COL341 Assignment 2 Report

-Eshan Jain
-2020CS50424

2) Kernels:

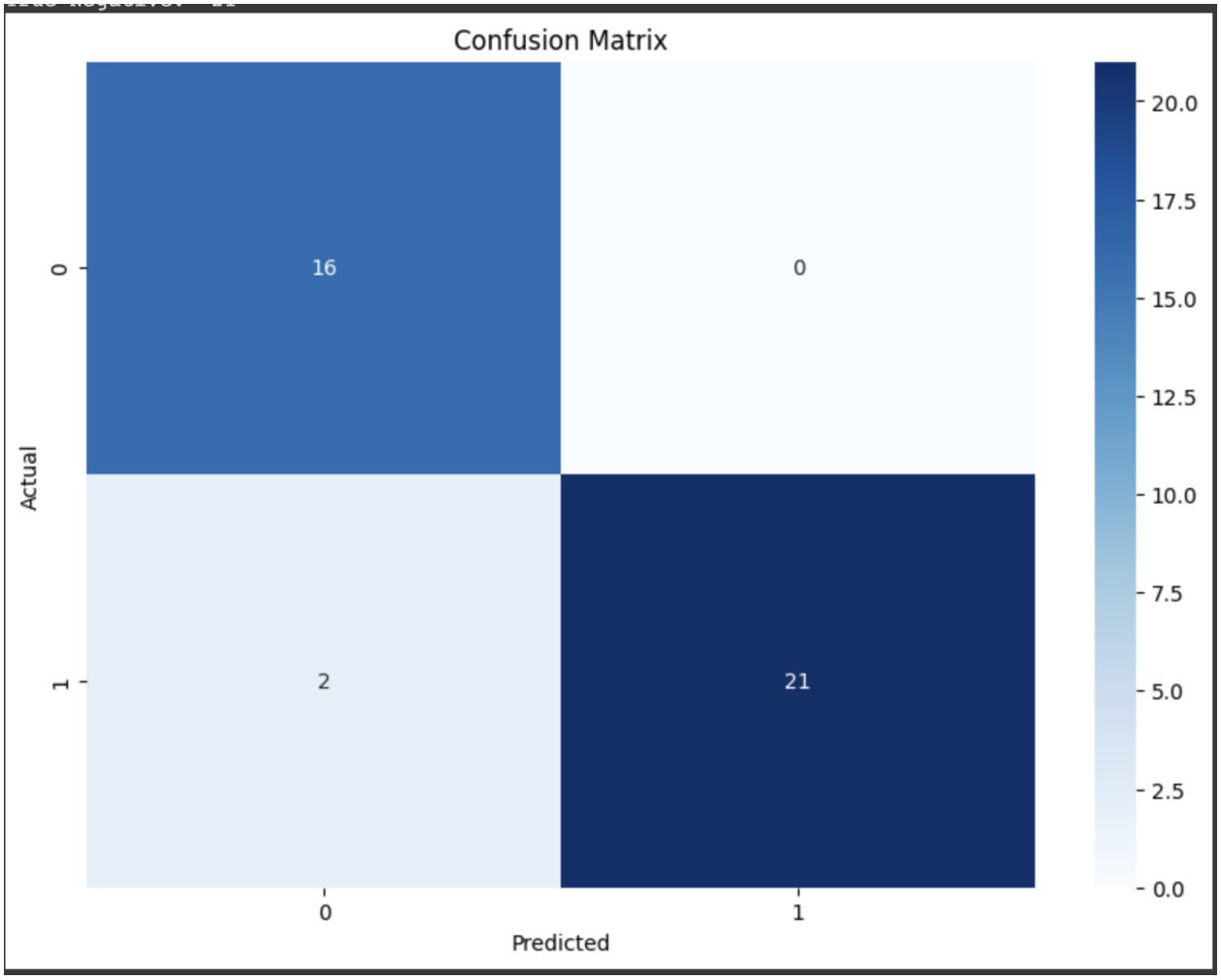
Ther kernel functions map input samples to a higher-dimensional space. The kernels have been implemented by utilising the kwargs parameter of the kernel functions. The polynomial kernel function takes in the degree as well as optional parameters like coefficient and gamma. It also takes in an optional parameter “no” and “Y” if two np.ndarray arrays are required as parameters. Similarly for other kernels these optional arguments are used.

3.1) I have implemented the standard soft margin SVM by firstly reading the input data and transforming all 0s to -1 for the functioning of the SVM. Then the parameters of the dual problem are computed along with the kernel matrix and qpsolver is used to solve the optimisation problem. The learned parameters are used to predict the labels.

3.2) Analysis:

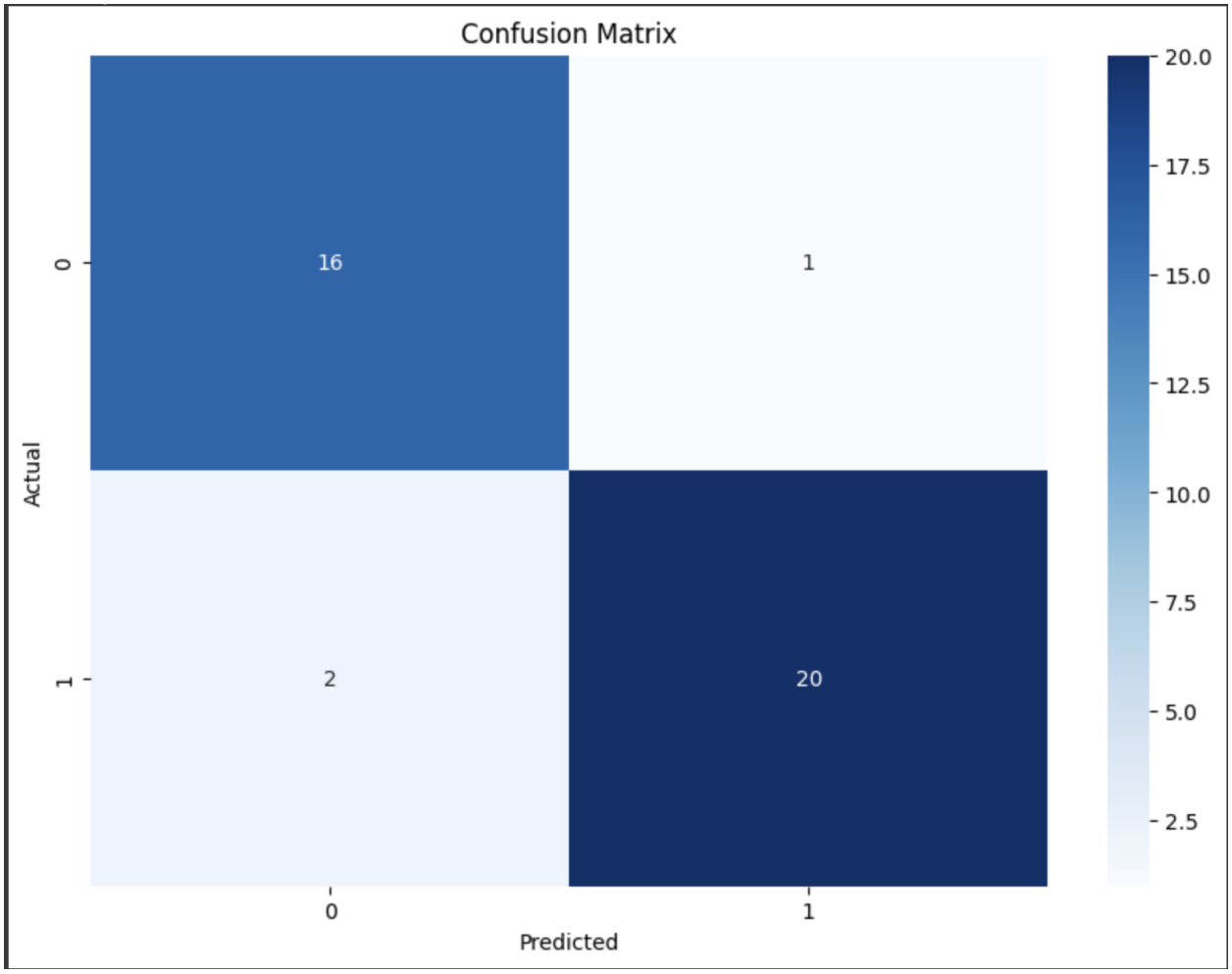
i) Linear Kernel:

a) C = 0.001:



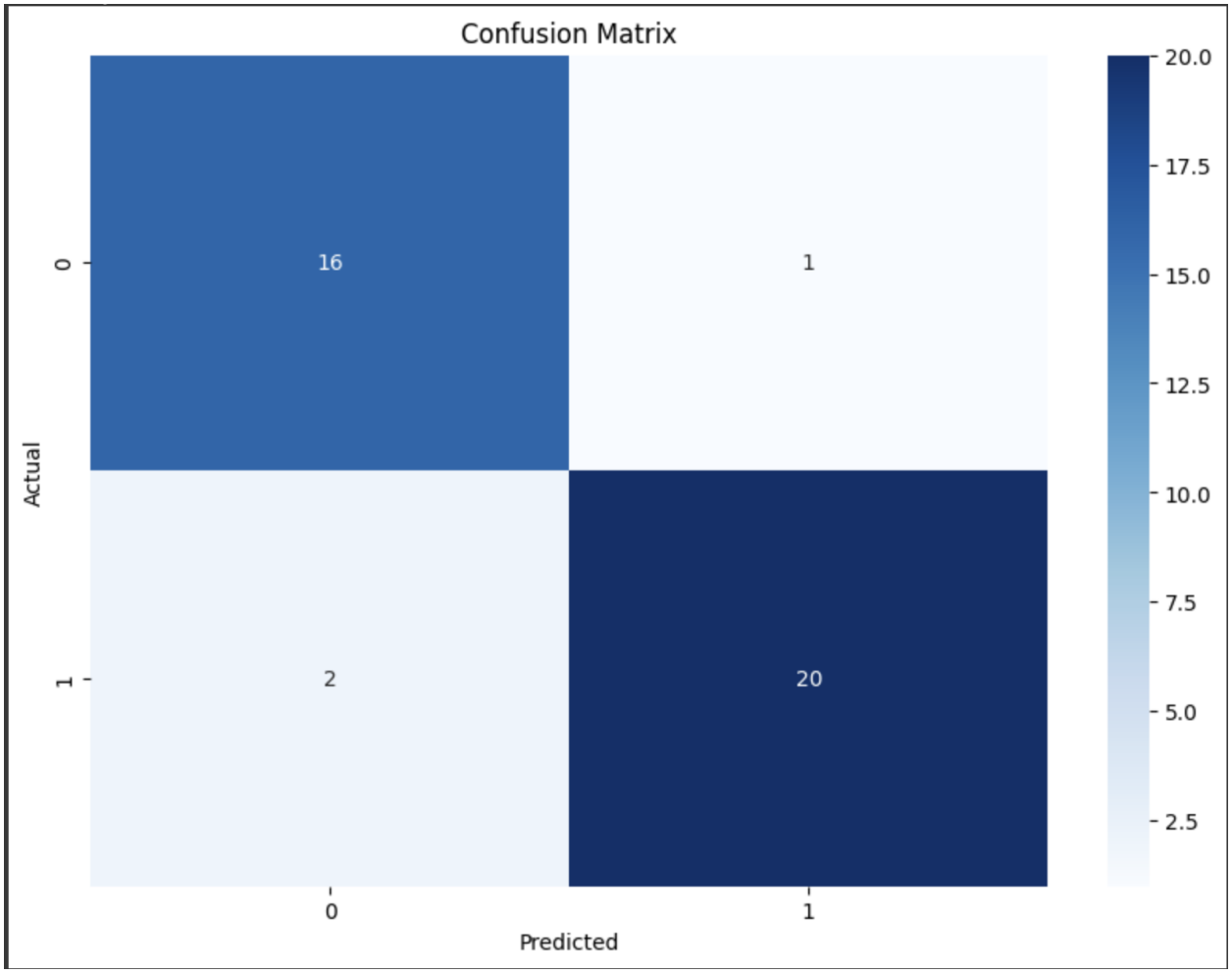
Accuracy = 92.307%
F1 Score = 0.91428

b) C = 0.01



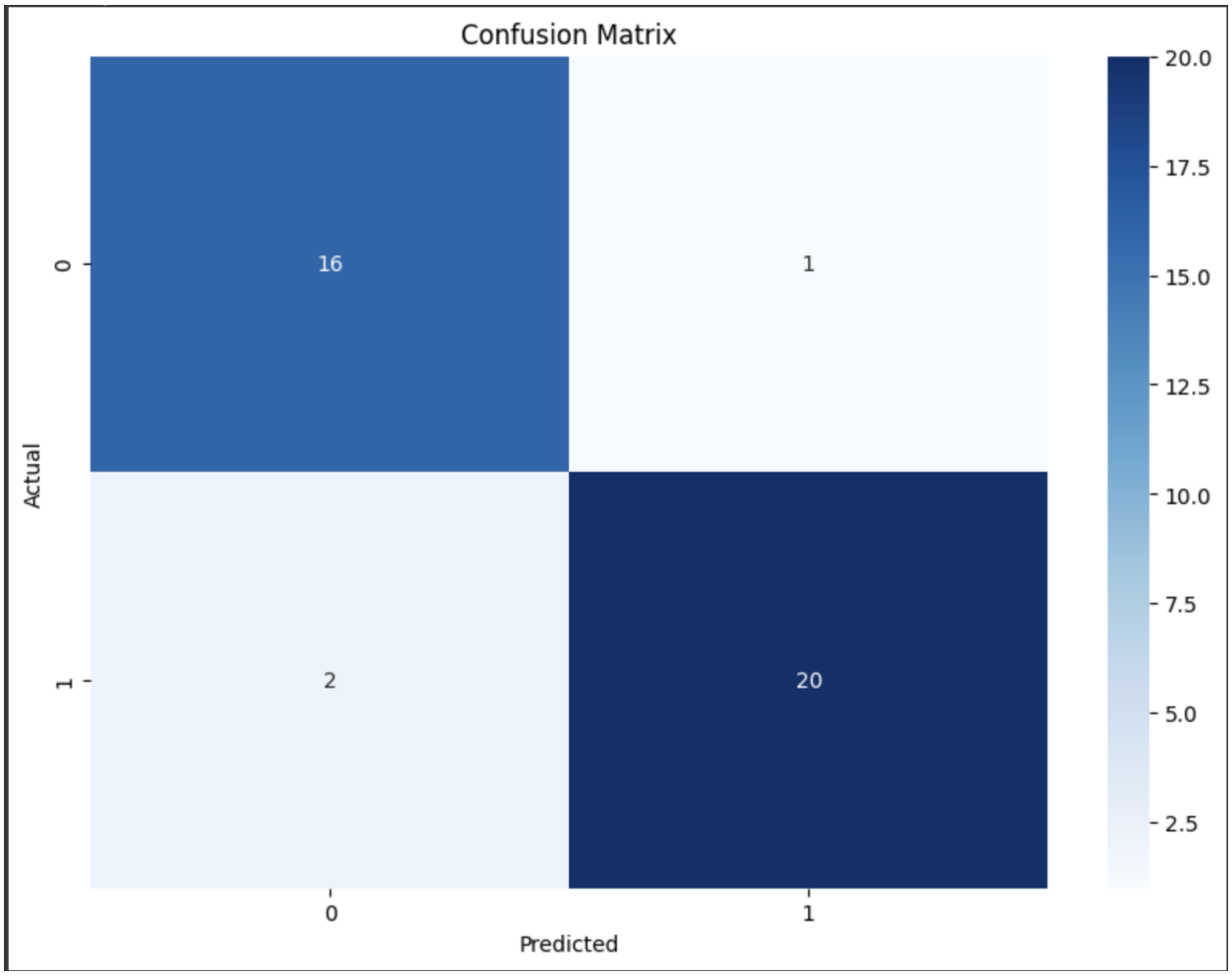
Accuracy = 92.307%
F1 Score = 0.91428

c) C = 0.1



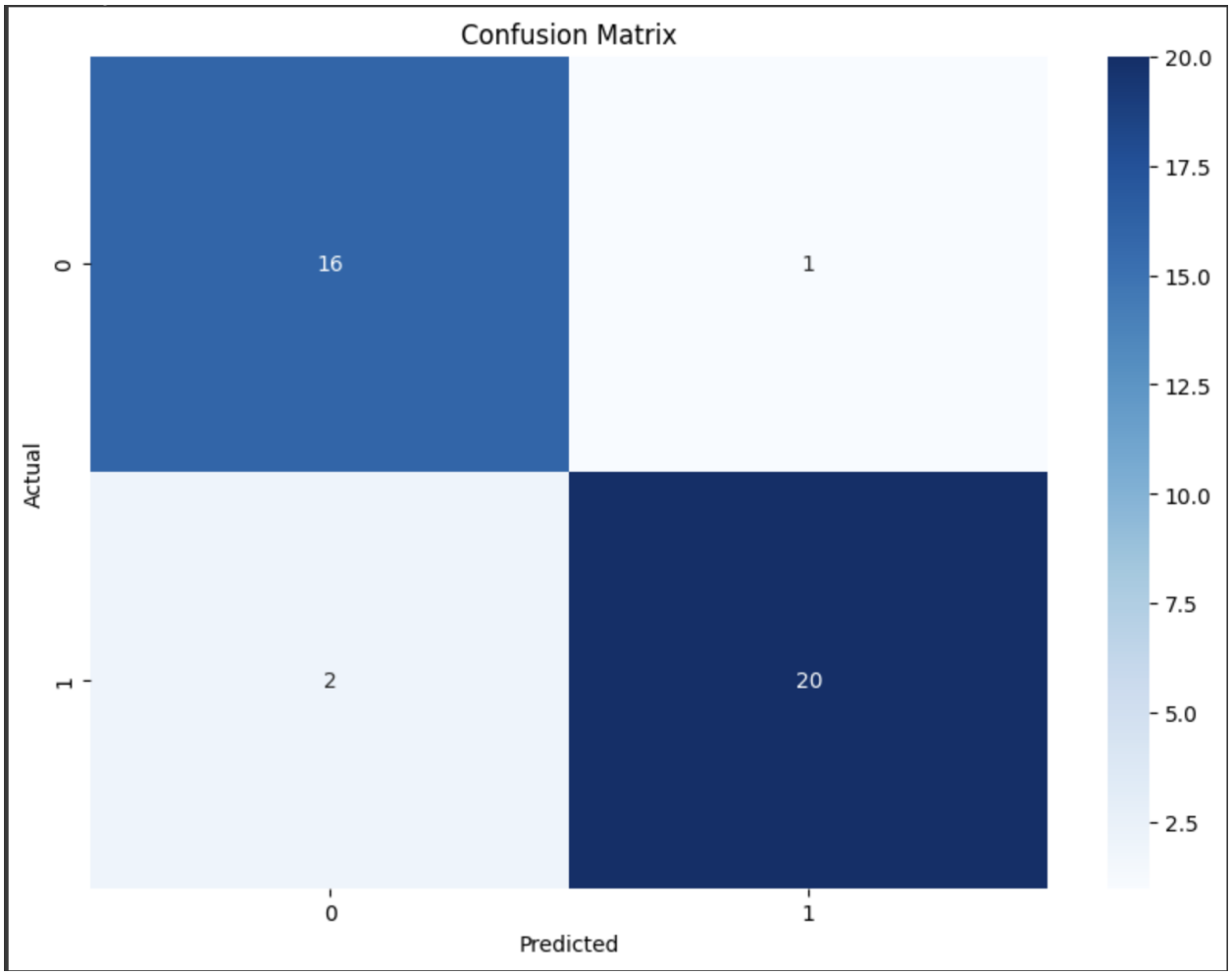
Accuracy = 92.307%
F1 Score = 0.91428

d) C = 1



Accuracy = 92.307%
F1 Score = 0.91428

e) C = 10

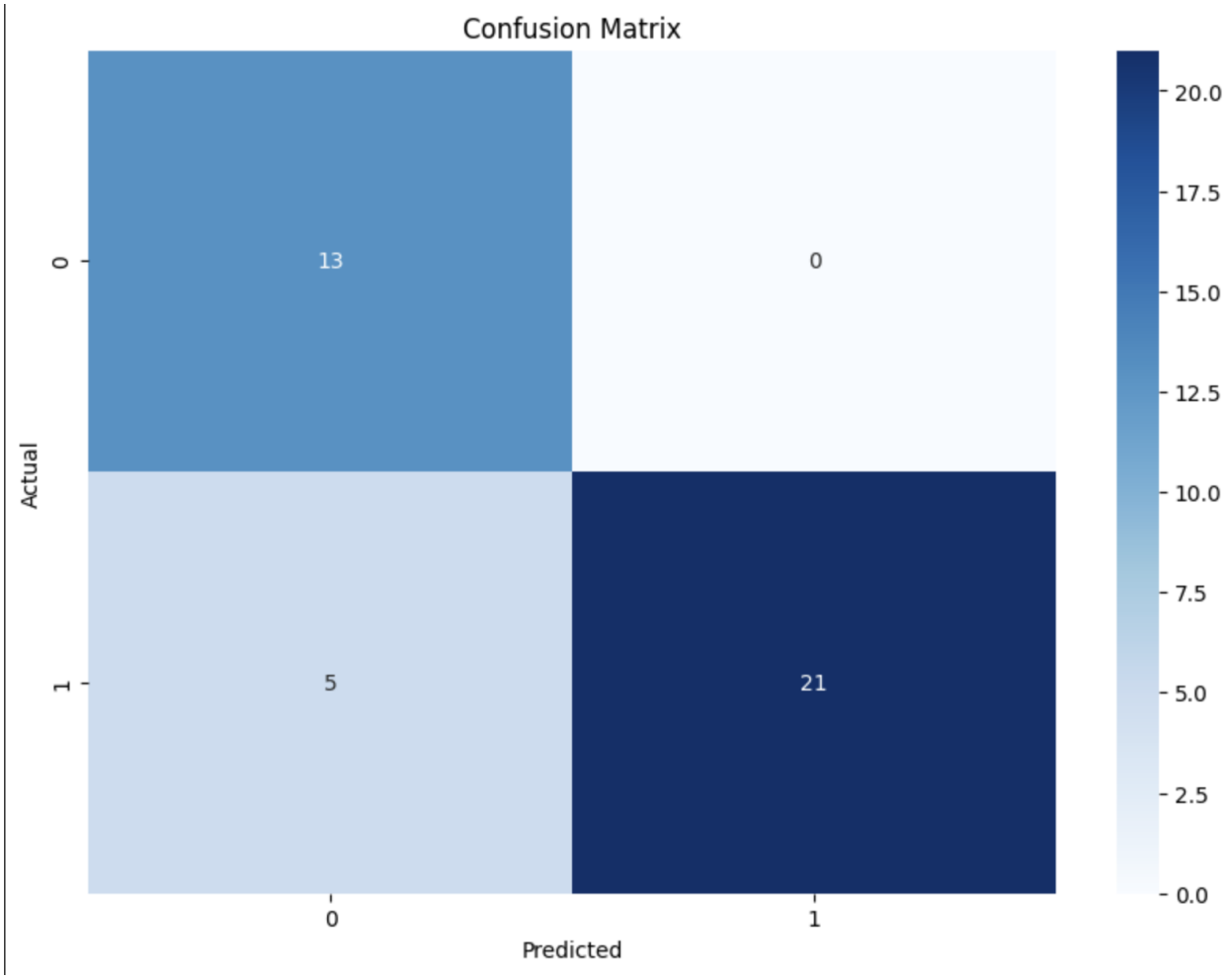


Accuracy = 92.307%
F1 Score = 0.91428

ii) RBF Kernel

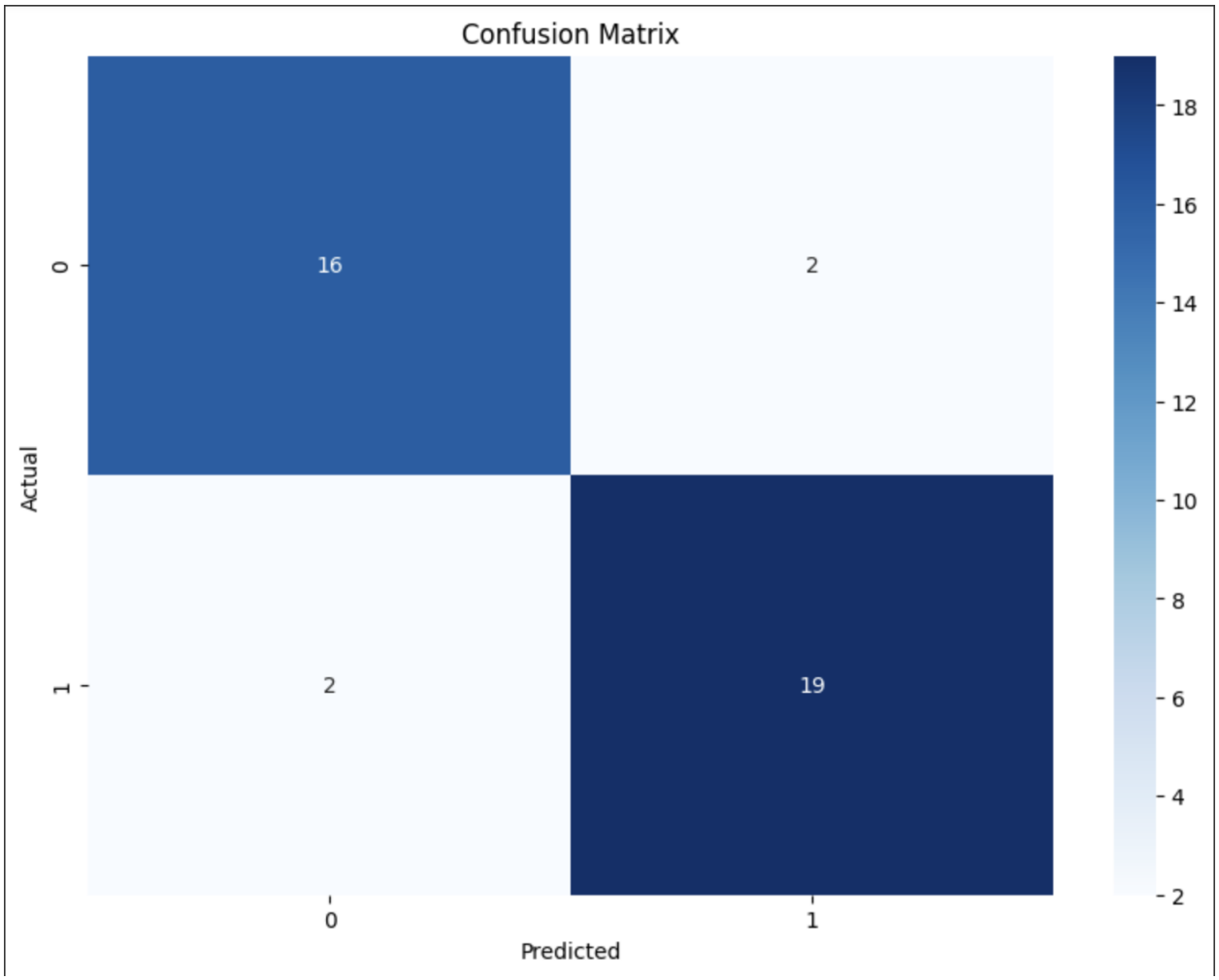
For gamma = 0.1, 0.01, 0.001:

a) C = 0.01



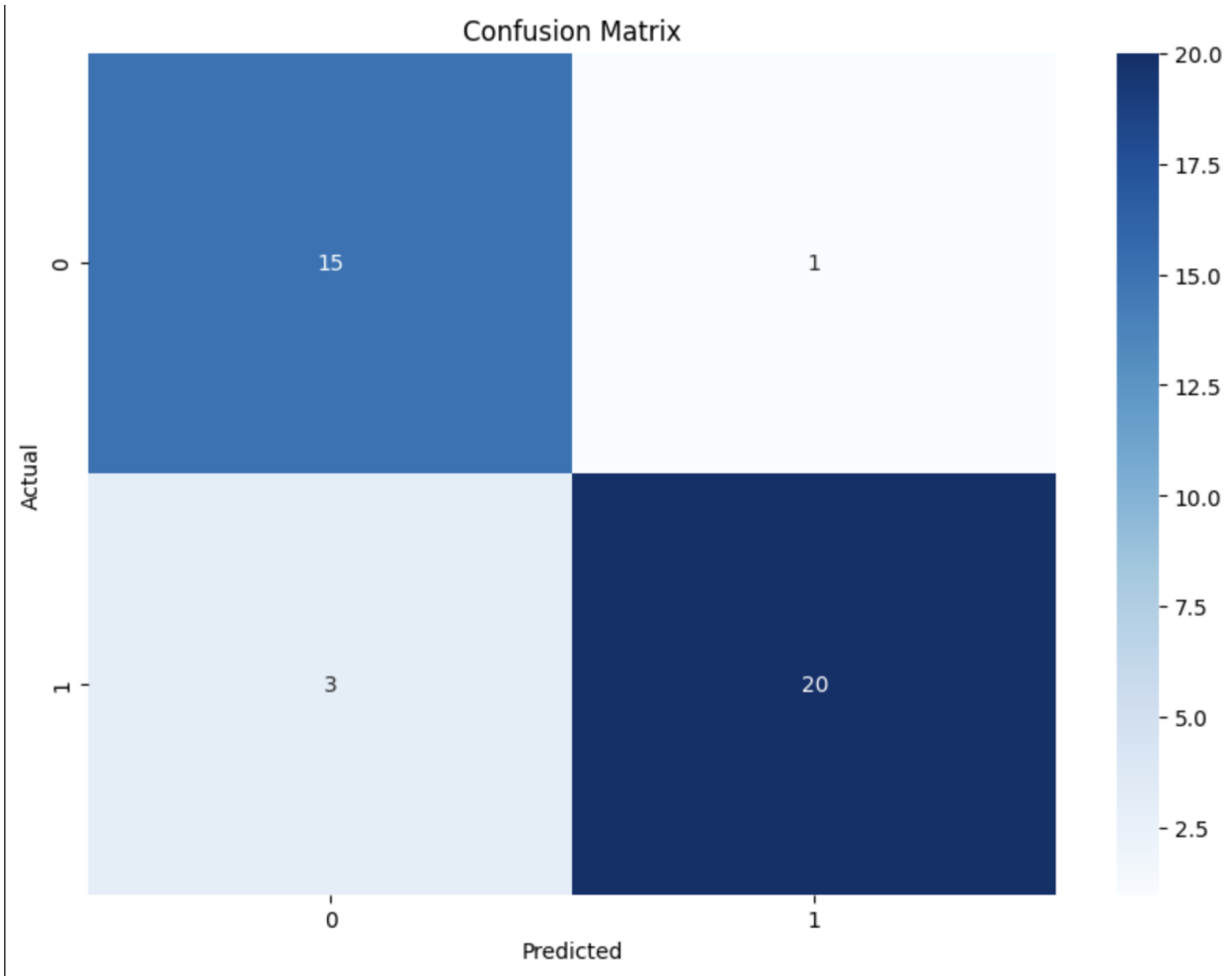
Accuracy = 87.179%
F1 Score = 0.8387

b) C = 0.1



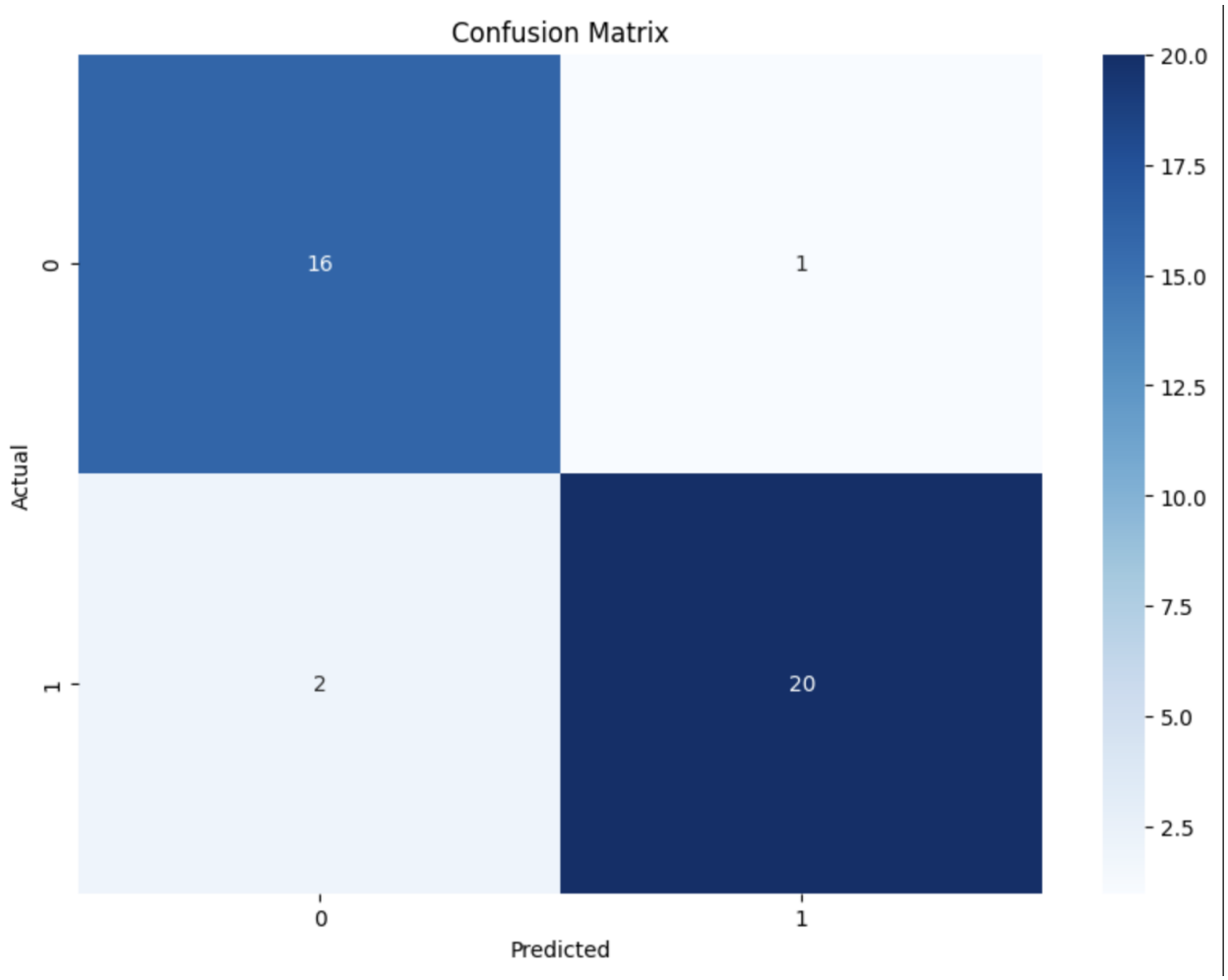
Accuracy = 89.743%
F1 Score = 0.8888

c) C = 1



Accuracy = 89.743%
F1 Score = 0.88235

d) C = 10



Accuracy = 92.307%
F1 Score = 0.9142

4) Analysis for RBF :

With gamma = 0.1

a) C = 0.1

One vs All : -

Accuracy = 41.025%

One vs One:-

Accuracy = 12.8205%

b) C = 1.0

One vs All :-

Accuracy = 43.5897%

One vs One :-

Accuracy = 25.641%