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Least mean squares LMS estimation vertical4



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## Exercise: Multidimensional challenges

(2/2 points)

Suppose that  $f_{\theta}$  and  $f_{X|\theta}$  are described by simple closed-form formulas. Suppose that  $\theta$  is one-dimensional but  $X$  is high-dimensional.

a) Suppose that a specific value  $x$  of the random variable  $X$  has been observed. Is it true that the calculation of the LMS estimate will always involve only ordinary integrals (integrals with respect to only one variable)?



Answer: Yes

b) Is it true that the calculation of the mean squared error of the LMS estimator will always involve only ordinary integrals (integrals with respect to only one variable)?



Answer: No


Answer:

a) The denominator in Bayes' rule involves an integral with respect to  $\theta$ . Once the conditional PDF is available, the LMS estimate is calculated by integrating again over the one-dimensional variable  $\theta$ .


b) In this case, we need to average the conditional variance over all possible values of  $x$ , and this will involve a multiple integral.

*You have used 1 of 1 submissions*


**Unit overview****Lec. 14:  
Introduction to  
Bayesian inference**

Exercises 14 due Apr  
06, 2016 at 23:59 UTC 


**Lec. 15: Linear  
models with  
normal noise**

Exercises 15 due Apr  
06, 2016 at 23:59 UTC 


**Problem Set 7a**

Problem Set 7a due  
Apr 06, 2016 at 23:59  
UTC 


**Lec. 16: Least  
mean squares  
(LMS) estimation**

Exercises 16 due Apr  
13, 2016 at 23:59 UTC 

**Lec. 17: Linear  
least mean  
squares (LLMS)  
estimation**

Exercises 17 due Apr  
13, 2016 at 23:59 UTC 

**Problem Set 7b**

Problem Set 7b due  
Apr 13, 2016 at 23:59  
UTC 

**Solved problems****Additional  
theoretical  
material****Unit summary**

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