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

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









▶ Ubuntu Linux 14.04





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- ▶ Python 2.7.6





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- Python 2.7.6
- ▶ IPython 4.0.0





To practise this tutorial, you should know how to -





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use plot interactively.





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- use plot interactively.
- load data from files.





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- 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 I v/s t² using the data in the file 'pendulum.txt'.





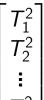
Matrix Formulation

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 $\begin{bmatrix} L_1 & 1 \\ L_2 & 1 \\ \vdots & \vdots \\ L_N & 1 \end{bmatrix}$



$$\begin{vmatrix} L_1 & 1 \\ L_2 & 1 \\ \vdots & \vdots \\ L_N & 1 \end{vmatrix}$$





Matrix Formulation

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

We need to find p to plot the line





Summary

In this tutorial, we have learnt to,

 Generate a least square fit using matrices.





Summary

In this tutorial, we have learnt to,

- Generate a least square fit using matrices.
- Use the function lstsq() to generate a least square fit line.





Evaluation

1. What does ones_like([1, 2, 3]) produce





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 - array([1, 1, 1])
 - **▶** [1, 1, 1]
 - ▶ [1.0, 1.0, 1.0]
 - Error





Evaluation

- 1. What does ones_like([1, 2, 3]) produce
 - array([1, 1, 1])
 - **▶** [1, 1, 1]
 - ▶ [1.0, 1.0, 1.0]
 - Error
- 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





Solutions

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

```
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





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 http://fossee.in/



