Math 342W/642/742W

Recitation – Day #20 (4.29.25)

I. Model Averaging/Bagging

(i) What does the meta-algorithm called "*Model Averaging*" entail?

(ii) What is the MSE of g_{avg}?

(iii) Why is the result of the MSE found in part (ii) impossible?

(iv) How do we make the models $g_1, \ldots, g_M$ "*more*" independent? What is this technique called?

(v) What bonus feature do we get with bagging?

II. Math 241 Review

Let $\bar{X} = \frac{1}{n}(X_1 + X_2 + \cdots + X_n)$ where the X_i's are dependent random variables.

(i) Find $\text{Var}[\bar{X}]$.

(ii) Recall definition of $\text{Cov}[X_i, X_j]$.

(iii) Find the expression for the correlation coefficient ρ.

Assume σ^2 is the same for all X_i, ρ is the same for all X_i, X_j where $i \neq j$.

(iv) Complete the expression for $\text{Var}[\bar{X}]$ in part (i).

III. More on Bagging

(i) Assuming that $\text{Var}[g_i] = \sigma^2$ and $\text{Corr}[g_i, g_j] = \rho$, find the MSE for bagging.

(ii) How can we decorrelate the trees even more leading to minimizing the variance of the MSE even further?