

Ridge vs. Lasso Regression

- Both ridge and lasso are convex optimization
- The ridge solution exists in closed form
- Lasso does not have closed form solution, but very efficient optimization algorithms exist

When to choose which?

- When the actual data-generating mechanism is **sparse** lasso has the advantage
- When the actual data-generating mechanism is **dense** ridge has the advantage

Sparse mechanisms: Few predictors are relevant to the response → good setting for lasso regression

Dense mechanisms: A lot of predictors are relevant to the response → good setting for ridge regression

- Also depends on:
 - Signal strength (the magnitude of the effects of the relevant variables)
 - The correlation structure among predictors
 - Sample size n vs. number of predictors p

Ridge vs. Lasso Regression

Ridge

- + Reduces Multicollinearity
- + Continuous Shrinking
- + Stable Solutions
- + Computationally Efficient
- No variable selection
- Interpretability
- Sensitive to scale

Lasso

- + Variable selection
- + Sparse models
- + Improves interpretability
- + Particularly useful for when $p > n$
- Collinearity issues
- Bias in coefficients (ℓ_1 penalty is harsher)
- Computationally intensive