21BCE7371

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ML LAB ASSIGNMENT

SVM

```
import pandas as pd
from sklearn.svm import SVC
from sklearn.model_selection import train_test_split
from sklearn.datasets import load_digits
```

```
['DESCR', 'data', 'feature_names', 'frame', 'images', 'target', 'target_names']
```

+ Code + Markdown

```
digits.target_names
```

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

```
digits.target
```

```
array([0, 1, 2, ..., 8, 9, 8])
```

```
digits.data[0]
```

```
array([ 0.,  0.,  5., 13.,  9.,  1.,  0.,  0.,  0.,  0., 13., 15., 10.,
       15.,  5.,  0.,  0.,  3., 15.,  2.,  0., 11.,  8.,  0.,  0.,  4.,
       12.,  0.,  0.,  8.,  8.,  0.,  0.,  5.,  8.,  0.,  0.,  9.,  8.,
        0.,  0.,  4., 11.,  0.,  1., 12.,  7.,  0.,  0.,  2., 14.,  5.,
       10., 12.,  0.,  0.,  0.,  0.,  6., 13., 10.,  0.,  0.,  0.])
```

```
df = pd.DataFrame(digits.data, digits.target)
df.head()
```

	0	1	2	3	4	5	6	7	8	9	...	54	55	56	57	58	59	6
0	0.0	0.0	5.0	13.0	9.0	1.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	6.0	13.0	10.
1	0.0	0.0	0.0	12.0	13.0	5.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	11.0	16.
2	0.0	0.0	0.0	4.0	15.0	12.0	0.0	0.0	0.0	0.0	...	5.0	0.0	0.0	0.0	0.0	3.0	11.
3	0.0	0.0	7.0	15.0	13.0	1.0	0.0	0.0	0.0	8.0	...	9.0	0.0	0.0	0.0	7.0	13.0	13.
4	0.0	0.0	0.0	1.0	11.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	2.0	16.

5 rows × 64 columns

```
df['target'] = digits.target
df.head(15)
```

	0	1	2	3	4	5	6	7	8	9	...	55	56	57	58	59	60
0	0.0	0.0	5.0	13.0	9.0	1.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	6.0	13.0	10.0
1	0.0	0.0	0.0	12.0	13.0	5.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	11.0	16.0
2	0.0	0.0	0.0	4.0	15.0	12.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	3.0	11.0
3	0.0	0.0	7.0	15.0	13.0	1.0	0.0	0.0	0.0	8.0	...	0.0	0.0	0.0	7.0	13.0	13.0
4	0.0	0.0	0.0	1.0	11.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	2.0	16.0
5	0.0	0.0	12.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	9.0	16.0	16.0
6	0.0	0.0	0.0	12.0	13.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	1.0	9.0	15.0
7	0.0	0.0	7.0	8.0	13.0	16.0	15.0	1.0	0.0	0.0	...	0.0	0.0	0.0	13.0	5.0	0.0
8	0.0	0.0	9.0	14.0	8.0	1.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	11.0	16.0	15.0
9	0.0	0.0	11.0	12.0	0.0	0.0	0.0	0.0	0.0	2.0	...	0.0	0.0	0.0	9.0	12.0	13.0
0	0.0	0.0	1.0	9.0	15.0	11.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	1.0	10.0	13.0
1	0.0	0.0	0.0	0.0	14.0	13.0	1.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	1.0	13.0
2	0.0	0.0	5.0	12.0	1.0	0.0	0.0	0.0	0.0	0.0	...	2.0	0.0	0.0	3.0	11.0	8.0
3	0.0	2.0	9.0	15.0	14.0	9.0	3.0	0.0	0.0	4.0	...	0.0	0.0	2.0	12.0	12.0	13.0
4	0.0	0.0	0.0	8.0	15.0	1.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	10.0	15.0

```
X_train, X_test, y_train, y_test =
train_test_split(df.drop('target',axis='columns'),df.target,test_size=0
.2)
```

```
rbf_model = SVC(kernel='rbf',gamma=0.002)
rbf_model.fit(X_train,y_train)
```

```
SVC
SVC(gamma=0.002)
```

```
rbf_model.score(X_test,y_test)
```

Accuracy of model

```
0.9888888888888889
```

Accuracy with linear kernel

```
linear_model = SVC(kernel='linear',C=0.001)
linear_model.fit(X_train,y_train)
```

```
SVC
SVC(C=0.001, kernel='linear')
```

```
linear_model.score(X_test,y_test)
```

```
0.9777777777777777
```