2019-10-07

- Inner product of vectors

$$x^T y = x \cdot y = \langle x, y \rangle$$

$$x^T y = \begin{bmatrix} x_1 & x_2 & \cdots & x_N \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_N \end{bmatrix} = x_1 y_1 + x_2 y_2 + \cdots + x_N y_N = \sum_{i=1}^{N} x_i y_i$$

$$x \in R^{N \times 1}$$

$$y \in R^{N \times 1}$$

$$x^T y \in R$$

$$x = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \quad y = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}, \quad x^T y = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} = 1 \cdot 4 + 2 \cdot 5 + 3 \cdot 6 = 32$$

- Weighted Sum

$$x = [x_1, \ldots, x_N]^T, \quad w = [w_1, \ldots, w_N]^T$$

$$w_1 x_1 + \cdots + w_N x_N = \sum_{i=1}^{N} w_i x_i$$

Practice

↳ In a Jupyter Notebook, I have solved it.

- weighted Average

Math class: 1 credit, scored 100
English class: 3 credit, scored 60

$$\text{weighted Average} = \frac{1}{1+3} \times 100 + \frac{3}{1+3} \times 60 = 70$$

- Similarity

↳ "Jupyter" note book.