In [ ]:
```
'''
NAME: MANE SHIVRAJ PANDURANG
ROLL NO.37
COURSE: AI&DS, SUB:ML(Machine Learning)
CLASS: BE
'''
```

In [ ]:
```
'''
PRACTICAL NO:03
A. Implementation of Support Vector Machines (SVM) for classifying images of
handwritten digits into their respective numerical classes (0 to 9).'''
```

In [6]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn import datasets
from sklearn.model_selection import train_test_split
from sklearn.svm import SVC
from sklearn.metrics import accuracy_score, classification_report, confusion_matrix
```

In [2]:
```
digits = datasets.load_digits()
X = digits.data  # Features (pixel values)
y = digits.target  # Target labels (0 to 9)
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
svm_model = SVC(kernel='linear', C=1.0)
svm_model.fit(X_train, y_train)
```

Out[2]:
```
▾ SVC
SVC(kernel='linear')
```

In [3]:
```
y_pred = svm_model.predict(X_test)
accuracy = accuracy_score(y_test, y_pred)
confusion_mat = confusion_matrix(y_test, y_pred)
classification_rep = classification_report(y_test, y_pred)

print("Accuracy:", accuracy)
print("Confusion Matrix:\n", confusion_mat)
print("Classification Report:\n", classification_rep)
```

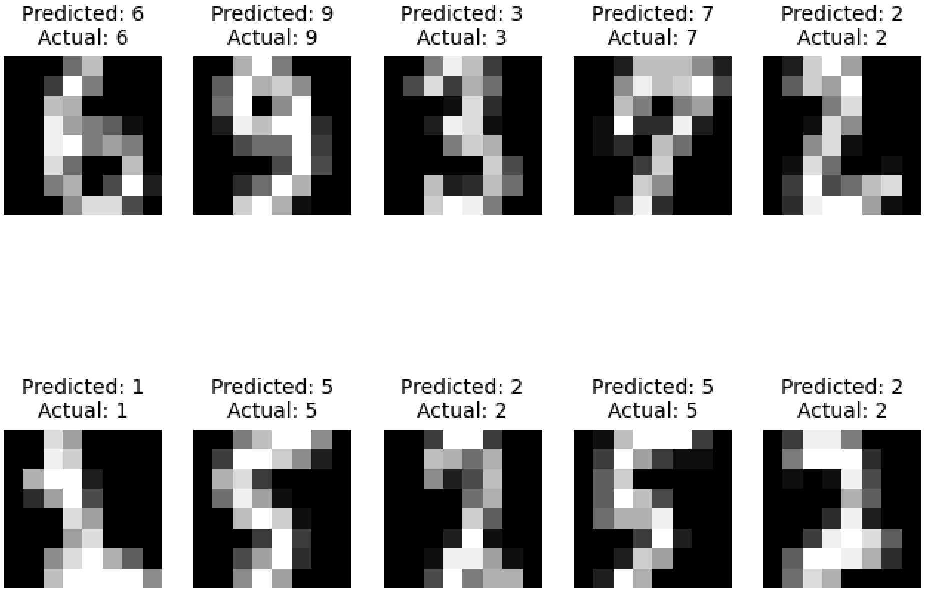
```
Accuracy: 0.9777777777777777
Confusion Matrix:
 [[33  0  0  0  0  0  0  0  0  0]
 [ 0 28  0  0  0  0  0  0  0  0]
 [ 0  0 33  0  0  0  0  0  0  0]
 [ 0  0  0 32  0  1  0  0  0  1]
 [ 0  1  0  0 45  0  0  0  0  0]
 [ 0  0  0  0  0 47  0  0  0  0]
 [ 0  0  0  0  0  0 35  0  0  0]
 [ 0  0  0  0  0  0  0 33  0  1]
 [ 0  0  0  0  0  1  0  0 29  0]
 [ 0  0  0  1  1  0  0  1  0 37]]
Classification Report:
               precision    recall  f1-score   support

           0       1.00      1.00      1.00        33
           1       0.97      1.00      0.98        28
           2       1.00      1.00      1.00        33
           3       0.97      0.94      0.96        34
           4       0.98      0.98      0.98        46
           5       0.96      1.00      0.98        47
           6       1.00      1.00      1.00        35
           7       0.97      0.97      0.97        34
           8       1.00      0.97      0.98        30
           9       0.95      0.93      0.94        40

    accuracy                           0.98       360
   macro avg       0.98      0.98      0.98       360
weighted avg       0.98      0.98      0.98       360
```

In [4]:

```
plt.figure(figsize=(8, 6))
for i in range(10):
    plt.subplot(2, 5, i + 1)
    plt.imshow(X_test[i].reshape(8, 8), cmap='gray')
    plt.title(f'Predicted: {y_pred[i]}\nActual: {y_test[i]}', fontsize=10)
    plt.axis('off')
plt.show()
```



In [ ]: