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Average and Standard Deviation

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1. Menu

File

*Save As	: Saves the image with a filename.
*Printer Setup	: Allows printer section and the setup.
*Print Zoom	: Sets the print zooming factor.
*Print	: Prints the image.
*Exit	: Closes the application.

Edit

*Copy	: Copies the image to Clipboard.

Statistics

*Data Input	: Sets data for the analysis.
*Previous Page	: Moves to the previous page.
*Next Page	: Moves to the next page.
*Analysis	: Analyzes the data.

Data

*Data Read	: Reads data from a data file.
*Data Save	: Copies the data to a file.

2. Introduction

Is it enough for you to calculate the <mean> and <standard deviation> of a data set in statistical data analysis? It seems to me these are not sufficient to understand the characteristics of a data set.
For example, suppose Company <A> has 50 employees and Company <B> has 20 employees. The bank deposits of the employees are as follows;

Company A:

Size of Bank Account	No. of employees
$10000	2 persons
$20000	4 persons
$30000	6 persons
$40000	8 persons
$50000	10 persons
$60000	8 persons
$70000	6 persons
$80000	4 persons
$90000	2 persons

Company B:

Size of Bank Account	No. of employees
$50000	16 persons
$94721	2 persons
$5279	2 persons

Both data sets have $50 k and $400 k for the mean and the variance (denominator = N), respectively.
Do you think that the employees of both companies have the same characteristics in the pattern of their deposits including the <Confidence Interval>?

3. Inputting Data

(1) Open the Data Input Window by pressing the <Data Input> button, or by clicking the <Data Input> menu.
(2) Input a datum by keyboard and press <Enter>. Repeat for all entries.
(3) If you want to correct a datum before hitting <Enter> key, use the <Backspace> key. After correcting the datum press <Enter>.

(4) If you want to correct a datum after pressing <Enter> key, use <Up> /<Down> key (or, Mouse right button click under the I-Beam Cursor) and/or <Previous Page> / <Next Page> menu so as to set the Caret to the datum that will be corrected. Then, input a new datum. After correcting the datum press <Enter> to fix the datum.

[NOTE] The maximum number of data to be analyzed is 1000.

4. Saving Inputted Data

(1) Click <Data Save> menu.

(2) Set an appropriate filename (and drive, directory) to save the data as Text format with the file structure of section 5.

5. Reading an External Data File

(1) Press <Data Read> button, or click <Data Read> menu.

(2) The External Data File should be in <Text Format> having the following file structure;

Numerical Value + (Enter) + Numerical Value + (Enter) + ... + Numerical Value + (Enter)

This kind of data-file can be created by Text Editor(s) for Windows/DOS, or NotePad for Windows.

If you want to add comment(s), the following format should be kept;

;This is a comment. (+Enter)

[Note] A semicolon is required at the head of a comment line.

(3) Data files formatted in any other way cannot be read by this software.

(4) Please refer to an example file, EXAMPLE.TXT.

6. Analyzing Data

(1) Press <Analysis> button, or click <Analysis> menu.

(2) Set appropriate values for <Interval Number in Graph> and <Confidence Probability for mean and standard deviation>, in <Analysis Condition> dialog.

(3) Then click <OK> button in the dialog.

[Note]

(a) <Interval Number in Graph> is defined as the number of bars between minimum and maximum values of data.

*** According to statistical data analysis, reasonable number of bars in the graph is estimated by:**

$$3.3 \log_{10}(\text{Number of Data}).$$

(b) It is assumed that the Population has a Gaussian Distribution.

7. Saving a Graph

(1) Press <Save As> button, or click <Save As> menu.

(2) Set an appropriate filename (and drive, directory) to save the data in Bitmap format.

8. Printing a Graph

(1) If necessary, set appropriate values for <Printer Setup> and/or <Print Zoom> menus.

(2) Press <Print> button, or click <Print> menu.

(3) Follow the instructions for printing which appear on the screen.

9. Copyright and Warranties

LEGAL RIGHTS. THERE MAY BE OTHER RIGHTS YOU HAVE WHICH VARY FROM STATE TO STATE.

10. Supplement

If

"m" is defined as "mean (unbiased estimator),"
"V^2" is defined as "variance (unbiased estimator)," and
"s" is defined as "standard deviation (unbiased estimator),"
we can get the following equations.

$$m = \frac{\sum_{i=1}^{N} X_i}{N}, \quad V^2 = \frac{\sum_{i=1}^{N} (X_i - m)^2}{N-1}, \quad s = \sqrt{\frac{N-1}{2}} \frac{\Gamma\left(\frac{N-1}{2}\right)}{\Gamma\left(\frac{N}{2}\right)} \sqrt{V^2},$$

where, $\Gamma(x)$ is the Gamma function.