**National University of Computer and Emerging Sciences**



**Lab Manual 07**

**CL461-Artificial Intelligence Lab**

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| Section | BDS-6A |
| Semester | Spring 2024 |

**Lab Task:**

You have been given a Google Colab starter code, you must perform the following tasks:

**Coding Exercise: Run Linear Regression Model**

1. Upload dataset in the colab

Run the loader cell and load the “student grades” dataset into google colab.

2. Run the build in linear regression model

Run the build-in model to predict the target variable.

**Coding Exercise 2: Implement a Manual Regression Model**

**Implement algorithm:**

1. Initialization:

* Initialize the weights (theta) and the bias (theta\_0) to some random values or zeros.
* Define hyperparameters like learning rate (alpha) and the number of iterations (num\_iterations).

1. Training:

Iterate num\_iterations times:

* Compute predictions:



* Compute the cost function (mean squared error):



* Compute gradients:



* Update weights and bias:



1. Prediction:

Given new input features X\_test, predict the output y\_pred using the learned parameters:

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LinearRegression:

initialize:

Initialize theta (weights) and theta\_0 (bias)

Initialize learning rate (alpha) and number of iterations (num\_iterations)

train:

for iter in range(num\_iterations):

Compute predictions: y\_hat = X.dot(theta) + theta\_0

Compute cost: J = (1/2m) \* sum((y\_hat - y)^2)

Compute gradients:

dtheta = (1/m) \* X.T.dot(y\_hat - y)

dtheta\_0 = (1/m) \* sum(y\_hat - y)

Update weights and bias:

theta = theta - alpha \* dtheta

theta\_0 = theta\_0 - alpha \* dtheta\_0

predict:

Compute predictions: y\_pred = X\_test.dot(theta) + theta\_0

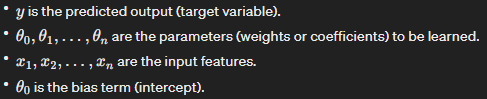
Return y\_pred

Remember:

Linear regression assumes that there is a linear relationship between the input features and the target variable. It models this relationship using a linear equation of the form:



where:



Instructions:

1. Implement the above-mentioned algorithm
2. Compare it with the build-in model
3. Write a detailed analysis