Machine Learning 1 - Practice Problems 4

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1. Bias and Variance Analysis

([Alp2014] Exercise 4.9 pp 90) Given the samples $X_i = \{x_i^t, r_i^t\}$, we define $g_i(x) = r_i^1$, meaning our estimate for any x is the r value of the first instance in the (unordered) dataset X_i.

- Compare the bias and variance of $g_i(x) = r_i^1$ with those of $g_i(x) = 2$ and $g_i(x) = \sum r_i^t/N$.
- Consider the case where the sample is ordered, so that $g_i(x) = \min_t r_i^t$. What changes?

2. Ridge Regression Experiments

Repeat the experiments in the bias and variance notebook using ridge regression:

- Use a fixed polynomial degree (e.g., 10).
- Vary the α parameter.

References

Alp2014 Alpaydin, E. *Introduction to Machine Learning*, 3rd Ed., The MIT Press, 2014.

- Colab Notebook
- Scikit-Learn: Linear Models