UIT2721 – DEPP LEARNING CONCEPTS AND ARCHITECTURE

Lab Exercise-1 (Regression & Classification)

1. **Linear Regression with Single Feature:**

- Implement linear regression using a single feature dataset (e.g., predicting house prices based on square footage).

- Visualize the data points and the regression line.

- Evaluate the model using Mean Squared Error (MSE).

2. **Logistic Regression for Binary Classification:**

- Implement logistic regression on a dataset like the Iris dataset (use only two classes).

- Visualize decision boundaries.

- Evaluate the model using accuracy, precision, recall, and F1-score.

3. **K-Nearest Neighbors (KNN) Classification:**

- Implement KNN from scratch and apply it to a simple dataset (e.g., classifying handwritten digits).

- Experiment with different values of \(k \) and observe the effect on accuracy.

4. **Decision Tree Classification:**

- Implement a decision tree classifier using the Scikit-learn library.

- Visualize the tree structure.

- Analyze the feature importance.

7. **Naive Bayes Classification:**

- Implement a Naive Bayes classifier for text classification (e.g., spam detection).

- Use techniques like Bag of Words or TF-IDF for text preprocessing.

- Evaluate the model performance.

8. **Support Vector Machines (SVM) with Kernel Trick:**

- Implement SVM with different kernels (linear, polynomial, RBF) on a non-linearly separable dataset.

- Visualize the decision boundaries for each kernel.