

Elastic Net

Regularization technique that we could use

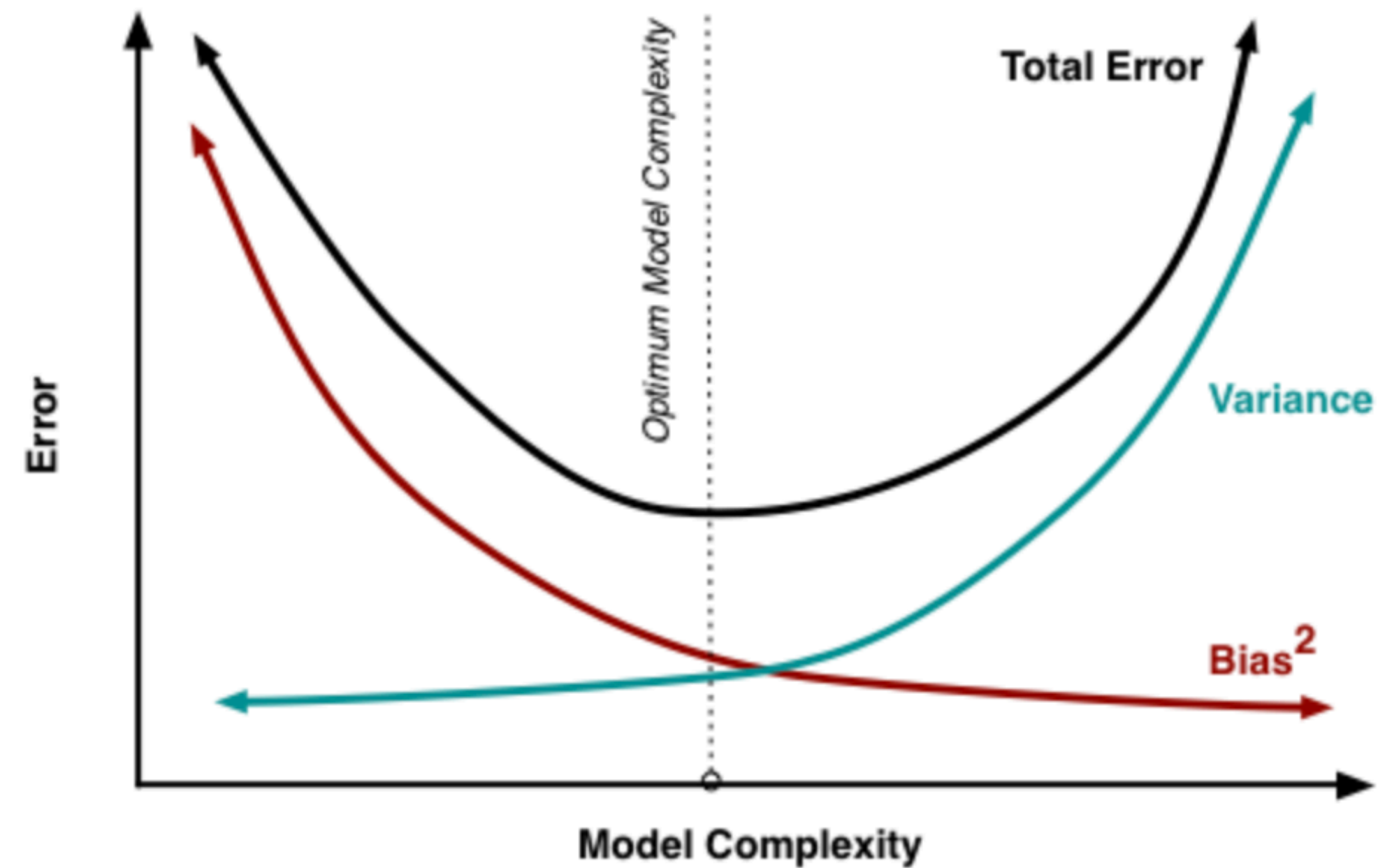
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Regularization



Minimize loss function / Prevent Overfitting

Bias-Variance trade-off

Ridge, Lasso, Elastic-Net

reduce variance at the cost of introducing some bias

Elastic Net

Reminder - Ridge & Lasso

SSR (Residual Sum of Squares) + penalty λ (lambda) on the slope

The **larger** λ we put, the **smaller slope** it becomes
= less sensitive

Ridge Regression (L2)

$$\begin{array}{c} \text{SSR} \\ + \\ \lambda * \text{the slope}^2 \end{array}$$

close to 0 - not exactly 0
preserve information

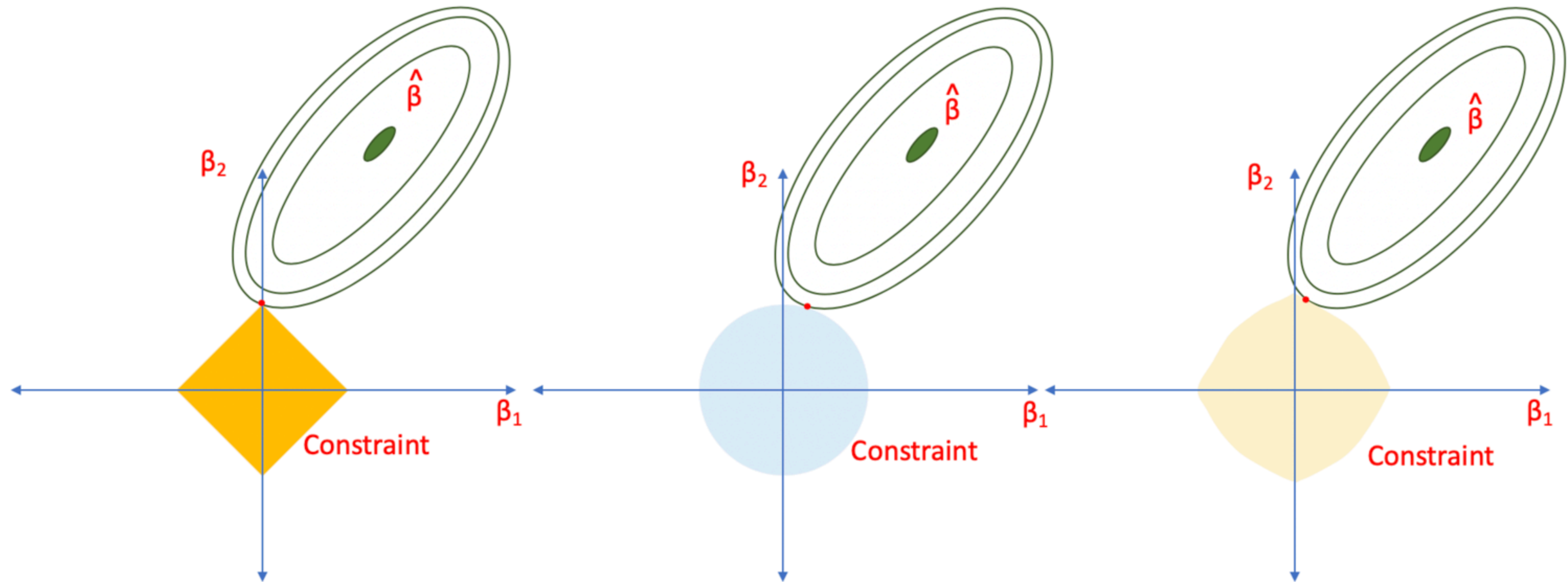
Lasso Regression (L1)

$$\begin{array}{c} \text{SSR} \\ + \\ \lambda * |\text{the slope}| \end{array}$$

makes some variables to 0
feature selection

Elastic Net

Ridge & Lasso & Elastic Net



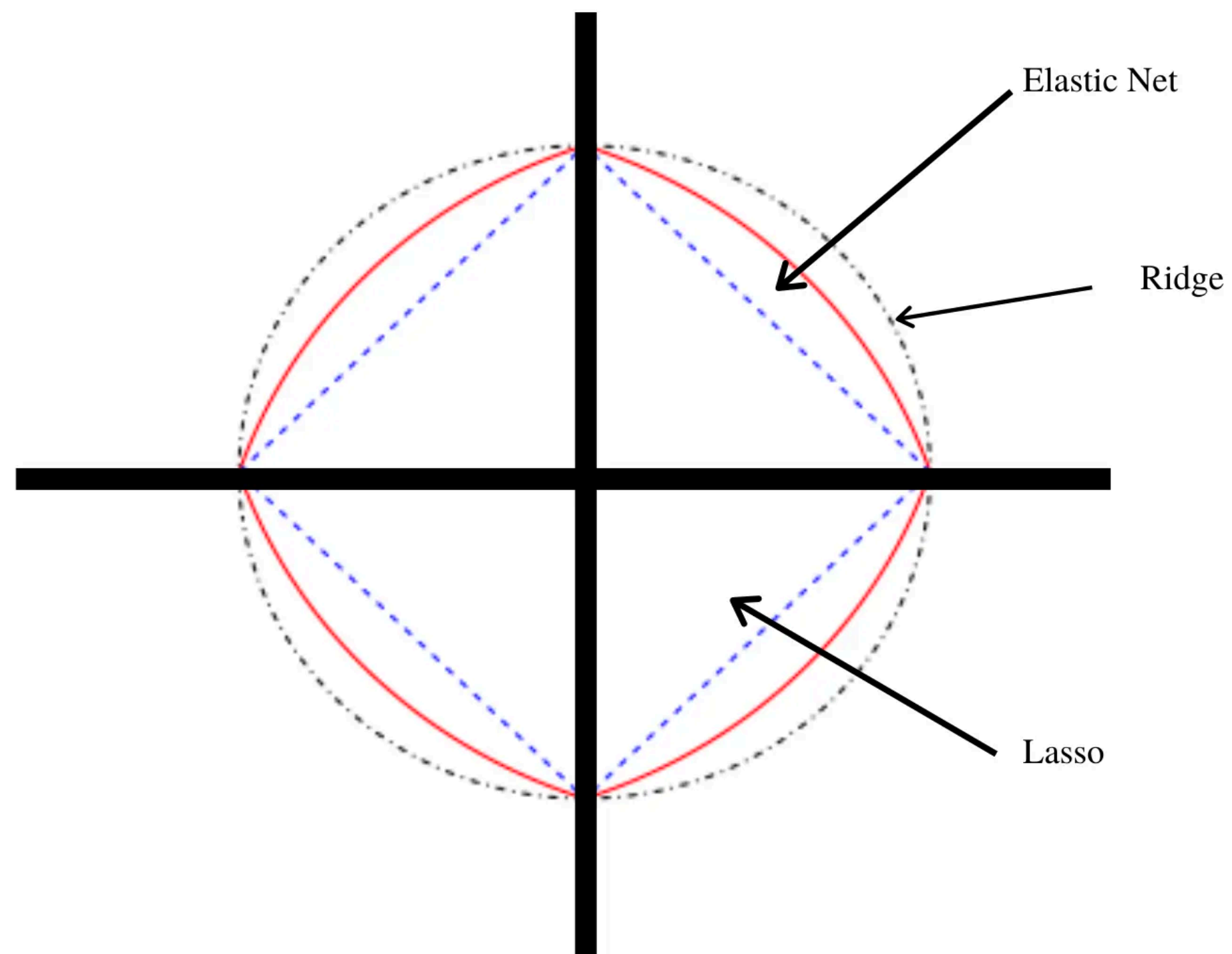
Lasso

Ridge

Elastic Net

Elastic Net

How Elastic Net works?



Convex combination of Ridge & Lasso

Loss function = SSR + **penalty**

$(\lambda_1 * \text{Lasso penalty}) + (\lambda_2 * \text{Ridge penalty})$

$$\lambda_1 \geq 0, \lambda_2 \geq 0$$

Encourage *grouping effect*

Generally works well on large dataset

Takeaway

Regularization reduces variance at the cost of introducing some bias

Elastic Net combine Ridge & Lasso for better performance

Due to **grouping effect** - good at handling correlated variables

The size of each penalties can be tuned via **Cross-Validation**

Which regularization technique to use **varies** depending on dataset

References

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Question

What are the other methods we could use to induce robustness to model?

Thank you 🤗