

```
In [4]: import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

```
In [17]: import keras
```

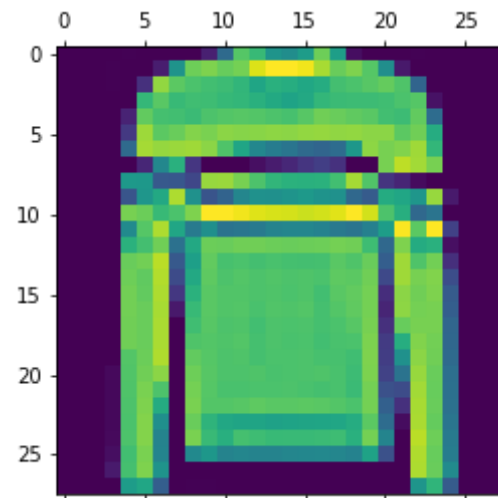
```
In [6]: keras.backend.backend()
```

```
Out[6]: 'tensorflow'
```

```
In [27]: from keras.datasets import fashion_mnist
(x_train,y_train), (x_test,y_test) = fashion_mnist.load_data()
```

```
In [37]: plt.matshow(x_train[5]) #individual image
```

```
Out[37]: <matplotlib.image.AxesImage at 0x2b2d413db88>
```



```
In [38]: y_train[5]
```

```
Out[38]: 2
```

```
In [39]: x_train=x_train/255
x_test=x_test/255
```

```
In [40]: x_train[0]
```

[illegible]

```

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```
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0.          , 0.          , 0.          ],
0.          , 0.          , 0.          ]]

```

```
In [57]: from keras.models import Sequential
from keras.layers import Dense, Activation, Flatten
```

```
In [58]: model = Sequential()
```

```
In [59]: model.add(Flatten(input_shape=[28,28]))
model.add(Dense(200,activation='relu'))
model.add(Dense(10,activation='softmax'))
```

```
In [60]: model.summary()
```

Model: "sequential_2"

Layer (type)	Output Shape	Param #
=====		
flatten_3 (Flatten)	(None, 784)	0
=====		
dense_3 (Dense)	(None, 200)	157000

dense_4 (Dense)	(None, 10)	2010
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```

Total params: 159,010
Trainable params: 159,010
Non-trainable params: 0

```

```
In [61]: model.compile(loss="sparse_categorical_crossentropy",
                      optimizer = "adam",
                      metrics=["accuracy"])
```

```
In [62]: model.fit(x_train,y_train,epochs=5)
```

```

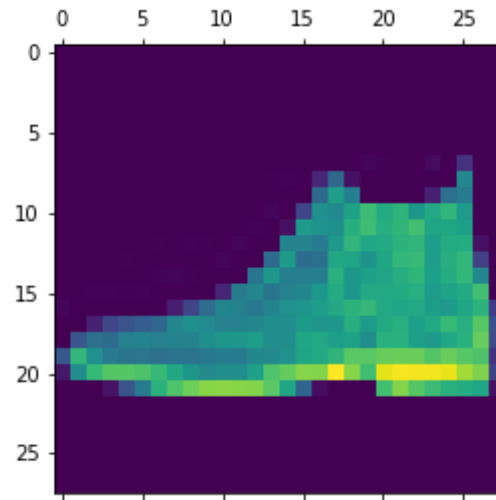
Epoch 1/5
60000/60000 [=====] - 12s 197us/step - loss:
0.4825 - accuracy: 0.8306
Epoch 2/5
60000/60000 [=====] - 13s 210us/step - loss:
0.3646 - accuracy: 0.8668
Epoch 3/5
60000/60000 [=====] - 9s 158us/step - loss: 0.
3283 - accuracy: 0.8795
Epoch 4/5
60000/60000 [=====] - 11s 176us/step - loss:
0.3042 - accuracy: 0.8873
Epoch 5/5
60000/60000 [=====] - 11s 187us/step - loss:
0.2851 - accuracy: 0.8942

```

```
Out[62]: <keras.callbacks.callbacks.History at 0x2b2d955f388>
```

```
In [63]: plt.matshow(x_test[0])
```

```
Out[63]: <matplotlib.image.AxesImage at 0x2b2c5dc8408>
```



```
In [64]: x_test.shape
```

```
Out[64]: (10000, 28, 28)
```

```
In [65]: yp = model.predict(x_test)
```

```
In [66]: yp[2]
```

```
Out[66]: array([1.89599092e-08, 1.00000000e+00, 1.12178405e-10, 1.50246642e-08,  
                5.64692577e-08, 2.04532788e-13, 3.72542330e-10, 8.12807787e-17,  
                2.99277658e-10, 9.04221118e-16], dtype=float32)
```

```
In [67]: np.argmax(yp[2])
```

```
Out[67]: 1
```

```
In [68]: model.evaluate(x_test,y_test)
```

```
10000/10000 [=====] - 0s 48us/step
```

```
Out[68]: [0.3363270444869995, 0.8779000043869019]
```