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Courses » Applied Time-Series Analysis

Announcements

Course

Ask a Question

Progress



Unit 16 - Week 11: Estimation methods (contd.)

Course outline

R-based Exam

How to access the portal?

Assignment 0

R Tutorials

Week 1: Introduction & Overview

Week 2: Review of Probability & Statistics

Week 3: Introduction to Random Processes, Auto- and Cross- Correlation Functions

Week 4: Auto- and cross-correlation functions (contd.), Models for Linear Stationary Processes

Week 5: Models for Linear Stationary & Non-Stationary Processes

Week 6: Models for Linear Non-Stationary Processes (contd.), Fourier Transforms

Week 7: Fourier Transforms, DFT and Periodogram

Week 8: Spectral Representations & Estimation Theory

Week 9: Estimation Theory

Week 10: Estimation Methods

Week 11: Estimation methods (contd.)

- Course Notes for Week 11
- Lecture 47A: MLE and Bayesian Estimation -3
- Lecture 47B: MLE and Bayesian Estimation -4
- Lecture 48A: Estimation of Time Domain Statistics -1
- Lecture 48B: Estimation of Time Domain Statistics -2
- Lecture 49: Periodogram as PSD Estimator
- Quiz : Week 11 Assignment
- Data sets
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- Week 10-11 solutions

Week 11 Assignment

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-04-15, 23:59 IST

1 point

1)

1. For the linear predictor

$$\hat{Y} = \hat{a}X + \hat{b}Z,$$

given the sample covariance matrix of the regressors

$$S = \begin{pmatrix} 0.5 & 0.1 \\ 0.1 & 0.25 \end{pmatrix},$$

find the 99% confidence intervals for the OLS estimate of b , when we have sufficient number of samples and $\sigma_e^2 = 1$ is the variance of the measurement noise in Y .

- a. ± 4.49
- b. ± 2.95
- c. ± 6.22
- d. ± 8.91

No, the answer is incorrect.

Score: 0

Accepted Answers:

c. ± 6.22

2)

2. Given the data-generating process

$$v[k] + d_1v[k-1] + d_2v[k-2] = e[k],$$

where $e[k]$ is a zero-mean *exponential* white noise process. Which of the following about the properties of the OLS estimates of d_1 and d_2 of an AR(2) model fit to v process?

- a) The estimates are unbiased and consistent
- b) The estimates are biased and consistent
- c) The estimates are unbiased and not fully efficient
- d) The estimates are unbiased and fully efficient

No, the answer is incorrect.

Score: 0

Accepted Answers:

c) The estimates are unbiased and not fully efficient

3)

1 point

1 point

Week 12: Estimation of Power Spectral Density & Time Series Models

Case Studies on Modelling

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Interactive Session

3. For a stationary process, the "impulse-response" coefficients are estimated as:

$\hat{h}[0]$	$\hat{h}[1]$	$\hat{h}[2]$	$\hat{h}[3]$	$\hat{h}[4]$	$\hat{h}[5]$	$\hat{h}[6]$	$\hat{h}[7]$
1 (± 0.073)	-0.0387 (± 0.0985)	0.2943 (± 0.1147)	0.9688 (± 0.1247)	0.5030 (± 0.1307)	0.2073 (± 0.1327)	-0.0408 (± 0.1307)	0.0 (± 0)

What is the order of the process?

- a) 2
 b) 3
 c) 4
 d) 5

No, the answer is incorrect.

Score: 0

Accepted Answers:

c) 4

4)

1 point

4. Given two observations $v[2]$, $v[1]$ of an $AR(1)$ process $v[k] = -d_1v[k-1] + e[k]$, $e[k] \sim \mathcal{N}(0, \sigma_e^2)$, the maximum likelihood estimate of d_1 is obtained as _____

- a. $\hat{d}_1 = -\frac{v[2]}{v[1]}$
 b. $\hat{d}_1 = -\frac{v[2]^2}{v[1]^2}$
 c. $\hat{d}_1 = -\frac{v[2]v[1]}{v[1]^2 + v[2]^2}$
 d. $\hat{d}_1 = -\frac{2v[2]v[1]}{v[1]^2 + v[2]^2}$

No, the answer is incorrect.

Score: 0

Accepted Answers:

d. $\hat{d}_1 = -\frac{2v[2]v[1]}{v[1]^2 + v[2]^2}$

5)

1 point

5. For the same process and data points in Q.4, the corresponding least square estimate is obtained as _____.

- a. $\hat{d}_1 = -\frac{v[2]}{v[1]}$
 b. $\hat{d}_1 = -\frac{v[2]^2}{v[1]^2}$
 c. $\hat{d}_1 = -\frac{v[2]v[1]}{v[1]^2 + v[2]^2}$
 d. $\hat{d}_1 = -\frac{2v[2]v[1]}{v[1]^2 + v[2]^2}$

No, the answer is incorrect.

Score: 0

Accepted Answers:

a. $\hat{d}_1 = -\frac{v[2]}{v[1]}$

6)

1 point

6. For any random process, the scenario in which the MLE estimate is identical to the estimator is _____.

- a) Gaussian prior and MAP estimate.
 b) Uniform prior and MAP estimate.
 c) Gaussian prior and median estimate.
 d) Uniform prior and median estimate.

No, the answer is incorrect.

Score: 0

Accepted Answers:

b) Uniform prior and MAP estimate.

7)

1 point

7. For the MA(1) process $v[k] = e[k] - e[k - 1]$ where $e[k] \sim \mathcal{N}(0, 1)$ the best BLP using only $v[0], v[1], v[2]$, is obtained as _____ . (hint: use projection th

- a. $v[3] = -0.75v[2] - 0.5v[1] - 0.25v[0]$
- b. $v[3] = -v[2] - v[1] - v[0]$
- c. $v[3] = -0.58v[2] - 0.5v[1] - 0.5v[0]$
- d. $v[3] = -0.25v[2] - 0.5v[1] - 0.55v[0]$

No, the answer is incorrect.

Score: 0

Accepted Answers:

a. $v[3] = -0.75v[2] - 0.5v[1] - 0.25v[0]$

8)

1 point

8. The corresponding MSE for the BLP in Q.7 is obtained as _____ .

- a) 1
- b) 1.5
- c) 1.25
- d) 2

No, the answer is incorrect.

Score: 0

Accepted Answers:

c) 1.25

9)

1 point

9. In a constant temperature-sensing experiment, there are two sensors, one of which - it adds a Gaussian measurement error with variance $\sigma_1^2 = 0.8$. After collecting samples, due to a fault in the sensor, it switches off, and triggers the backup sensor adds a Gaussian measurement error with variance $\sigma_2^2 = 1.6$, which is on for another samples. The temperature data is given in w10_q9.RData. Find the WLS estimate mean temperature. (Round off to 2 decimal places) _____ .

- a) 10.57
- b) 46.51
- c) 59.97
- d) 50.56

No, the answer is incorrect.

Score: 0

Accepted Answers:

c) 59.97

10)

1 point

10. To the data given in w10_q10.RData, an AR(2) model was fit using OLS. What degree of freedom and the unbiased estimate of σ_e^2 , (the variance of the driving noise) rounded to 2 decimal places?

- a) 98, 0.85
- b) 98, 0.87
- c) 2, 0.83
- d) 2, 0.81

No, the answer is incorrect.

Score: 0

Accepted Answers:

b) 98, 0.87

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