(nb_filter=32, filter_length=3, border_mode= 'same' ,
            activation= 'relu' ))
model.add(MaxPooling1D(pool_length=2))
model.add(Flatten())
model.add(Dense(250, activation= 'relu' ))
model.add(Dense(1, activation= 'sigmoid' ))
```

```
WARNING:tensorflow:From C:\Users\ShahinN\Anaconda3\lib\site-packages\keras\back
end\tensorflow_backend.py:4070: The name tf.nn.max_pool is deprecated. Please u
se tf.nn.max_pool2d instead.


C:\Users\ShahinN\Anaconda3\lib\site-packages\ipykernel_launcher.py:5: UserWarni
ng: Update your `Conv1D` call to the Keras 2 API: `Conv1D(activation="relu", fi
lters=32, kernel_size=3, padding="same")`
  """
C:\Users\ShahinN\Anaconda3\lib\site-packages\ipykernel_launcher.py:6: UserWarni
ng: Update your `MaxPooling1D` call to the Keras 2 API: `MaxPooling1D(pool_size
=2)`
```

In [6]:
```
model.compile(loss= 'binary_crossentropy' , optimizer= 'adam' , metrics=['ac
print(model.summary())
```

```
WARNING:tensorflow:From C:\Users\ShahinN\Anaconda3\lib\site-packages\tensorflow
\python\ops\nn_impl.py:180: add_dispatch_support.<locals>.wrapper (from tensorf
low.python.ops.array_ops) is deprecated and will be removed in a future versio
n.
Instructions for updating:
Use tf.where in 2.0, which has the same broadcast rule as np.where
Model: "sequential_2"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
embedding_2 (Embedding)      (None, 500, 32)           160000
_________________________________________________________________
conv1d_1 (Conv1D)            (None, 500, 32)           3104
_________________________________________________________________
max_pooling1d_1 (MaxPooling1 (None, 250, 32)           0
_________________________________________________________________
flatten_1 (Flatten)          (None, 8000)              0
_________________________________________________________________
dense_1 (Dense)              (None, 250)               2000250
_________________________________________________________________
dense_2 (Dense)              (None, 1)                 251
=================================================================
Total params: 2,163,605
Trainable params: 2,163,605
Non-trainable params: 0
_________________________________________________________________
None
```

In [7]:
```
# Fit the model
model.fit(X_train, y_train, validation_data=(X_test, y_test), epochs=2, batc
            verbose=1)
```

```
WARNING:tensorflow:From C:\Users\ShahinN\Anaconda3\lib\site-packages\keras\back
end\tensorflow_backend.py:422: The name tf.global_variables is deprecated. Plea
se use tf.compat.v1.global_variables instead.

Train on 25000 samples, validate on 25000 samples
Epoch 1/2
25000/25000 [==============================] - 133s 5ms/step - loss: 0.4304 - a
ccuracy: 0.7744 - val_loss: 0.2730 - val_accuracy: 0.8852
Epoch 2/2
25000/25000 [==============================] - 147s 6ms/step - loss: 0.2033 - a
ccuracy: 0.9224 - val_loss: 0.2690 - val_accuracy: 0.8876
```

Out[7]:
```
<keras.callbacks.callbacks.History at 0x1f09b299668>
```

In [10]:
```
#Final evaluation of the model
scores = model.evaluate(X_test, y_test, verbose=0)
print("Accuracy: %.2f%%" % (scores[1]*100))
```

```
Accuracy: 88.76%
```

In [ ]:
```
1
```