



# AIML

# MODULE PROJECT

Neural Networks

TOTAL  
SCORE

30

General Instructions:

- 1. Submission of all the parts is expected in 1 notebook only
- 2. Expected submission format: 1 '.ipynb' notebook and 1 '.html' notebook only
- 3. 50% marks will be deducted if insights/steps are missing in the corresponding questions.
- 4. If output for any code cell is missing, 50% marks will be deducted.
- 5. Any kind of Plagiarism will lead to 0 (zero) Marks.

Submission Format:

- 1. '.ipynb' (Jupyter Notebook) and
  - 2. '.html' (Jupyter Notebook > File > Download as > HTML)
- 5 Marks will be deducted if submission in any of the formats is missing.

- **DOMAIN:** Electronics and Telecommunication
- **CONTEXT:** A communications equipment manufacturing company has a product which is responsible for emitting informative signals. Company wants to build a machine learning model which can help the company to predict the equipment's signal quality using various parameters.
- **DATA DESCRIPTION:** The data set contains information on various signal tests performed:
  - 1. **Parameters:** Various measurable signal parameters.
  - 2. **Signal\_Quality:** Final signal strength or quality
- **PROJECT OBJECTIVE:** To build a classifier which can use the given parameters to determine the signal strength or quality.

Steps and tasks: [ Total Score: 30 Marks]

- 1. Data import and Understanding [10 Marks]
  - A. Read the 'Signals.csv' as DataFrame and import required libraries. [2 Marks]
  - B. Check for missing values and print percentage for each attribute. [2 Marks]
  - C. Check for presence of duplicate records in the dataset and impute with appropriate method. [2 Marks]
  - D. Visualise distribution of the target variable. [2 Marks]
  - E. Share insights from the initial data analysis (at least 2). [2 Marks]
- 2. Data preprocessing [7 Marks]
  - A. Split the data into X & Y. [1 Marks]
  - B. Split the data into train & test with 70:30 proportion.[1 Marks]
  - C. Print shape of all the 4 variables and verify if train and test data is in sync. [1 Marks]
  - D. Normalise the train and test data with appropriate method. [2 Marks]
  - E. Transform Labels into format acceptable by Neural Network [2 Marks]
- 3. Model Training & Evaluation using Neural Network [13 Marks]
  - A. Design a Neural Network to train a classifier. [3 Marks]
  - B. Train the classifier using previously designed Architecture [2 Marks]
  - C. Plot 2 separate visuals. [3 Marks]
    - i. Training Loss and Validation Loss
    - ii. Training Accuracy and Validation Accuracy
  - D. Design new architecture/update existing architecture in attempt to improve the performance of the model. [2 Marks]
  - E. Plot visuals as in Q3.C and share insights about difference observed in both the models. [3 Marks]