09.09.25

Ex:- 6 Implement gradient descent and backpropagation in deep neural network.

Aim:- To implement gradient descent and Backpropagation in deep neural network.

Objectives:-

* To understand gradient descent in an optimized method.
* To implement Backpropogation in deep neural network to update weights.
* To implements a simple neural network for classification task.
* To observe how loss decrease with iteration.

Observation:-

* Loss decreases as number of iterations increase
* weights and bias object to minimize error.
* Backpropogation ensures errors are efficiently distributed layer by layer.
* Learning rate (η) greatly influences on speed.

Pseudocode:-

Begin
Initialize weight and bias randomly
FOR epoch in range (max_epochs)
for each input sample
* Forward pass
Compute $z = w^T x + b$
Apply activation to get A
Compute output prediction
* Compute loss
loss = Costly (y_true, y_pred)
* Backward pass
Compute gradient dw, db using Chain

Else update parameters:

$w = w - a * dw$

$b = b - a * db$

END for

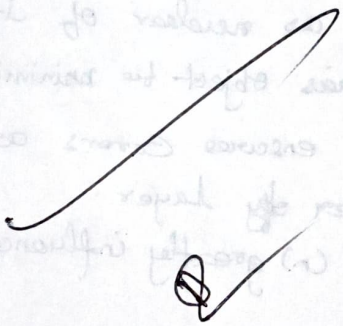
Print after epoch

END FOR

END.

Results:-

Therefore implementation of gradient descent and backpropogation in neural network.



Output :-

Epoch 0, Loss: 0.2558
Epoch 2000, Loss: 0.2454
Epoch 4000, Loss: 0.1532
Epoch 6000, Loss: 0.1336
Epoch 8000, Loss: 0.1267

Final predictions :-

[[0.05300868]
[0.49554215]
[0.95091319]
[0.50519888]]

Loss Curve - Gradient Decent and Back propagation