



Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject: Machine Learning (01CT0519)

Aim: Implement Regression as Classification problem. Explain the process using a dummy example by taking 3 features, 3 classes and N observations. What changes should be done in the code of Multi-Variable Linear Regression?

Assignment 1

Date: 15-08-2025

Enrollment No: 92301733054

Understanding the Problem

Regression

- Predicts a continuous numerical value.

Classification

- Predicts a discrete class label.
- Example: Predicting if a person has diabetes (Yes = 1, No = 0).

Regression as Classification

We can use a **linear regression model** to output a continuous score, and then **convert** that score into a class label using decision boundaries.

For example:

- $y < 0.5 \rightarrow$ Class 0 (No diabetes)
- $y \geq 0.5 \rightarrow$ Class 1 (Diabetes present)

Dataset Description:-


Feature	Type	Description
gender	Integer	0 = Female, 1 = Male
age	Float	Age in years
bmi	Float	Body Mass Index
diabetes	Integer	0 = No diabetes, 1 = Diabetes present

Process to Implement:-

Step 1 – Train a Multi-Variable Linear Regression Model

- Features: gender, age, bmi
- Target: diabetes (binary, 0/1)

Step 2 – Convert Regression Output to Class

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- Use threshold = 0.5:
 - If prediction < 0.5 → Class 0
 - Else → Class 1

Changes Needed in Multi-Variable Linear Regression Code for Classification:-

1. **Target Variable Encoding**
 - Regression: y is continuous.
 - Classification: Encode categories (0, 1, 2, ...).
2. **Post-processing Predictions**
 - Regression: Use the continuous output.
 - Classification: Apply threshold or mapping function to assign class labels.
3. **Evaluation Metrics**
 - Regression: MSE, RMSE, R^2 .
 - Classification: Accuracy, Precision, Recall, Confusion Matrix.
4. **Optional Upgrade**
 - Instead of LinearRegression + threshold, use Logistic Regression for better performance in binary classification.

Conclusion:-

In this assignment, we learn that a regression model can be adapted to perform classification by converting continuous predictions into discrete categories using thresholds. While this method works for basic binary classification tasks, logistic regression or other dedicated classifiers are more suited for classification problems.