20 JUNE 2024

LINEAR ALGEBRA

Systems of equations:

$y = mx + b$ — best values for w & b

$y = w_1x_1 + w_2x_2 + b$ — forms a PLANE

} LINEAR RELATIONSHIPS

no. of data points equal to the no. of features would be required to form the RELATIONSHIP. } FORMS THE SYSTEM OF LINEAR EQUATIONS

So,

$$\left.\begin{array}{l} w_1x_1^1 + w_2x_2^1 + w_3x_3^1 + \dots w_nx_n^1 + b = y^1 \\ \vdots \\ w_1x_1^m + \dots\dots\dots\dots + b = y^m \end{array}\right\}$$

$$\underbrace{\begin{bmatrix} W_1 & W_2 & \dots & W_n \end{bmatrix}}_{W \text{ vector}} \quad \underbrace{\begin{bmatrix} X_1^1 & \dots & X_n^1 \\ X_1^2 & & \vdots \\ X_1 & & \vdots \\ \vdots & & \vdots \\ X_1^m & & X_n^m \end{bmatrix}}_{X \text{ matrix}} \Bigg\} \quad WX + b = Y \text{ (vector)}$$

ok, so the thing which is common throughout the system of linear equations are the weights & form the weight vector!!

Systems of sentences ⇒ Systems of equations } WHEN SYSTEM IS CONTRADICTORY OR REDUNDANT IT IS A SINGULAR SYSTEM } MEASURE OF HOW REDUNDANT A SYSTEM IS ITS RANK

Linear equation } LINE

GEOMETRIC NOTION OF SINGULARITY : NON INTERSECTING

singular matrix $\Delta = 0$ ✓

SO, THE BIAS TERM DOESN'T MATTER FOR SINGULARITY

LINEAR DEPENDENCE — Singular Matrix $\Delta = 0$

$$\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 2 \\ 1 & 1 & 3 \end{bmatrix} = 0 = \Delta$$

One row can be represented as a combination of other 2 rows } LINEAR DEPENDENCE

DETERMINANT

non singular matrices have non zero determinant

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

Singular if $R1 * k \rightarrow R2$ ∵ $ak = c$, $bk = d$

Formula of DETERMINANT: $ad - bc$ $\left\{ \frac{c}{a} = \frac{d}{b} \right.$

LAB