Regularisation

① Underfitting ② Overfitting

Bias & Variance ⇒ Tradeoff ⇒ Bet bias & Variance

↓

Inability of the model to learn properly. ⇒ assumptions / Inductive bias

① Low bias ⇒ fewer assumptions ⇒

② High bias ⇒ ~~few~~ more assumptions ⇒ Underfitting

Linear Regression Assumptions

① Linearity betw data

reduce high bias

⇒ Neural Nets

* More complex
* No. of features
* Increase Poly degree.

Variance: Variance is the measure of Spread from its mean.

Variance in the model is how much sensitive it is to variations in my training data.

↓

how much can my model adjust to

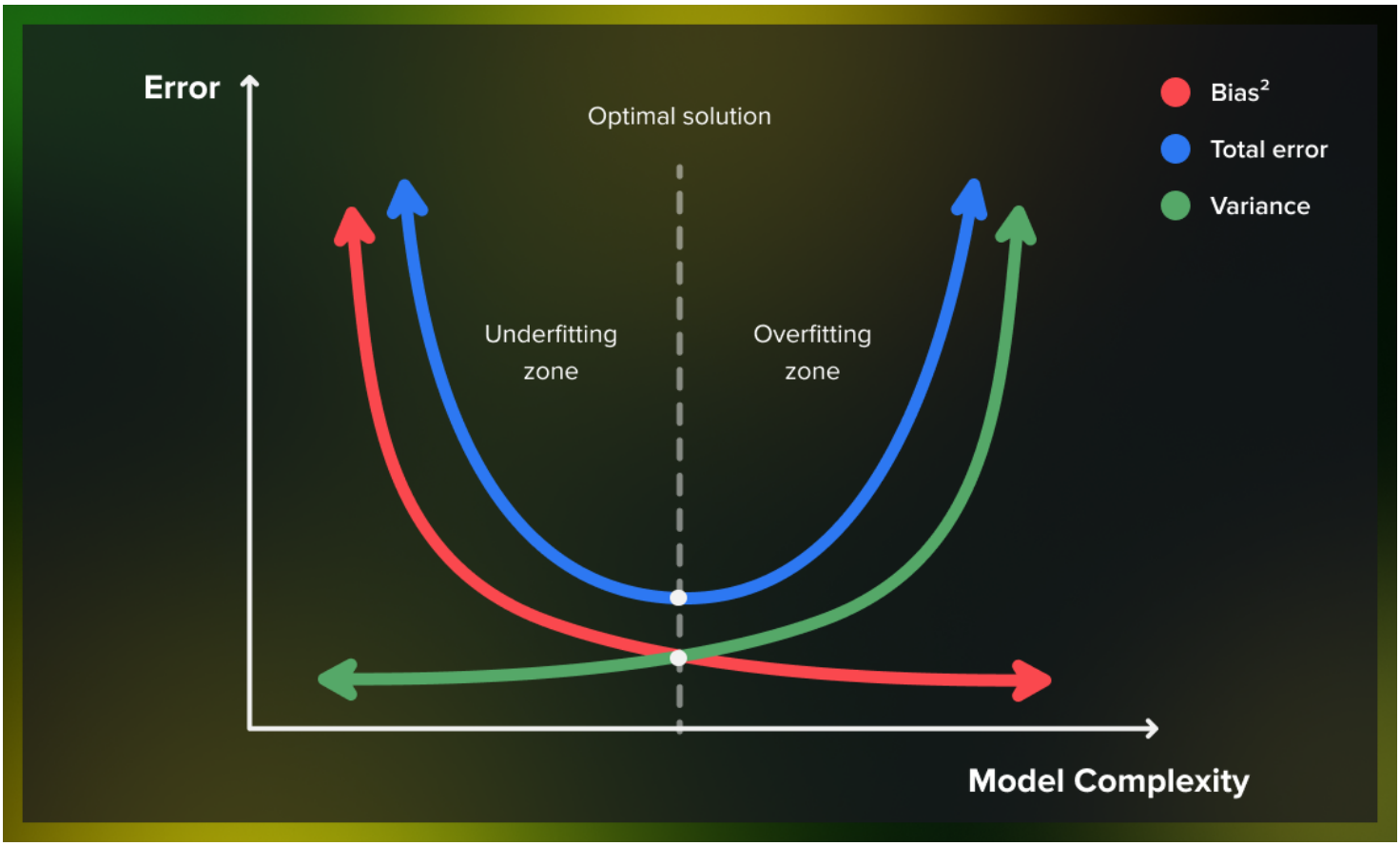
i.e., no a
variance in my train

Low variance :- Less Sensitive to changes in my train ⇒ high bias

high variance :- Overfitting highly sensitive to changes in my train set / overfitting

reducing high Variance :-

(1) Cross Val - Scores & inner par
⇒ (2) feature Selection / relevant feat
(3) Regularizati
(4) Ensembling techniq ⇒ RF - DT
(5) Early Stopping → N.N
(6) Simplifying the model → N.N


Error
Optimal solution
Bias²
Total error
Variance
Underfitting zone
Overfitting zone
Model Complexity

Regularization:

ML ⇒ Critical Thinking & Creativity

Overfitting ⇒ Optimization algorithm ⇒ parameters ⇒ $\min(J(\theta_1, \theta_2))$

↓ reduce.

Means ⇒ Model lacks generalization

↳ Adjust my Error/Cost in train to get better results in val?

I Compromise ⇒ Score ⇒ Achieve better perfor

Train ⇒ Val/Test ⇒ Generalization

Regular: Penalize my cost fu for

L_1 - lasso

Least Absolute Shrinkage & Selection operation.

$\text{argmin}\left(\|y - \theta * X\|^2 + \lambda * \|\theta\|\right)$

L_2 ⇒ Ridge

$\text{argmin}\left(\|y - \theta * X\|^2 + \lambda (\theta)^2\right)$

Slope ⇒ Derivatives

Elastic Net

$L + \lambda\left(\frac{1-\alpha}{2}(\theta)^2 + \alpha(|\theta|)\right)$

$h = \text{argmin}\left(\|y - \underset{\downarrow}{\theta} * X\|^2\right)$

params

Ridge = $L + \lambda |\theta|^2$

Lasso = $L + \lambda |\theta|$

$y = \theta$ = Slope1 * length + Slope2 * width of the item then

+ place * Slope3 + ~~fall~~ * Slope4 ~~moon day~~

+ Slope5 * day of the week

Ridge

$L + \lambda |Slope|^2$

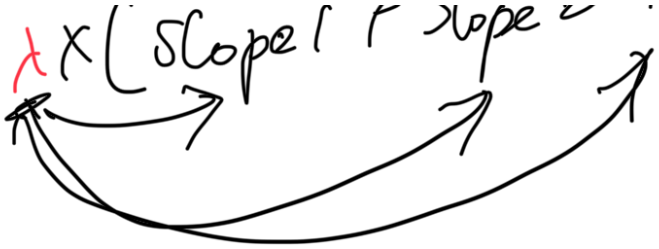
Lasso $L + \lambda |Slope|$

~~$\lambda = 0.5$~~

~~$\lambda = 5000$~~

Ridge

... Slope n^2)



Ridge ⇒ Slope values → $0 \neq 0$

lasso ⇒ Slopes values → $0 = 0$