SHIV NADAR
INSTITUTION OF EMINENCE DEEMED TO BE UNIVERSITY
DELHI NCR

Department of Electrical and Computer Engineering
AIML (ECE304) - Spring 2025

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ASSIGNMENT-3

1. Consider the MNIST (Hand written digits)-dataset (Modified National Institute of Standards and Technology dataset) provided in the assignment 2. Extract the features and target separately using pre-processing (if necessary) and split them into training (50%) and testing (50%) sets.

   (a) Train the **SVM classifier (Linearly Non-Separable)** using the training data set and predict the labels for testing data. Find the accuracy score for different C (Regularization or Penalty Factor) values, 0.1,1 and 10. Observe the changes regarding performance and comment on computational time.

   (b) Use **Gaussian Kernel (RBF)** and predict the labels. With different C and gamma combinations (0.1, 1) and (1, 0.1), observe the effect on the classifier performance.

   (c) Predict the labels by applying **Polynomial Kernel** and observe the performance changes for different polynomial degree (d = 2, 4) values.

   (d) Compare the performance of the three given classifiers, suggest the best among them for the given data set with supportive comments and compare its performance with the Random Forest classifier.

   (e) Give detailed comments on the observed results of the different classifiers and how the parameters changes will affect the classifiers performances.

Note:

- Students can use in-built library functions or can do from scratch.
- Use the nomenclature with the format $Netid's\_ASGN3.extension$
- Submit the file in html format(you can download Jupyter-Notebook(.ipy) as html file).

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