```python
from sklearn import datasets
digits = datasets.load_digits()
```

```python
digits.images.shape
```

    (1797, 8, 8)

```python
import matplotlib.pyplot as plt
fig, axes = plt.subplots(10, 10, figsize=(8, 8),subplot_kw={'xticks':[], 'yticks':[]},gridspe
for i, ax in enumerate(axes.flat):
    ax.imshow(digits.images[i], cmap='binary', interpolation='nearest')
    ax.text(0.05, 0.05, str(digits.target[i]),transform=ax.transAxes, color='red')
```



```python
X = digits.data
X.shape
```

    (1797, 64)

```python
y=digits.target
y.shape
```

    (1797,)

```
from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = train_test_split(X, y,test_size=0.2,random_state=0)
X_train.shape
y_train.shape
```

```
(1437,)
```

```
from sklearn.tree import DecisionTreeClassifier
clf=DecisionTreeClassifier()
clf.fit(X_train,y_train)
```

```
DecisionTreeClassifier()
```

```
y_pred=clf.predict(X_test)
y_pred
```

```
array([2, 8, 2, 6, 6, 7, 1, 9, 8, 2, 2, 8, 6, 6, 6, 6, 4, 0, 5, 8, 8, 7,
       8, 4, 7, 5, 4, 9, 2, 9, 4, 7, 6, 8, 9, 6, 3, 1, 0, 1, 8, 6, 7, 7,
       1, 0, 7, 4, 2, 1, 9, 6, 7, 9, 9, 0, 7, 3, 6, 3, 0, 1, 3, 4, 8, 9,
       6, 6, 9, 1, 8, 3, 5, 1, 2, 8, 2, 2, 9, 7, 2, 3, 6, 0, 9, 3, 7, 5,
       1, 2, 0, 9, 3, 1, 5, 7, 1, 8, 5, 1, 5, 4, 2, 5, 9, 0, 7, 1, 4, 7,
       9, 4, 8, 9, 7, 9, 8, 0, 2, 5, 2, 5, 2, 4, 7, 7, 0, 6, 1, 5, 8, 3,
       9, 5, 9, 9, 8, 7, 5, 6, 3, 8, 6, 9, 6, 1, 5, 1, 5, 9, 9, 1, 3, 3,
       6, 1, 8, 9, 1, 7, 6, 7, 3, 5, 6, 0, 8, 1, 9, 3, 6, 1, 0, 4, 1, 6,
       3, 8, 6, 7, 4, 9, 6, 9, 9, 9, 3, 3, 0, 7, 7, 5, 7, 8, 0, 7, 8, 9,
       6, 4, 5, 0, 1, 4, 6, 4, 3, 3, 0, 9, 5, 5, 3, 3, 4, 6, 1, 6, 8, 9,
       9, 4, 9, 3, 7, 6, 2, 3, 3, 1, 6, 9, 3, 6, 3, 3, 2, 0, 7, 6, 1, 1,
       3, 7, 2, 7, 2, 5, 5, 7, 5, 2, 3, 7, 2, 7, 5, 5, 8, 0, 9, 1, 6, 5,
       8, 7, 4, 3, 8, 2, 3, 6, 4, 6, 3, 2, 6, 1, 8, 8, 4, 6, 7, 5, 2, 4,
       8, 3, 2, 4, 6, 9, 0, 5, 4, 3, 4, 6, 2, 9, 0, 1, 7, 2, 0, 9, 6, 5,
       4, 2, 0, 7, 9, 8, 5, 7, 8, 2, 8, 4, 3, 7, 2, 6, 9, 1, 5, 1, 0, 8,
       8, 3, 3, 5, 6, 2, 2, 7, 2, 1, 5, 1, 6, 4, 5, 0, 9, 4, 1, 1, 7, 0,
       8, 9, 0, 5, 4, 3, 8, 0])
```

```
from sklearn.metrics import accuracy_score
from sklearn import metrics
metrics.accuracy_score(y_test,y_pred)
```

```
0.8472222222222222
```

```
from sklearn.metrics import confusion_matrix
mat = confusion_matrix(y_test, y_pred)
mat
```

```
array([[23,  0,  1,  0,  0,  1,  0,  0,  0,  2],
       [ 0, 30,  0,  3,  1,  0,  0,  0,  1,  0],
       [ 1,  1, 27,  3,  0,  0,  2,  0,  1,  1],
       [ 0,  0,  0, 26,  0,  0,  0,  0,  0,  3],
```

```
       [ 1,  1,  0,  0, 26,  0,  1,  1,  0,  0],
       [ 0,  0,  1,  1,  1, 32,  0,  1,  2,  2],
       [ 0,  0,  1,  1,  1,  0, 41,  0,  0,  0],
       [ 0,  0,  0,  0,  0,  1,  0, 37,  1,  0],
       [ 1,  4,  3,  1,  0,  0,  0,  1, 29,  0],
       [ 1,  0,  0,  3,  0,  1,  0,  0,  2, 34]])
```

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