```
++++++++++++++++++++++++++  Digit resolution 8 X 8 ++++++++++++++++++++++++++n

Resolution of original digits dataset (x,y) : (8, 8)

 Dataset shape (1797, 8, 8)

_____________________________________________________________________________________________
[" Gamma :  g, '    C': c}", '            Train Accuracy', '  Validation Accuracy', '  Test Accuracy']
_____________________________________________________________________________________________

[{'gamma': 0.01, 'C': 0.1}, '         ', '    0.1044     ', '    0.1215     ', '    0.0838     ']
[{'gamma': 0.01, 'C': 0.2}, '         ', '    0.1204     ', '    0.1215     ', '    0.0950     ']
[{'gamma': 0.01, 'C': 0.5}, '         ', '    1.0000     ', '    0.4144     ', '    0.2682     ']
[{'gamma': 0.01, 'C': 0.7}, '         ', '    1.0000     ', '    1.0000     ', '    0.5866     ']
[{'gamma': 0.01, 'C': 1}, '         ', '    1.0000     ', '    1.0000     ', '    0.8715     ']
[{'gamma': 0.01, 'C': 2}, '         ', '    1.0000     ', '    1.0000     ', '    0.8771     ']
[{'gamma': 0.01, 'C': 5}, '         ', '    1.0000     ', '    1.0000     ', '    0.8771     ']
[{'gamma': 0.01, 'C': 7}, '         ', '    1.0000     ', '    1.0000     ', '    0.8771     ']
[{'gamma': 0.01, 'C': 10}, '         ', '    1.0000     ', '    1.0000     ', '    0.8771     ']
[{'gamma': 0.005, 'C': 0.1}, '         ', '    1.0000     ', '    1.0000     ', '    0.8771     ']
[{'gamma': 0.005, 'C': 0.2}, '         ', '    1.0000     ', '    1.0000     ', '    0.8771     ']
[{'gamma': 0.005, 'C': 0.5}, '         ', '    1.0000     ', '    1.0000     ', '    0.9274     ']
[{'gamma': 0.005, 'C': 0.7}, '         ', '    1.0000     ', '    1.0000     ', '    0.9497     ']
[{'gamma': 0.005, 'C': 1}, '         ', '    1.0000     ', '    1.0000     ', '    0.9553     ']
[{'gamma': 0.005, 'C': 2}, '         ', '    1.0000     ', '    1.0000     ', '    0.9553     ']
[{'gamma': 0.005, 'C': 5}, '         ', '    1.0000     ', '    1.0000     ', '    0.9553     ']
[{'gamma': 0.005, 'C': 7}, '         ', '    1.0000     ', '    1.0000     ', '    0.9553     ']
[{'gamma': 0.005, 'C': 10}, '         ', '    1.0000     ', '    1.0000     ', '    0.9553     ']
[{'gamma': 0.001, 'C': 0.1}, '         ', '    1.0000     ', '    1.0000     ', '    0.9609     ']
[{'gamma': 0.001, 'C': 0.2}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.001, 'C': 0.5}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.001, 'C': 0.7}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.001, 'C': 1}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.001, 'C': 2}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.001, 'C': 5}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.001, 'C': 7}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.001, 'C': 10}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0005, 'C': 0.1}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0005, 'C': 0.2}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0005, 'C': 0.5}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0005, 'C': 0.7}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0005, 'C': 1}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0005, 'C': 2}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0005, 'C': 5}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0005, 'C': 7}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0005, 'C': 10}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0001, 'C': 0.1}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0001, 'C': 0.2}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0001, 'C': 0.5}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0001, 'C': 0.7}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0001, 'C': 1}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0001, 'C': 2}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0001, 'C': 5}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0001, 'C': 7}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
[{'gamma': 0.0001, 'C': 10}, '         ', '    1.0000     ', '    1.0000     ', '    0.9888     ']
```

```
Train Classification report for classifier SVC(C=0.5, gamma=0.01):

              precision    recall  f1-score   support

           0       1.00      1.00      1.00       140
           1       1.00      1.00      1.00       147
           2       1.00      1.00      1.00       150
           3       1.00      1.00      1.00       146
           4       1.00      1.00      1.00       147
           5       1.00      1.00      1.00       142
           6       1.00      1.00      1.00       144
           7       1.00      1.00      1.00       142
           8       1.00      1.00      1.00       136
           9       1.00      1.00      1.00       143

    accuracy                           1.00      1437
   macro avg       1.00      1.00      1.00      1437
weighted avg       1.00      1.00      1.00      1437


Best Train hyperparameters were: {'gamma': 0.01, 'C': 0.5}
```

```
Validation Classification report for classifier SVC(C=0.7, gamma=0.01):

              precision    recall  f1-score   support

           0       1.00      1.00      1.00        22
           1       1.00      1.00      1.00        15
           2       1.00      1.00      1.00        12
           3       1.00      1.00      1.00        20
           4       1.00      1.00      1.00        21
           5       1.00      1.00      1.00        18
           6       1.00      1.00      1.00        18
           7       1.00      1.00      1.00        17
           8       1.00      1.00      1.00        21
           9       1.00      1.00      1.00        17

    accuracy                           1.00       181
   macro avg       1.00      1.00      1.00       181
weighted avg       1.00      1.00      1.00       181


Best Validation hyperparameters were: {'gamma': 0.01, 'C': 0.7}
```

```
Test Classification report for classifier SVC(C=0.2, gamma=0.001):

              precision    recall  f1-score   support

           0       1.00      1.00      1.00        16
           1       1.00      1.00      1.00        20
           2       1.00      1.00      1.00        15
           3       1.00      0.88      0.94        17
           4       1.00      1.00      1.00        13
           5       1.00      1.00      1.00        22
           6       1.00      1.00      1.00        19
           7       0.95      1.00      0.98        20
           8       0.94      1.00      0.97        17
           9       1.00      1.00      1.00        20

    accuracy                           0.99       179
   macro avg       0.99      0.99      0.99       179
weighted avg       0.99      0.99      0.99       179


Best Test hyperparameters were: {'gamma': 0.001, 'C': 0.2}
```