**Artificial Intelligence**

Home Work – 3

Akshara Boppidi

**Solution of 2(a):**

Given σ(α) = and we need to show that

= σ(α) (1- σ(α))

Taking LHS,

( σ(α)) = ()

= [ ]

= [0+e-α]

= [e-α . -1]

=

= - - - - 1

Now, taking RHS

σ(α).(1-σ(α))

= [1-]

= []

= - - - -> 2

Thus, equation 1 = equation 2

Hence proved.

**Solution of 2(b):**

To derive the gradient of log-likelihood:  **l(w)**

l(w) **=** =

=

Given,

P(y=1|x) σ(wT-x) =

P(y=-1|x)1-σ(wT-x) =

=

=

P(y|x) = P(y=1|x)(y+1)/2 P(y=-1|x)(1-y)/2

Where g(x,w)=

Taking gradient of Li with respect to w, for deriving log likelihood function:

=

=

=

=xi

=xi

=xi

=xi

Considering all training examples,

=(xi,w))xi

The update rule for batch method is w 🡨w + η

Where, η= learning rate.

Similarly, update step for gradient ascent of l(w) is : w 🡨 w +

If y=k, with L(w1,w2,……wk)

=Yki

update rule for weight vector wk is

Wk 🡨wk +( Yki+1-2p(k|xi))xi