PROB 140

Probability for Data Science

Fall 2021

WEEK 12 STUDY GUIDE

The Big Picture

The least squares predictor of one variable given another, and the error in it

- If you have the scatter diagram of simulated (X,Y) pairs, then Data 8 ideas say that given X, the best predictor of Y is the "center of the vertical strip at X."
- Formally, "best" means "least squares," and the "center of the vertical strip at X" is the conditional expectation of Y given X.
- The error in this estimate, given X, is the conditional SD of Y given X.
- This allows us to decompose the variance of Y into two easier pieces, by conditioning on X.

Week At a Glance

Mon 11/08	Tue 11/09	Wed 11/10	Thu 11/11	Fri 11/12
	Instructor's Session		University holiday	
		GSIs' Sessions	University holiday	GSIs' Sessions
HW 11 Party 12-2PM	**HW 11 Due** HW 12 (Due Tue 11/16)		University holiday	
	Lab 7A Due Lab 7B (Due Tue 11/16)		University holiday	Lab 7B Party 3-6PM
Read Sections 22.1-22.2	Read Sections 22.1-22.2 Skim Sections 22.3-22.4	Read Sections 22.3-22.4	University holiday	Work some exercises from Ch 22

Reading, Practice, and Live Sessions

Sections	Topic	Live Sessions: Prof. Sahai	Live Sessions: GSIs	Recommended Practice
Ch 22	**Approaches to inference** - 22.1 develops the main reason why conditional expectation is important for prediction - 22.2 shows that conditional expectation is a least squares predictor, and defines the error in the estimate - 22.3 decomposed variance into two pieces, by conditioning - 22.4 is a series of examples of varied uses of the method of 22.3	Tuesday 11/09 - The random variable equivalent of “dropping a perpendicular” - Least squares prediction, and a new variance - Variance by conditioning - Examples, including a look back at Section 9.2	Wednesday 11/10 - Ch 20 Ex 3 - Ch 22 Ex 6, 7 Friday 11/12 - Ch 22 Ex 2, 1, 5	Ch 22 - Ex 3, 4