Closed form equation

Mathematical expression or formula the directly provided the optimal values of model parameters without the need for iterative process. These closed form solutions are often used in Linear Regression.

Linear regression is a classic example of closed form solution

Date

Simple linear regression we have linear relationships between input features (X) & target variable (Y)

$$Y = \beta_0 + \beta_1 * x$$

Regularization L_1 & L_2

L_1 Regularization (Lasso)

1) Adds a penalty term to the cost function that is proportional to the absolute values of model parameters
2) Encourages model parameters to become zero.
3) Can produce sparce models, some features will have zero weights.

$$\text{Cost} = \text{Loss} + \lambda \sum_i (\text{weights})$$

$\lambda \rightarrow$ Regularization strength.

L2 Regularization (Ridge regression)

1) Adds a penalty term to the cost function that is proportional to the squared values of model parameter
2) Encourages parameters to be small but not zero
3) Smooth process, shrinking of weights towards zero

$$\text{Cost} = \text{Loss} + \lambda \sum (\text{weights}^2)$$

L1 → when most of the features are irrelevant, to perform feature selection
L2 → when you want to prevent multicollinearity

Elastic Net

Combination of L1 & L2
Used when multiple features are correlated with one another