Lab 5: Regression & Neural Networks

> CS410: Artificial Intelligence
> Shanghai Jiao Tong University, Fall 2021

Exercise 1: Linear Regression

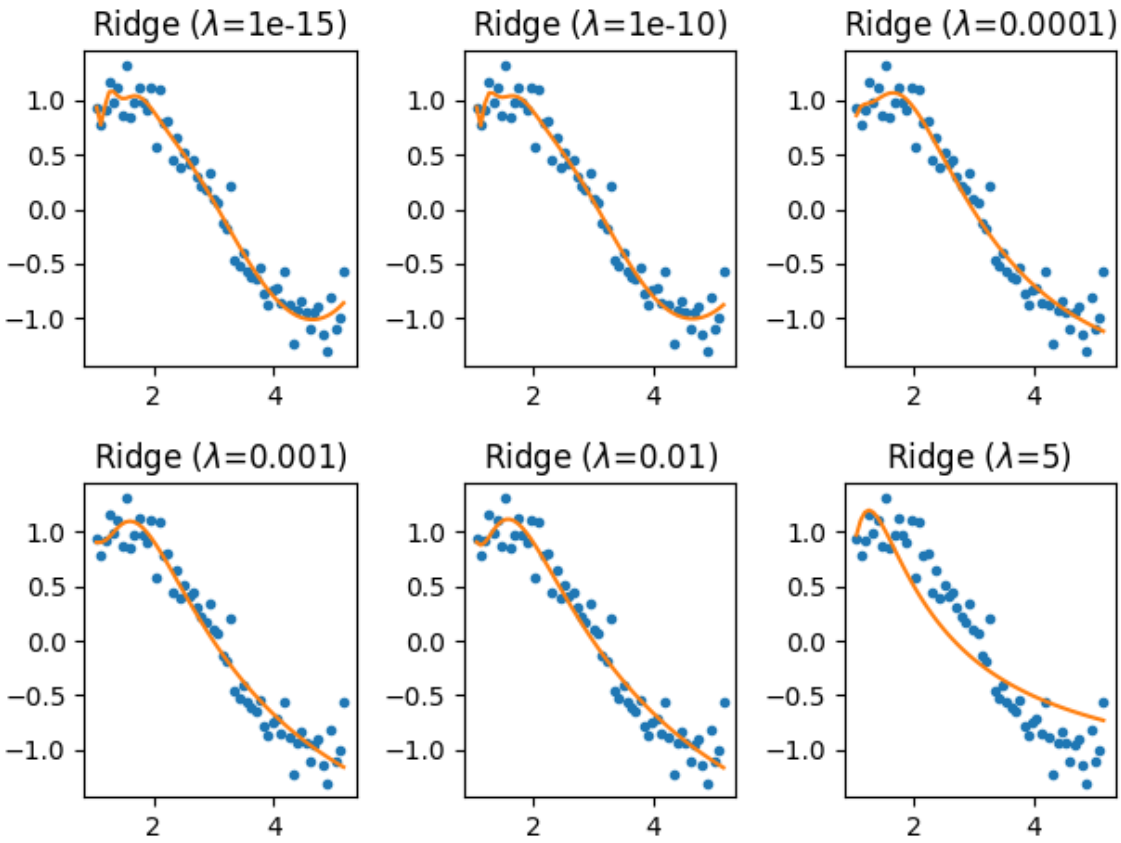
It is not hard to compute $\hat{Y}$. One way to verify the geometric interpretation is to compute and show that $X^\top(Y - \hat{Y}) \approx \mathbf{0}$.

Exercise 2: Logistic Regression

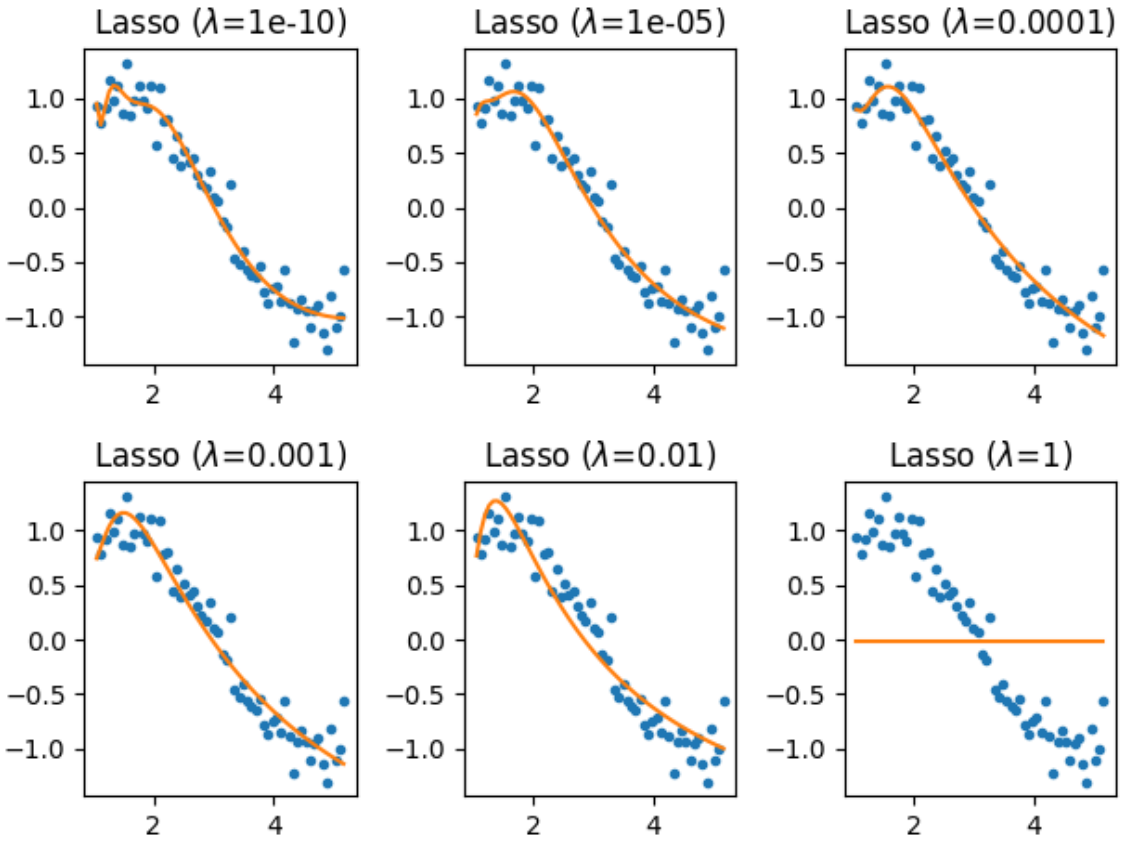
Please refer to the code. Reasonable discussions are acceptable.

Exercise 3: L1/L2 Regularization

Ridge regression:



Lasso regression:

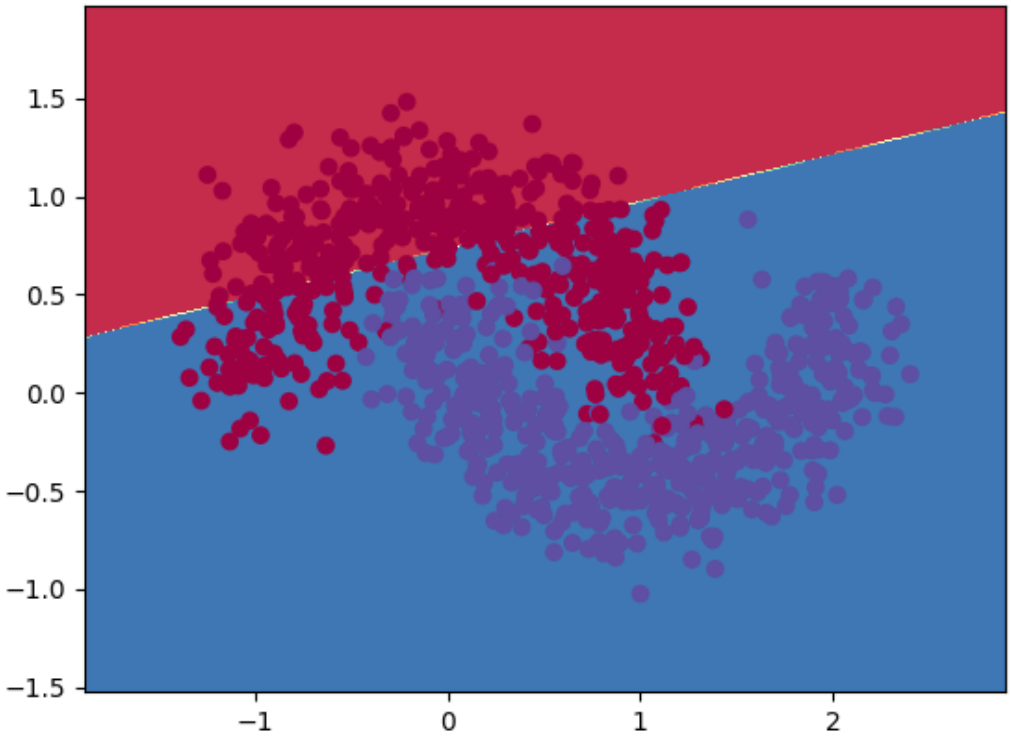


Discussions:

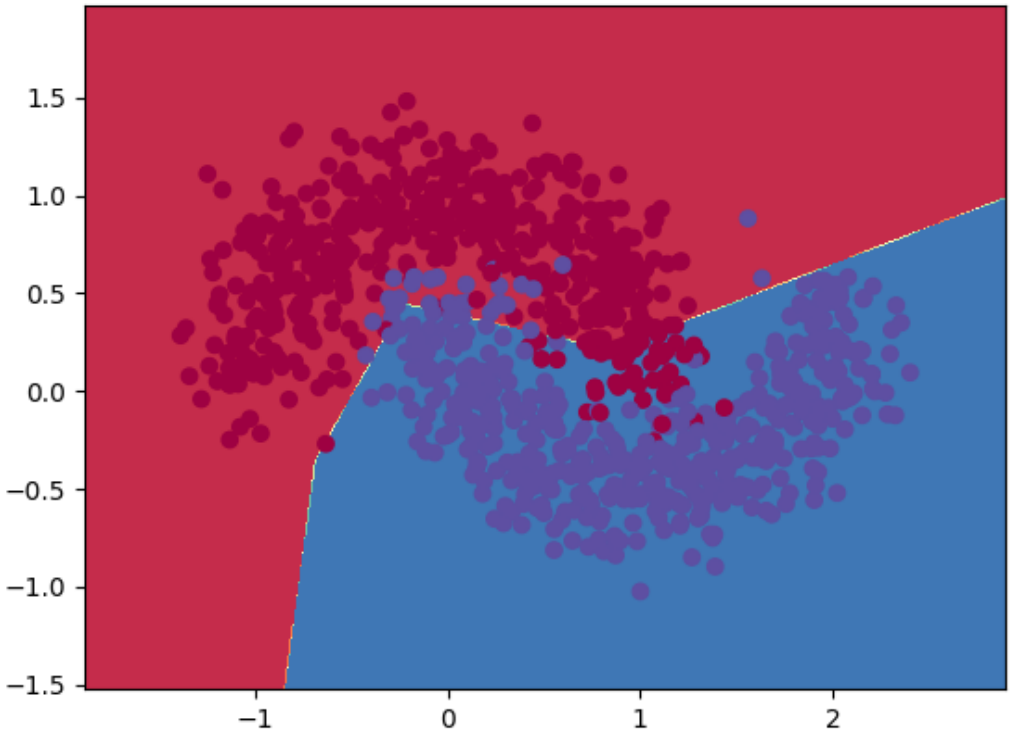
1. Theoretically, Lasso regression requires more complex optimization techniques, which is usually computationally expensive. However, such difference may not be observed at this scale.
2. Lasso regression.
3. There is a trade-off. You can discuss it based on the results.

Exercise 4: Two-layer Perceptron Network

`hidden_dim=2`:



`hidden_dim=10`:



Generally speaking, larger `hidden_dim` leads to better fitting (in terms of error and stability).

Any reasonable discussions are acceptable.