LVC 1: Glossary of Notations

x = Input vector for the Neural Network

x_i = i^{th} component of the input vector **x**

w = The vector containing the weights for all the components of the input vector **x**

w_i = i^{th} component of the weight vector **w**

$\mathbf{w}^T$ = Transpose of the weight vector **w**

d = Total number of input features

b = The bias Term

$\sum_{j=1}^{d} w_j x_j$ = Weighted sum of all input features starting from $j = 1$ to $j = d$, where j is the iterator

z = Output of each neuron, i.e., the sum of “weighted sum of inputs” and “the bias”

$f(z)$ = Activation function applied on the vector z

θ = The weight array **w** concatenated with the bias term

$F(\mathbf{x}; \Theta)$ = The output of the neural network when the input given is **x** and the weights are given by the vector θ

Sigmoid = This is an activation function which takes an input and gives an output lying withing the range of 0 to 1

tanh = This is an activation function which takes an input and gives an output lying withing the range of -1 to 1

ReLu = This activation function also called Rectified Linear Unit takes an input and returns it as it is, if it’s positive, and returns zero if the input is negative

a_j = Softmax Activation Function

$L(data;\ \theta)$ = Loss term, i.e., the difference between the output of the Neural Network and the actual target variable, when the Neural Networks received the particular $data$ and had the particular set of weights, i.e., θ

$\Delta\omega_{ij}$ = Small change in weights ω_{ij}

$\frac{\partial L}{\partial \omega_{ij}}$ = Partial derivative of the loss with respect to the particular weight given by ω_{ij}

y^i = The actual value of the target variable for the i^{th} data point

$F(\mathbf{x}^i\ ; \theta)$ = The predicted output for the i^{th} data point

ω_{ij}^t = The value of weight ω_{ij} at time = t

ω_{ij}^{t+1} = The value of weight ω_{ij} at time = t + 1

η = Learning rate for updating the weights

λ = Regularization coefficient

$\frac{\lambda}{2}||\theta||^2$ = Regularization term for L2 regularization