

## 3110712028. Exp 2. Implement a Classifier Using Open Source Dataset

Aim: To implement classifier  
Using an open source Dataset.

### Objective

- To understand the fundamentals of supervised classification
- To train and test a classifier using data
- To evaluate model performance using accuracy.
- To visualize predictions and interpret results.

### Pseudocode:

- 1) Import necessary libraries
- 2) Load dataset from sklearn - (digits)
- 3) Split the dataset into features (X) and labels (y).
- 4) Divide the data into training and testing sets
- 5) Initialize K-NN (K-Nearest Neighbors) Classifier

- 6) Train the classifier using Training data
- 7) Predict The labels for the test data.
- 8) Evaluate the performance using accuracy and classification report.
- 9) Visualize a ~~sample~~ sample predictions

#### Observation

- The Classifier trained successfully on the dataset
- It achieved high accuracy in classifying unseen data
- Visual inspection showed that prediction values matched the actual labels in most cases

#### Result.

~~1~~ ✓ Implemented classifier using an open source dataset.

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Code

Notebook Python 3 (ipykernel)

[2]: !pip install scikit-learn

Defaulting to user installation because normal site-packages is not writeable  
Collecting scikit-learn  
 Downloading scikit\_learn-1.7.1-cp310-cp310-manylinux2014\_x86\_64.manylinux\_2\_17\_x86\_64.whl.metadata (11 kB)  
Requirement already satisfied: numpy>=1.22.0 in ./local/lib/python3.10/site-packages (from scikit-learn) (2.1.3)  
Collecting scipy>=1.8.0 (from scikit-learn)  
 Downloading scipy-1.15.3-cp310-cp310-manylinux\_2\_17\_x86\_64.manylinux2014\_x86\_64.whl.metadata (61 kB)  
Collecting joblib>=1.2.0 (from scikit-learn)  
 Downloading joblib-1.5.1-py3-none-any.whl.metadata (5.6 kB)  
Collecting threadpoolctl>=3.1.0 (from scikit-learn)  
 Downloading threadpoolctl-3.6.0-py3-none-any.whl.metadata (13 kB)  
Downloading scikit\_learn-1.7.1-cp310-cp310-manylinux2014\_x86\_64.manylinux\_2\_17\_x86\_64.whl (9.7 MB)  
----- 9.7/9.7 MB 47.1 MB/s eta 0:00:00a 0:00:01  
Downloading joblib-1.5.1-py3-none-any.whl (307 kB)  
Downloading scipy-1.15.3-cp310-cp310-manylinux\_2\_17\_x86\_64.manylinux2014\_x86\_64.whl (37.7 MB)  
----- 37.7/37.7 MB 45.3 MB/s eta 0:00:0000:0100:01  
Downloading threadpoolctl-3.6.0-py3-none-any.whl (18 kB)  
Installing collected packages: threadpoolctl, scipy, joblib, scikit-learn  
Successfully installed joblib-1.5.1 scikit-learn-1.7.1 scipy-1.15.3 threadpoolctl-3.6.0  
  
[notice] A new release of pip is available: 25.0 -> 25.1.1  
[notice] To update, run: pip install --upgrade pip

[3]: pip install --upgrade pip



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Notebook 🗑️ Python 3 (ipykernel) 🔍

[3]:

```
pip install --upgrade pip
```

Defaulting to user installation because normal site-packages is not writeable  
Requirement already satisfied: pip in ./local/lib/python3.10/site-packages (25.0)  
Collecting pip  
 Downloading pip-25.2-py3-none-any.whl.metadata (4.7 kB)  
 Downloading pip-25.2-py3-none-any.whl (1.8 MB)  
 ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 1.8/1.8 MB 8.8 MB/s eta 0:00:00a 0:00:01

Installing collected packages: pip  
 Attempting uninstall: pip  
 Found existing installation: pip 25.0  
 Uninstalling pip-25.0:  
 Successfully uninstalled pip-25.0  
 WARNING: The scripts pip, pip3 and pip3.10 are installed in '/home/jupyter-ra2311047010018/.local/bin' which is not on PATH.  
 Consider adding this directory to PATH or, if you prefer to suppress this warning, use --no-warn-script-location.  
 Successfully installed pip-25.2  
 Note: you may need to restart the kernel to use updated packages.

[6]:

```
from sklearn.datasets import load_digits
```

[7]:

```
d=load_digits()
```

[8]:

```
x=d.data  
y=d.target
```

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tion.

Successfully installed pip-25.2  
Note: you may need to restart the kernel to use updated packages.

[6]: from sklearn.datasets import load\_digits

[7]: d=load\_digits()

[8]: x=d.data  
y=d.target

[9]: x

[9]: array([[ 0., 0., 5., ..., 0., 0., 0.],  
[ 0., 0., 0., ..., 10., 0., 0.],  
[ 0., 0., 0., ..., 16., 9., 0.],  
...,  
[ 0., 0., 1., ..., 6., 0., 0.],  
[ 0., 0., 2., ..., 12., 0., 0.],  
[ 0., 0., 10., ..., 12., 1., 0.]])

[10]: y

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

[11]: from sklearn.model\_selection import train\_test\_split

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Notebook 📄 Python 3 (ipykernel) ⌵

```
[10]: y
[10]: array([0, 1, 2, ..., 8, 9, 8])
[11]: from sklearn.model_selection import train_test_split
[12]: x_train,x_test,y_train,y_test=train_test_split(x,y, test_size=0.2,random_state=42)
[13]: from sklearn.neighbors import KNeighborsClassifier
[14]: knn = KNeighborsClassifier()
[15]: knn.fit(x_train,y_train)
[15]: ▾ KNeighborsClassifier ⓘ ⓘ
    ▶ Parameters
[26]: y_pred=knn.predict(x_test)
      y_pred
[26]: array([6, 9, 3, 7, 2, 1, 5, 2, 5, 2, 1, 9, 4, 0, 4, 2, 3, 7, 8, 8, 4, 3,
           9, 7, 5, 6, 3, 5, 6, 3, 4, 9, 1, 4, 4, 6, 9, 4, 7, 6, 6, 9, 1, 3,
           6, 1, 3, 0, 6, 5, 5, 1, 9, 5, 6, 0, 9, 0, 0, 1, 0, 4, 5, 2, 4, 5,
```

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[26]: y\_pred=knn.predict(x\_test)  
y\_pred

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

[27]: from sklearn.metrics import accuracy\_score

[18]: accuracy\_score(y\_test,y\_pred)

[18]: 0.9861111111111112



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```
[27]: from sklearn.metrics import accuracy_score

[18]: accuracy_score(y_test,y_pred)

[18]: 0.9861111111111112

[19]: from sklearn import metrics

[20]: confusion_matrix=metrics.confusion_matrix(y_test,y_pred)
      confusion_matrix

[20]: array([[33,  0,  0,  0,  0,  0,  0,  0,  0,  0],
            [ 0, 28,  0,  0,  0,  0,  0,  0,  0,  0],
            [ 0,  0, 33,  0,  0,  0,  0,  0,  0,  0],
            [ 0,  0,  0, 34,  0,  0,  0,  0,  0,  0],
            [ 0,  0,  0,  0, 46,  0,  0,  0,  0,  0],
            [ 0,  0,  0,  0,  0, 45,  1,  0,  0,  1],
            [ 0,  0,  0,  0,  0,  0, 35,  0,  0,  0],
            [ 0,  0,  0,  0,  0,  0,  0, 33,  0,  1],
            [ 0,  0,  0,  0,  0,  0,  0,  0, 30,  0],
            [ 0,  0,  0,  0,  1,  1,  0,  0,  0, 38]])

[21]: cm_display=metrics.ConfusionMatrixDisplay(confusion_matrix=confusion_matrix,display_labels=[0.1])
      cm_display

[21]: <sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at 0x771e42d28ca0>
```



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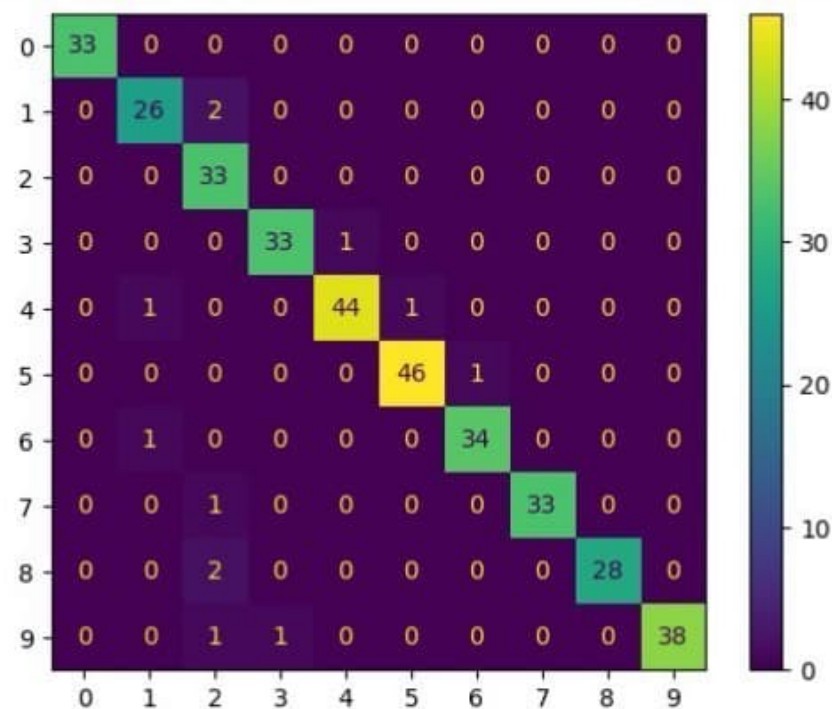
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**ValueError:** The number of FixedLocator locations (10), usually from a call to set\_ticks, does not match the number of labels (1).



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• L3.ipynb	next year
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L1.ipynb



L2.ipynb



L3.ipynb



Code



Notebook



Python 3 (ipykernel)

```
[19]: from sklearn import metrics
```

```
[20]: confusion_matrix=metrics.confusion_matrix(y_test,y_pred)
      confusion_matrix
```

```
[20]: array([[33,  0,  0,  0,  0,  0,  0,  0,  0,  0],
           [ 0, 28,  0,  0,  0,  0,  0,  0,  0,  0],
           [ 0,  0, 33,  0,  0,  0,  0,  0,  0,  0],
           [ 0,  0,  0, 34,  0,  0,  0,  0,  0,  0],
           [ 0,  0,  0,  0, 46,  0,  0,  0,  0,  0],
           [ 0,  0,  0,  0,  0, 45,  1,  0,  0,  1],
           [ 0,  0,  0,  0,  0,  0,  0, 35,  0,  0],
           [ 0,  0,  0,  0,  0,  0,  0,  0, 33,  0,  1],
           [ 0,  0,  0,  0,  0,  0,  0,  0,  0, 30,  0],
           [ 0,  0,  0,  0,  0,  1,  1,  0,  0,  0, 38]])
```

```
[21]: cm_display=metrics.ConfusionMatrixDisplay(confusion_matrix=confusion_matrix,display_labels=[0.1])
      cm_display
```

```
[21]: <sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at 0x771e42d28ca0>
```

```
[22]: pip install matplotlib
```

Defaulting to user installation because normal site-packages is not writeable

Requirement already satisfied: matplotlib in ./local/lib/python3.10/site-packages (3.10.3)