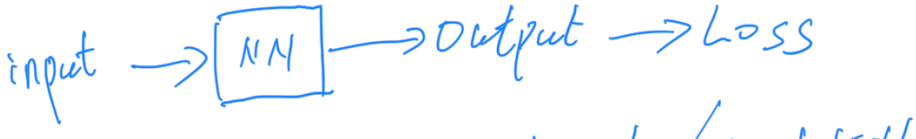
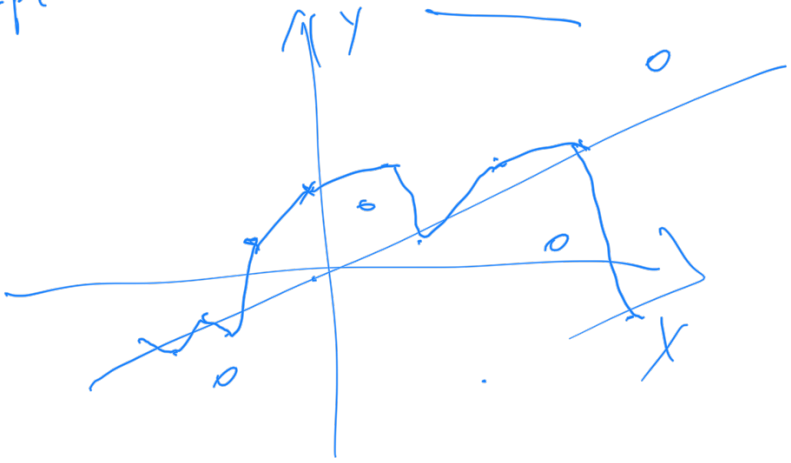
Lecture 1

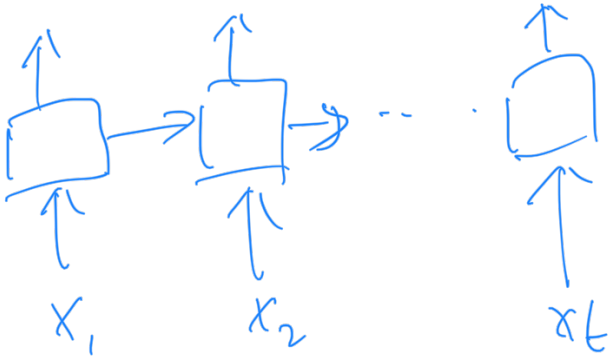
Overview:



dataset { input, labels/ground truth }

split dataset to training, validation testing



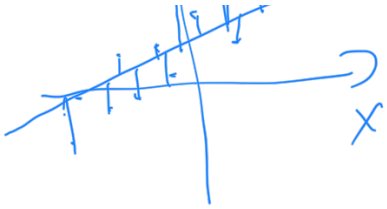


Regression Problem:

A set of data points: (x, y)

$\{(x_1, y_1), (x_2, y_2), \cdots, (x_n, y_n)\}$

$y = ax + b$



$x \rightarrow [\text{Linear}] \rightarrow y \rightarrow \text{Loss}$

$y_i' = a' x_i + b'$ $\quad \frac{\partial y'}{\partial a'} = ;$

$$L = \sum (y_i - y_i')^2$$

Arg min L $\Rightarrow$ best fit of data
(a,b)

$$\frac{\partial L}{\partial b} = 0$$

$$a^{i+1} = a^i - \lambda \frac{\partial L}{\partial a^i}$$

$$a^2 = a' - \lambda \frac{\partial L}{\partial a'} \qquad b^2 = b' - \lambda \frac{\partial L}{\partial b'}$$

$$L = \sum (y_i - y_i')^2$$

$$a^2 = a' - \lambda \frac{\partial \sum (y_i - y_i')^2}{\partial a'}$$

$$= a' - \lambda \sum \frac{\partial (y_i - y_i')^2}{\partial a'}$$

$$= a' - \lambda \sum -2 (y_i - y_i') \cdot \frac{\partial y_i'}{\partial a'}$$

$$= a' - \lambda \sum_i [-2 (y_i - y_i') x_i]$$

$$= a' - \lambda \sum_i [-2(y_i - (a' x_i + b')\, x_i]$$

$$y_1, (x_{11}, x_{12}, \cdots x_{1m})$$

$$y = a_0 + a_1 x_1 + a_2 x_2 + \cdots a_m x_m$$

$$= \vec{a}^T \vec{x} \qquad \vec{x} = \begin{bmatrix} 1 \\ x_1 \\ \vdots \\ x_m \end{bmatrix} \qquad \vec{a} = \begin{bmatrix} a_0 \\ \vdots \\ a_m \end{bmatrix}$$