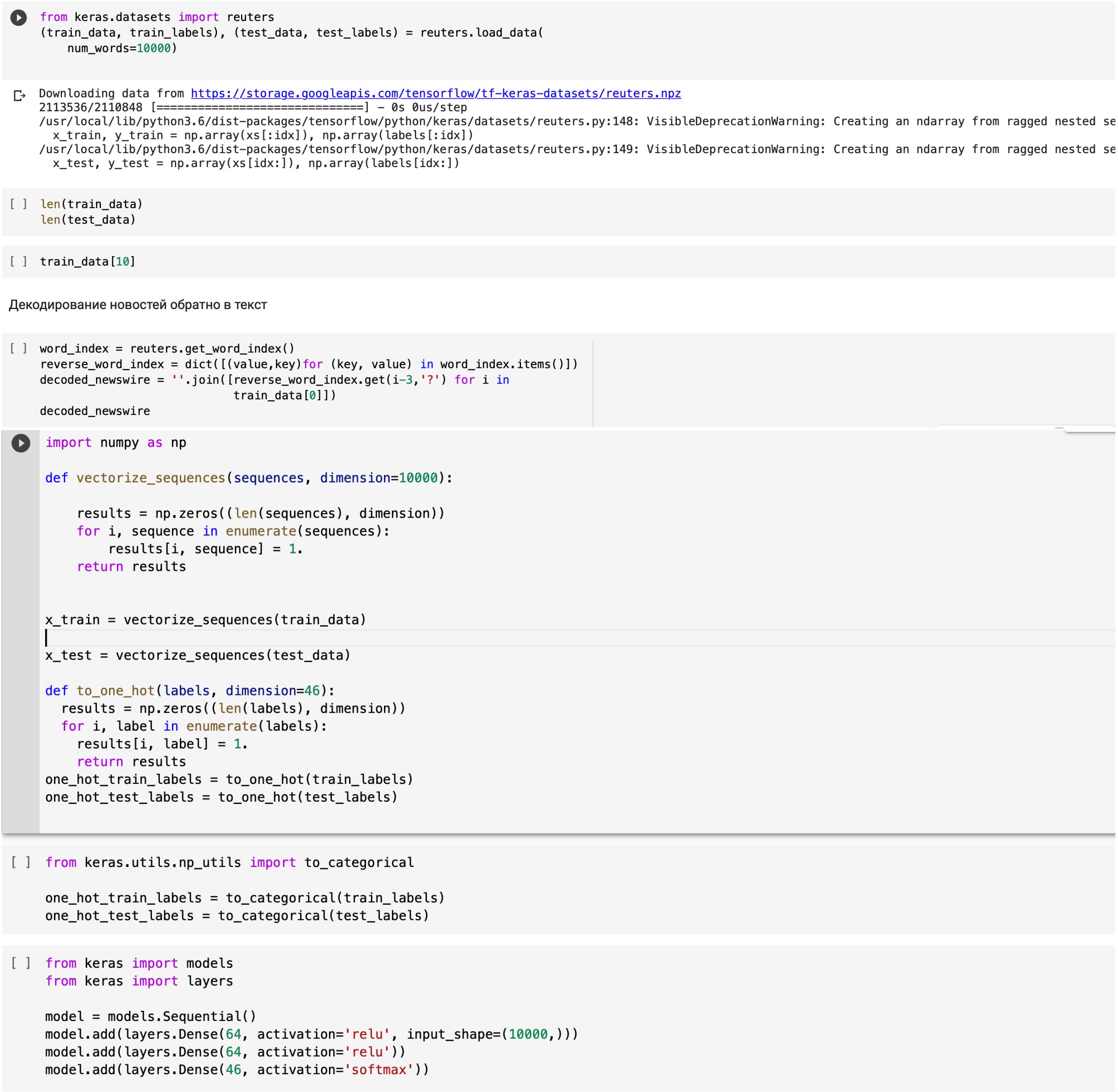


```
from keras.datasets import reuters
(train_data, train_labels), (test_data, test_labels) = reuters.load_data(
    num_words=10000)
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/reuters.npz
2113536/2110848 [==============================] - 0s 0us/step
/usr/local/lib/python3.6/dist-packages/tensorflow/python/keras/datasets/reuters.py:148: VisibleDeprecationWarning: Creating an ndarray from ragged nested se
  x_train, y_train = np.array(xs[:idx]), np.array(labels[:idx])
/usr/local/lib/python3.6/dist-packages/tensorflow/python/keras/datasets/reuters.py:149: VisibleDeprecationWarning: Creating an ndarray from ragged nested se
  x_test, y_test = np.array(xs[idx:]), np.array(labels[idx:])
```

```
len(train_data)
len(test_data)
```

```
train_data[10]
```

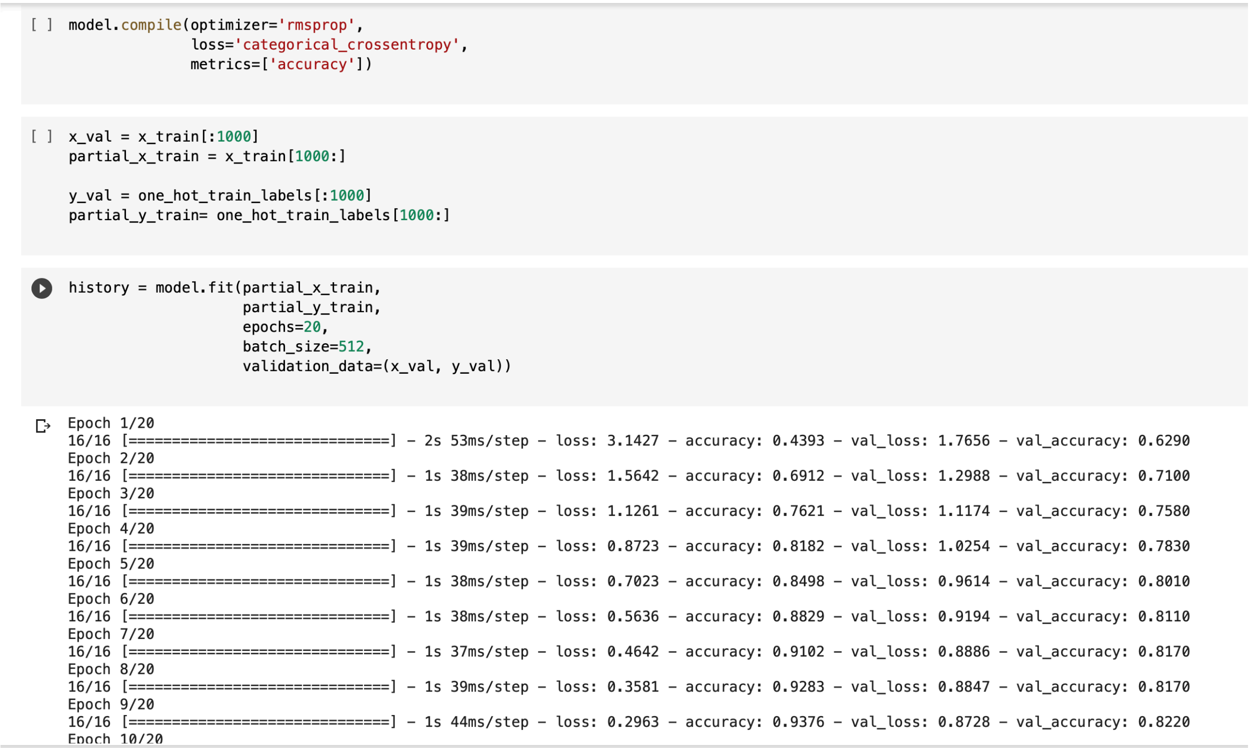
Декодирование новостей обратно в текст

```
word_index = reuters.get_word_index()
reverse_word_index = dict([(value,key)for (key, value) in word_index.items()])
decoded_newswire = ''.join([reverse_word_index.get(i-3,'?') for i in
                            train_data[0]])
decoded_newswire
```

```
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)

def to_one_hot(labels, dimension=46):
  results = np.zeros((len(labels), dimension))
  for i, label in enumerate(labels):
    results[i, label] = 1.
    return results
one_hot_train_labels = to_one_hot(train_labels)
one_hot_test_labels = to_one_hot(test_labels)
```

```
from keras.utils.np_utils import to_categorical

one_hot_train_labels = to_categorical(train_labels)
one_hot_test_labels = to_categorical(test_labels)
```

```
from keras import models
from keras import layers

model = models.Sequential()
model.add(layers.Dense(64, activation='relu', input_shape=(10000,)))
model.add(layers.Dense(64, activation='relu'))
model.add(layers.Dense(46, activation='softmax'))
```

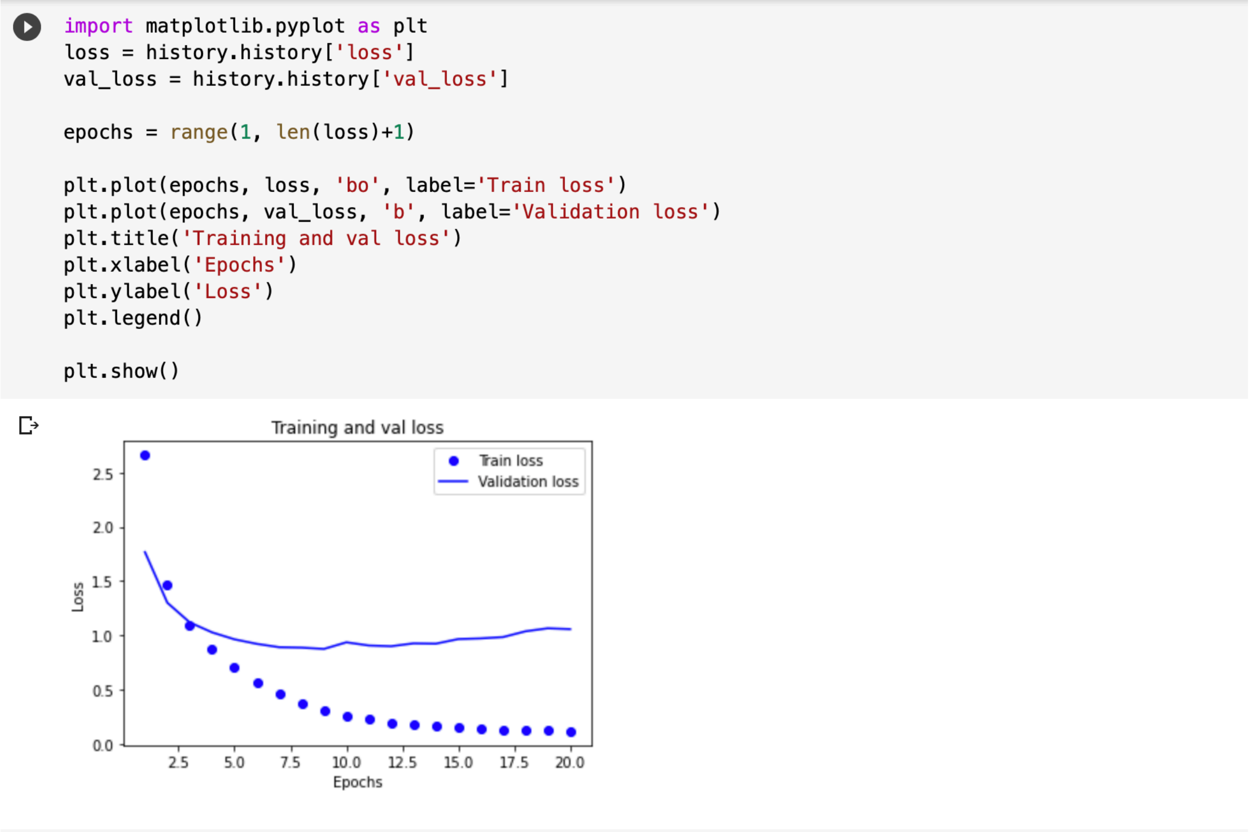


```
[ ] model.compile(optimizer='rmsprop',
                  loss='categorical_crossentropy',
                  metrics=['accuracy'])
```

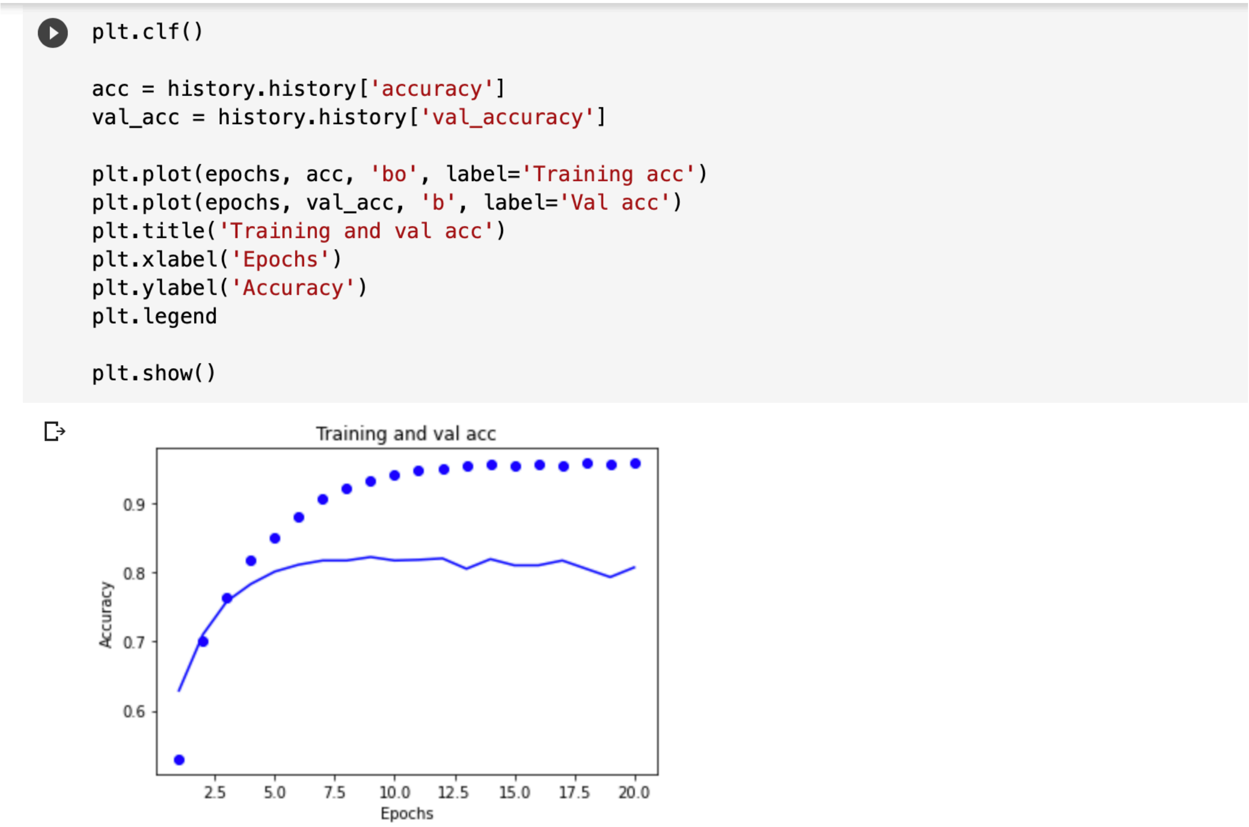
```
[ ] x_val = x_train[:1000]
    partial_x_train = x_train[1000:]

    y_val = one_hot_train_labels[:1000]
    partial_y_train= one_hot_train_labels[1000:]
```

```
history = model.fit(partial_x_train,
                    partial_y_train,
                    epochs=20,
                    batch_size=512,
                    validation_data=(x_val, y_val))
```

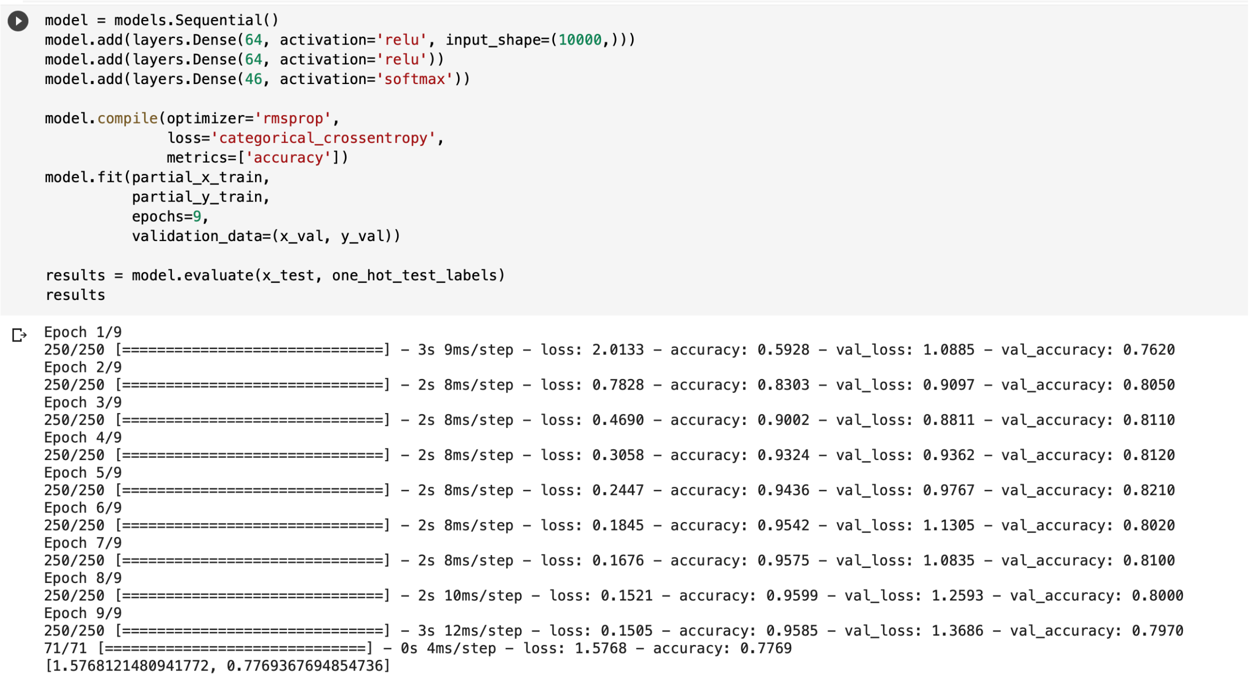
```
Epoch 1/20
16/16 [==============================] - 2s 53ms/step - loss: 3.1427 - accuracy: 0.4393 - val_loss: 1.7656 - val_accuracy: 0.6290
Epoch 2/20
16/16 [==============================] - 1s 38ms/step - loss: 1.5642 - accuracy: 0.6912 - val_loss: 1.2988 - val_accuracy: 0.7100
Epoch 3/20
16/16 [==============================] - 1s 39ms/step - loss: 1.1261 - accuracy: 0.7621 - val_loss: 1.1174 - val_accuracy: 0.7580
Epoch 4/20
16/16 [==============================] - 1s 39ms/step - loss: 0.8723 - accuracy: 0.8182 - val_loss: 1.0254 - val_accuracy: 0.7830
Epoch 5/20
16/16 [==============================] - 1s 38ms/step - loss: 0.7023 - accuracy: 0.8498 - val_loss: 0.9614 - val_accuracy: 0.8010
Epoch 6/20
16/16 [==============================] - 1s 38ms/step - loss: 0.5636 - accuracy: 0.8829 - val_loss: 0.9194 - val_accuracy: 0.8110
Epoch 7/20
16/16 [==============================] - 1s 37ms/step - loss: 0.4642 - accuracy: 0.9102 - val_loss: 0.8886 - val_accuracy: 0.8170
Epoch 8/20
16/16 [==============================] - 1s 39ms/step - loss: 0.3581 - accuracy: 0.9283 - val_loss: 0.8847 - val_accuracy: 0.8170
Epoch 9/20
16/16 [==============================] - 1s 44ms/step - loss: 0.2963 - accuracy: 0.9376 - val_loss: 0.8728 - val_accuracy: 0.8220
Epoch 10/20
```



```
import matplotlib.pyplot as plt
loss = history.history['loss']
val_loss = history.history['val_loss']

epochs = range(1, len(loss)+1)

plt.plot(epochs, loss, 'bo', label='Train loss')
plt.plot(epochs, val_loss, 'b', label='Validation loss')
plt.title('Training and val loss')
plt.xlabel('Epochs')
plt.ylabel('Loss')
plt.legend()

plt.show()
```



```
plt.clf()

acc = history.history['accuracy']
val_acc = history.history['val_accuracy']

plt.plot(epochs, acc, 'bo', label='Training acc')
plt.plot(epochs, val_acc, 'b', label='Val acc')
plt.title('Training and val acc')
plt.xlabel('Epochs')
plt.ylabel('Accuracy')
plt.legend

plt.show()
```



```
model = models.Sequential()
model.add(layers.Dense(64, activation='relu', input_shape=(10000,)))
model.add(layers.Dense(64, activation='relu'))
model.add(layers.Dense(46, activation='softmax'))

model.compile(optimizer='rmsprop',
              loss='categorical_crossentropy',
              metrics=['accuracy'])
model.fit(partial_x_train,
          partial_y_train,
          epochs=9,
          validation_data=(x_val, y_val))

results = model.evaluate(x_test, one_hot_test_labels)
results
```

```
Epoch 1/9
250/250 [==============================] - 3s 9ms/step - loss: 2.0133 - accuracy: 0.5928 - val_loss: 1.0885 - val_accuracy: 0.7620
Epoch 2/9
250/250 [==============================] - 2s 8ms/step - loss: 0.7828 - accuracy: 0.8303 - val_loss: 0.9097 - val_accuracy: 0.8050
Epoch 3/9
250/250 [==============================] - 2s 8ms/step - loss: 0.4690 - accuracy: 0.9002 - val_loss: 0.8811 - val_accuracy: 0.8110
Epoch 4/9
250/250 [==============================] - 2s 8ms/step - loss: 0.3058 - accuracy: 0.9324 - val_loss: 0.9362 - val_accuracy: 0.8120
Epoch 5/9
250/250 [==============================] - 2s 8ms/step - loss: 0.2447 - accuracy: 0.9436 - val_loss: 0.9767 - val_accuracy: 0.8210
Epoch 6/9
250/250 [==============================] - 2s 8ms/step - loss: 0.1845 - accuracy: 0.9542 - val_loss: 1.1305 - val_accuracy: 0.8020
Epoch 7/9
250/250 [==============================] - 2s 8ms/step - loss: 0.1676 - accuracy: 0.9575 - val_loss: 1.0835 - val_accuracy: 0.8100
Epoch 8/9
250/250 [==============================] - 2s 10ms/step - loss: 0.1521 - accuracy: 0.9599 - val_loss: 1.2593 - val_accuracy: 0.8000
Epoch 9/9
250/250 [==============================] - 3s 12ms/step - loss: 0.1505 - accuracy: 0.9585 - val_loss: 1.3686 - val_accuracy: 0.7970
71/71 [==============================] - 0s 4ms/step - loss: 1.5768 - accuracy: 0.7769
[1.5768121480941772, 0.7769367694854736]
```