



KUET CCC Digital Skills for Students Training  
Final Examination

Course Title: Machine Learning with Python (ML-4)  
Batch No. KUETEDGE33



Time: 01 hour

Full Marks: 50

- N.B (i) Answer **All the** questions below.  
(ii) Figures in the right margin indicate full marks.  
(iii) Once you have answered the question, save the file as your `_ID.ipyn` and email it to [edgeexam@kuet.ac.bd](mailto:edgeexam@kuet.ac.bd)

- Q1 Implement Linear Regression (10)  
Dataset: Use the Advertising.csv  
(<https://raw.githubusercontent.com/selva86/datasets/master/Advertising.csv>)  
Task:  
I. Load the dataset and use TV, Radio, and Newspaper as features to predict Sales.  
II. Split the data into training and testing sets.  
III. Implement and train a Linear Regression model using scikit-learn.  
IV. Calculate and print the Mean Squared Error (MSE) and R-squared ( $R^2$ ) score for the test set.
- Q2 Implement Logistic Regression (10)  
Dataset: Use the **Iris Dataset** from (<https://raw.githubusercontent.com/uiuc-cse/data-fa14/gh-pages/data/iris.csv>)  
Task:  
I. Load the dataset and classify whether the flower is "Iris-setosa" (binary classification).  
II. Use sepal length and sepal width as features.  
III. Train a **Logistic Regression model** using scikit-learn.  
IV. Visualize the decision boundary.
- Q3 Load the dataset using the python command "from sklearn.datasets import load\_breast\_cancer", Then do the following tasks: (10)  
I. Load the dataset and perform standard scaling on the features.  
II. Apply PCA to reduce the dimensionality to 2 components.  
III. Visualize the data in 2D with PCA components as axes.  
IV. Explain the explained variance ratio.  
V. Implement Probabilistic PCA using FactorAnalysis from sklearn.decomposition.
- Q4 Compute and Plot AUC-ROC (10)  
Dataset: Use the following python command to get data:  
`from sklearn.datasets import load_breast_cancer`  
`data = load_breast_cancer()`  
`X = data.data`  
`y = data.target`  
Task:  
I. Train a Logistic Regression model to classify cancer  
II. Compute the probabilities of the positive class.





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III. Plot the AUC-ROC curve using `sklearn.metrics.roc_curve` and calculate the AUC score.

Q5 Implement a Simple Neural Network

(10)

Dataset: Use the following command to get data:

`from tensorflow.keras.datasets import mnist`

`(x_train, y_train), (x_test, y_test) = mnist.load_data()`

Task:

- I. Load and preprocess the MNIST dataset (flatten and normalize the images).
- II. Build a Neural Network using `Sequential` from `tensorflow.keras`.  
Input layer: Flatten the image to a vector.  
Hidden layers: Two layers with 128 neurons each, ReLU activation.  
Output layer: 10 neurons with softmax activation.
- III. Compile the model using adam optimizer and `sparse_categorical_crossentropy` loss.
- IV. Train the model for 5 epochs and evaluate its accuracy on the test set.