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Graded Assignment due Feb 8, 2017 17:30 IST

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Module 2 Assessment - Part 2 (incl. MATLAB)

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You have 6 monthly measurements of the height of a point on a glacier. The measurements are obtained from a satellite laser altimeter.

Time [months]: [0, 1, 2, 3, 4, 5]

Observed heights [meters]: [100.9, 99.6, 98.7, 99.9, 100.3, 98.5]

We will consider four different functional models, with the following observation equations:

Model 1: zero-order polynomial: $E\{\underline{y}_i\} = x_0$

Model 2: second order polynomial: $E\{\underline{y}_i\} = x_0 + x_1 t_i + x_2 t_i^2 = \sum_{p=0}^2 x_p t_i^p$

Model 3: fifth order polynomial: $E\{\underline{y}_i\} = \sum_{p=0}^5 x_p t_i^p$

Model 4: $E\{\underline{y}_i\} = x_0 + x_1 \cdot t_i + x_2 \cos\left(\frac{2\pi t_i}{12}\right)$

- ▶ 4. Best Linear Unbiased Estimation (BLUE)
- ▶ Pre-knowledge Mathematics
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MATLAB ASSIGNMENT GLACIER MODEL (EXTERNAL RESOURCE)

Glacier model

You will now define the A -matrix for each of the four models of the height change of a point on a glacier (see introduction above).

What is the redundancy for each model?

Your Solution



Save



Reset

MATLAB Documentation (<https://www.mathworks.com/help/>)

```

1 %% times of observation [months]
2 t = [0 1 2 3 4 5]';
3 %% observed heights [m]
4 y = [100.9 99.6 98.7 99.9 100.3 98.5]';
5
6 %% number of observations
7 m = length(t);
8
9 %% design matrices for the four models [complete the code on all 4 lines below]
10 A1 = ones(6, 1)
11 A2 = [A1, t, t.^2]
12 A3 = [A1, t, t.^2, t.^3, t.^4, t.^5]
13 A4 = [A1, t, cos(2*pi*t/12)]
14
15 %% what is the redundancy with each model? [complete the code on all 4 lines below]
16 r1 = 5
17 r2 = 3
18 r3 = 0
19 r4 = 3
20
21

```

Run

Submit for Assessment

Assessment Tests: Correct

Glacier model - questions

2/2 points (graded)

What is the redundancy of each model?

Redundancy model 1:

✓ Answer: 5

Redundancy model 2:

✓ Answer: 3

Redundancy model 3:

✓ Answer: 0

Redundancy model 4:

✓ Answer: 3

You have used 1 of 2 attempts

✓ Correct (2/2 points)

Glacier model - questions (cont'd)

2/2 points (graded)

Which of the following statements is true? *Select all correct answers.*☐ All models are overdetermined☒ None of the models is underdetermined☒ Model 3 will have a unique solution☐ The stochastic model for each model will different

You have used 1 of 2 attempts

✓ Correct (2/2 points)

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