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Warming up

5.1. Error Propagation

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Assessment

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Exercises: Estimator Precision and Confidence Interval (2)

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Assume we have an estimate of an two-dimensional \mathbf{x} vector as $\hat{\mathbf{x}} = \begin{bmatrix} 100 \\ 100 \end{bmatrix}$. In the following question, there are five covariance matrices ($\mathbf{Q}_{\hat{\mathbf{x}}\hat{\mathbf{x}}}$) corresponding to five different estimators of \mathbf{x} . In addition to the covariance matrices, six different two-dimensional confidence intervals (or confidence regions/ellipse) are provided. In these plots, the corresponding 68.3%, 95.4%, and 99.7% confidence regions are denoted as blue, red, and green ellipses, respectively. Drag each covariance matrix and drop it to its associating confidence-region plot.


Covariance matrix and Confidence region

1/1 point (ungraded)

🖨 Keyboard Help

PROBLEM

Drag the correct correct covariance matrix to the corresponding confidence region (ellipse) plots

Graded Assignment due Feb 8,
2017 17:30 IST 

Q&A Forum

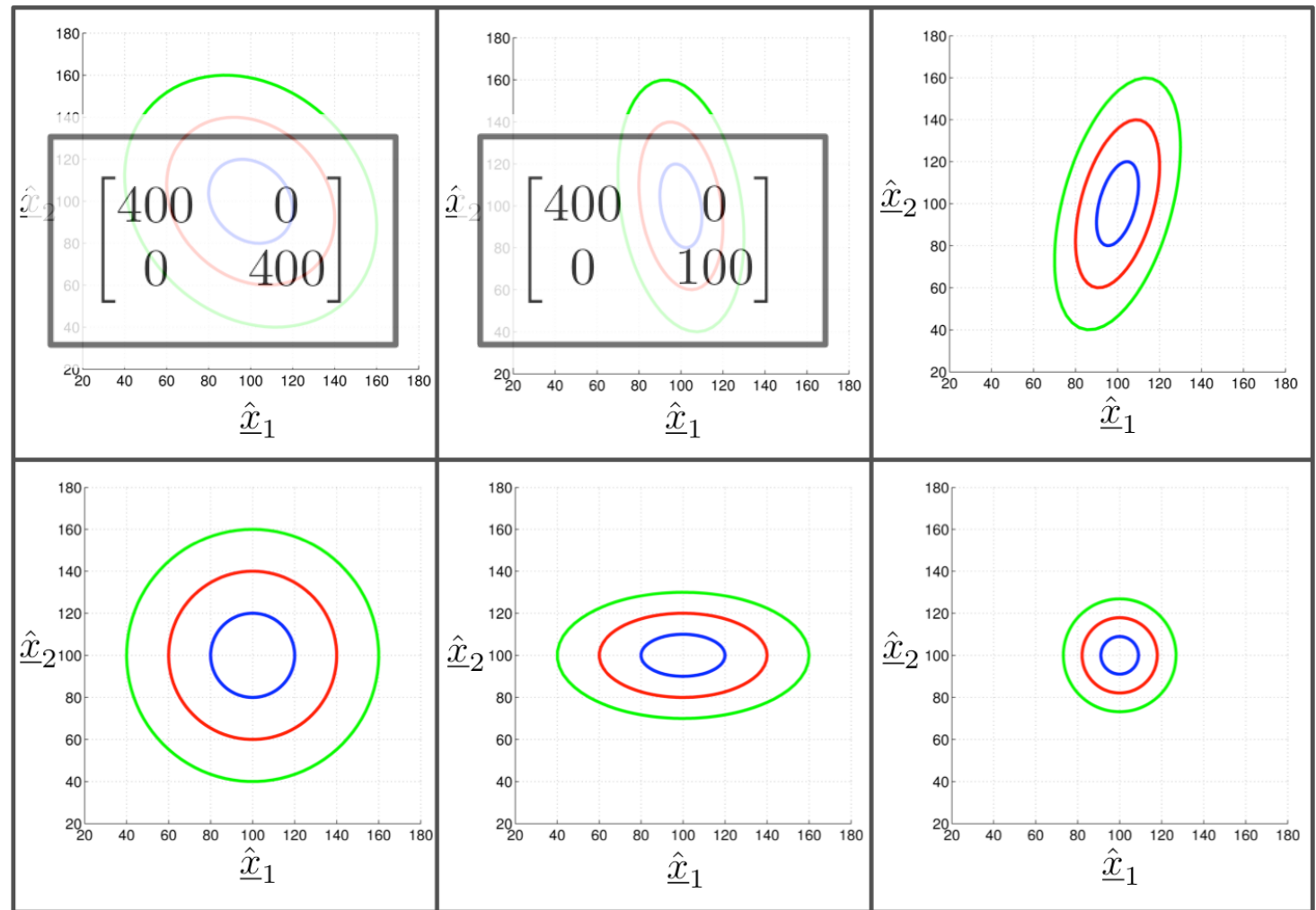
Feedback

- ▶ 6. Does the estimate make sense?
- ▶ Pre-knowledge Mathematics
- ▶ MATLAB Learning Content

$$\begin{bmatrix} 400 & -80 \\ -80 & 400 \end{bmatrix}$$

$$\begin{bmatrix} 100 & -50 \\ -50 & 400 \end{bmatrix}$$

$$\begin{bmatrix} 100 & 90 \\ 90 & 400 \end{bmatrix}$$



 Reset

Feedback

i Good work! You have completed this drag and drop problem.

Error propagation for average (2)

1/1 point (ungraded)

An unknown parameter x is estimated by taking the average of m observations: $\hat{x} = \frac{1}{m} \sum_{i=1}^m y_i$ where y_i are independent and $y_i \sim N(0, \sigma_y^2)$.

What will be the 95 percent confidence interval of \hat{x} ?

☐ $\hat{x} \pm \frac{1.96}{m} \sigma_y^2$

☒ $\hat{x} \pm \frac{1.96}{\sqrt{m}} \sigma_y$ ✓

☐ $\hat{x} \pm \frac{1.96}{m} \sigma_y$

☐ $\hat{x} \pm \frac{2}{\sqrt{m}} \sigma_y$

Feedback

$$\hat{x} = \left[\frac{1}{m} \quad \frac{1}{m} \quad \dots \quad \frac{1}{m} \right] \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_m \end{bmatrix}, \quad \sigma_{\hat{x}}^2 = \left[\frac{1}{m} \quad \frac{1}{m} \quad \dots \quad \frac{1}{m} \right] (\sigma_y^2 I_m) \begin{bmatrix} \frac{1}{m} \\ \frac{1}{m} \\ \vdots \\ \frac{1}{m} \end{bmatrix} = \frac{\sigma_y^2}{m}, \quad \sigma_{\hat{x}} = \frac{\sigma_y}{\sqrt{m}}$$

Submit

✓ Correct (1/1 point)

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