PAGE No.
DATE / /

Week 5 - Assignment

Exercise :- Implement Vectorized Gradient Descent for linear regression problem

Sol:- Cost function

$$\min \left(J(\theta) = \frac{1}{2m} \sum_{i=1}^{m} (h_\theta(x_i) - y_i)^2 \right)$$

goal is to minimize θ_0, θ_1 $J(\theta)$

Using Vectorized gradient Descent approach

$h_\theta = \theta^T X$, h_θ = hypothesis
X = input feature vector

loop until Converge {

$$\theta_j = \theta_j - \frac{1}{m} \alpha \frac{\partial J(\theta)}{\partial \theta_j}$$

}

Here $\frac{\partial J(\theta)}{\partial \theta_j}$ = gradients α = learning rate

advantage of vectorized approach is ,

i) easy to debug
ii) This approach decreases the time taken for execution of gradient descent

PAGE No.
DATE / /

Algorithm

1) Set the weight step to zero: $\Delta w_i = 0$
2) For each record in the training data:
   2.1) Make a forward pass through the network, calculating the output $\hat{y} = f(\sum_i w_i x_i)$
   2.2) Calculate the error term for the output unit
   $$\delta = (y - \hat{y}) * f'(\sum_i w_i x_i)$$
   2.3) Update the weight step $\Delta w_i = \Delta w_i + \delta x_i$
3.) Update the weights $w_i = w_i + \eta \Delta w_i$ / m. Where η is the learning rate and m is the number of records. Here we're averaging the weight steps to help reduce any large variations in the training data.
4) Repeat for e epochs