

```
from keras.datasets import mnist

data = mnist.load_data()
```

Double-click (or enter) to edit

Double-click (or enter) to edit

```
((x_train, y_train), (x_test, y_test)) = data
```

```
x_train = x_train.reshape((x_train.shape[0], 28*28)).astype('float32')
x_test = x_test.reshape((x_test.shape[0], 28*28)).astype('float32')
```

```
x_train = x_train / 255
x_test = x_test / 255
```

```
from keras.utils import np_utils
```

```
print(y_test.shape)
```

```
y_train = np_utils.to_categorical(y_train)
y_test = np_utils.to_categorical(y_test)
```

```
num_classes = y_test.shape[1]
print(y_test.shape)
```

```
(10000,)
(10000, 10)
```

```
from keras.models import Sequential
from keras.layers import Dense
```

```
model = Sequential()
model.add(Dense(32, input_dim=28*28, activation='relu'))
model.add(Dense(64, activation='relu'))
model.add(Dense(10, activation='softmax'))
```

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

```
model.summary()
```

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
dense_3 (Dense)	(None, 32)	25120
dense_4 (Dense)	(None, 64)	2112

dense_5 (Dense)	(None, 10)	650
=====		
Total params: 27,882		
Trainable params: 27,882		
Non-trainable params: 0		
=====		

```
model.fit(x_train, y_train, epochs=10, batch_size=100)
```

```

 1/10
500 [=====] - 2s 3ms/step - loss: 0.7476 - accuracy: 0.7950
 2/10
500 [=====] - 2s 3ms/step - loss: 0.2069 - accuracy: 0.9409
 3/10
500 [=====] - 2s 3ms/step - loss: 0.1555 - accuracy: 0.9548
 4/10
500 [=====] - 2s 3ms/step - loss: 0.1279 - accuracy: 0.9631
 5/10
500 [=====] - 2s 3ms/step - loss: 0.1076 - accuracy: 0.9680
 6/10
500 [=====] - 2s 3ms/step - loss: 0.0943 - accuracy: 0.9720
 7/10
500 [=====] - 1s 2ms/step - loss: 0.0853 - accuracy: 0.9746
 8/10
500 [=====] - 1s 2ms/step - loss: 0.0758 - accuracy: 0.9771
 9/10
500 [=====] - 1s 2ms/step - loss: 0.0693 - accuracy: 0.9787
10/10
500 [=====] - 1s 2ms/step - loss: 0.0621 - accuracy: 0.9815
sorflow.python.keras.callbacks.History at 0x7f56fb618ad0>

```