Least Square Fit

Spoken Tutorial Project
http://spoken-tutorial.org
National Mission on Education through ICT

http://sakshat.ac.in

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Objectives

At the end of this tutorial, you will be able to,

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- **Generate the least square fit line for a given set of points.**

System Specifications

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- **`IPython 4.0.0`**

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To practise this tutorial, you should know how to -

- **use plot interactively.**
- **load data from files.**
- **use arrays and matrices.**

If not, see the pre-requisite Python tutorials on http://spoken-tutorial.org.

Exercise 1

- **Generate a least square fit line for l v/s t^2 using the data in the file 'pendulum.txt'.**

Matrix Formulation

- **We need to fit a line through points for the equation** $T^2 = m \cdot L + c$
- **In matrix form, the equation can be represented as** $T_{sq} = A \cdot p$**,**

where T_{sq} **is** $\begin{bmatrix} T_1^2 \\ T_2^2 \\ \vdots \\ T_N^2 \end{bmatrix}$ **, A is** $\begin{bmatrix} L_1 & 1 \\ L_2 & 1 \\ \vdots & \vdots \\ L_N & 1 \end{bmatrix}$

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and p is $\begin{bmatrix} m \\ c \end{bmatrix}$

We need to find p **to plot the line**

Summary

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- **Use the function `lstsq()` to generate a least square fit line.**

Evaluation

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   - **Error**

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2. **The plot of "u" vs "v" is a bunch of scattered points that show a linear trend. How do you find the least square fit line of "u" v/s "v".**

Solutions

1. `array([1, 1, 1])`

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2. ```
   A = array(u,
   ones_like(u)).T
   result = lstsq(A, v)
   m, c = result[ 0 ]
   lst_line = m * u + c
   ```


   ```

Forum to answer questions

- **Do you have questions in THIS Spoken Tutorial?**
- **Choose the minute and second where you have the question.**
- **Explain your question briefly.**
- **Someone from the FOSSEE team will answer them. Please visit**

http://forums.spoken-tutorial.org/

Forum to answer questions

- **Questions not related to the Spoken Tutorial?**
- **Do you have general / technical questions on the Software?**
- **Please visit the FOSSEE Forum**

  http://forums.fossee.in/
- **Choose the Software and post your question.**

Textbook Companion Project

- **The FOSSEE team coordinates coding of solved examples of popular books**
- **We give honorarium and certificate to those who do this**

For more details, please visit this site:

http://tbc-python.fossee.in/

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- More information on this Mission is available at: http://spoken-tutorial.org/NMEICT-Intro

THANK YOU!

For more Information, visit our website
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