CS/CE 316/365 Deep Learning

Activity 01

August 30, 2025

Loss Calculation

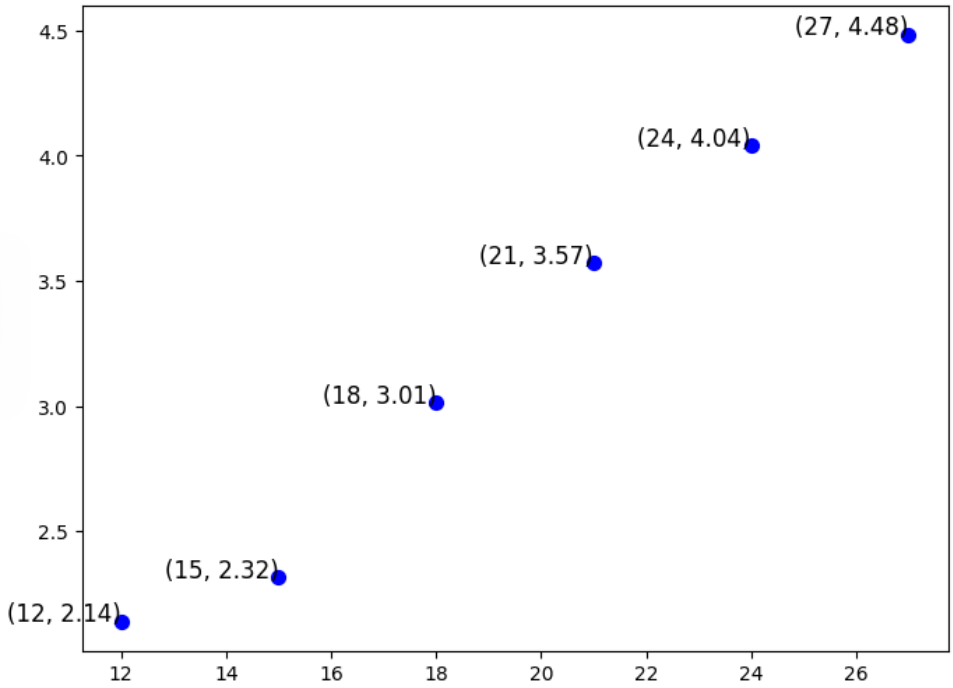
Let's consider a model $y = f[x, \phi]$ that predicts a single output y from a single input x. A 1D linear regression model describes the relationship between input x and output y as a straight line. Hence,

$$y = f[x, \phi]$$
$$y = \phi_0 + \phi_1 x$$

i.e. y is equal to sum phi-0 with product of phi-1 and x. phi-0 is our y-intercept and phi-1 is gradient.As we studied in class, the loss function of this model can be defined as:

$$L[\phi] = \sum_{i=1}^{I} (f[x_i, \phi] - y_i)^2$$
$$L[\phi] = \sum_{i=1}^{I} (\phi_0 + \phi_1 x_i - y_i)^2$$

For this model the training dataset consists of I input/output pairs $\{x_i, y_i\}$. Below given figure shows the data points.



Select a set of 3 values for ϕ_0, ϕ_1. Calculate the loss based on these values for this data and select the best set of ϕ values. Submit it before the start of the next class. Solution should be handwritten.