PROB 140

Probability for Data Science

Spring 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 4/12	Tue 4/13	Wed 4/14	Thu 4/15	Fri 4/16
	Instructor's Session		Instructor's Session	
		GSIs' Sessions		GSIs' Sessions
No Checkpoint this week				
HW 9 Party 7PM **HW 9 Due** HW 10 (Due Mon 4/19)				
Lab 6A Due Lab 6B (Due Mon 4/19)				Lab 6B Party 5PM
Skim Sections 22.1-22.2	Read Sections 22.1-22.2	Skim Sections 22.3-22.4	Read Sections 22.3-22.4	Work some exercises from Ch 22

Reading, Practice, and Live Sessions

Sections	Topic	Live Sessions: Prof. A.	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 4/13 - The random variable equivalent of “dropping a perpendicular” - Least squares prediction, and a new variance **No checkpoint** Thursday 4/15 - Variance by conditioning - Examples, including a look back at Section 9.2	Wednesday 4/14 - Ch 21 Ex 3 - Ch 22 Ex 6, 7 Friday 4/16 - Ch 22 Ex 2, 1, 5	Ch 22 - Ex 3, 4