Vector Multiplication - Element wise multiplication

Corresponding elements of 2 vectors are multiplied to form a new vector of the same dimension

Say I have 2 vectors

$$A = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \quad B = \begin{bmatrix} 3 \\ 4 \\ 5 \end{bmatrix}$$

$$A \otimes B = \begin{bmatrix} 3 \\ 8 \\ 15 \end{bmatrix}$$

This is how you represent it

→ The Result vector will have the same dimension

→ Previously in normal multiplication we actually get a scalar

Features Engineering → creating new features from raw data to improve the performance of the ML model

Say you have a date column

→ These columns can be added features (to enhance the performance)

date	day	month	year
2023-01-01	1	1	2023
2023-02-15	15	2	2023
2023-03-20	20	3	2023

Application → (Vector multiplication
(in Data Science) ↳ Element wise)

Feature Engineering

These are the 2 new vectors which we added

Product	Cost		Discount		Discounted Price	Final Price
A	1000	⊗	0.1	=	100	900
B	500	⊗	0.2	=	100	400
C	200	⊗	0.15	=	30	170

considering them to be a vector

Also you can use Element wise mul in Deep Learning

Deep Learning → RNN, LSTM RNN, GRU RNN

⊗ ⊕ ⇒ forget gate, input gate

⊗ example (for passing info)

$$\begin{bmatrix} 0.5 \\ 0.6 \\ 0.3 \end{bmatrix} \otimes \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \Rightarrow \begin{bmatrix} 0 \\ 0 \\ 0.3 \end{bmatrix}$$

→ forget the first two

→ only this data passes

gate → pass info (or) not