```
from sklearn.datasets import fetch_openml
mnist= fetch_openml('mnist_784')
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/datasets/_openml.py:968: FutureWarning: The default value of `parser` wi
  warn(
```

```
x,y= mnist['data'], mnist['target']
```

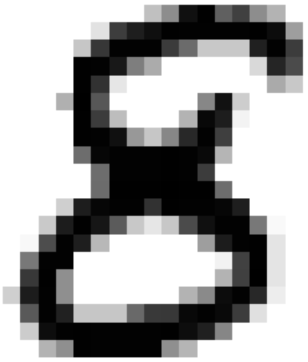
```
x.shape
```

```
(70000, 784)
```

```
%matplotlib inline
import matplotlib
import matplotlib.pyplot as plt
```

```
some_digit= x.loc[3601]
some_digit_image= some_digit.values.reshape(28,28)
```

```
plt.imshow(some_digit_image, cmap=matplotlib.cm.binary, interpolation='nearest')
plt.axis('off')
plt.show()
```



```
y[36001]
```

```
'2'
```

```
x_train,x_test = x[:60000], x[60000:]
y_train, y_test = y[:60000], y[60000:]
```

```
import numpy as np
shuffle_index = np.random.permutation(60000)
x_train, y_train = x_train.iloc[shuffle_index], y_train.iloc[shuffle_index]
```

Creating 2 detector

```
y_train= y_train.astype(np.int8)
y_test= y_test.astype(np.int8)
y_train_2= (y_train==2)
y_test_2= (y_test==2)
y_test_2
```

```
60000    False
60001     True
60002    False
60003    False
60004    False
```

```
             ...
    69995     True
    69996    False
    69997    False
    69998    False
    69999    False
    Name: class, Length: 10000, dtype: bool
```

```
from sklearn.linear_model import LogisticRegression
clf= LogisticRegression(tol=0.09, solver='lbfgs')
clf.fit(x_train, y_train_2)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/linear_model/_logistic.py:458: ConvergenceWarning: lbfgs failed to conve
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression
  n_iter_i = _check_optimize_result(
▾     LogisticRegression
LogisticRegression(tol=0.09)
```

```
clf.predict([some_digit])
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439: UserWarning: X does not have valid feature names, but Logis
  warnings.warn(
array([False])
```

```
from sklearn.model_selection import cross_val_score
a=cross_val_score(clf, x_train, y_train_2, cv=3, scoring='accuracy')
a.mean()
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/linear_model/_logistic.py:458: ConvergenceWarning: lbfgs failed to conve
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    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression
  n_iter_i = _check_optimize_result(
0.9784
```

```
clf.score(x_test,y_test)
```

```
0.0979
```

Start coding or generate with AI.