

Analysing with One-way Layout Method

Use the one-way layout method to verify whether there is a relation to the results achieved based on one condition. Analysis of variance is carried out with this method.

Calculation

Analysis of variance chart of one-way layout method

	Sum of squares (S)	Degree of freedom (θ)	Variance (V)	Variance ratio (F)
Factor	$S_A = [A] - [X]$	$\theta_A = A - 1$	$V_A = S_A \div \theta_A$	$F_A = V_A \div V_E$
Error	$S_E = [AS] - [A]$	$\theta_E = A(N - 1)$	$V_E = S_E \div \theta_E$	
Total	$S_T = [AS] - [X]$	$\theta_T = AN - 1$		

$$[X] = (\sum \sum X_{ij})^2 \div AN$$

$$[A] = \sum_i (\sum_j X_{ij})^2 \div N$$

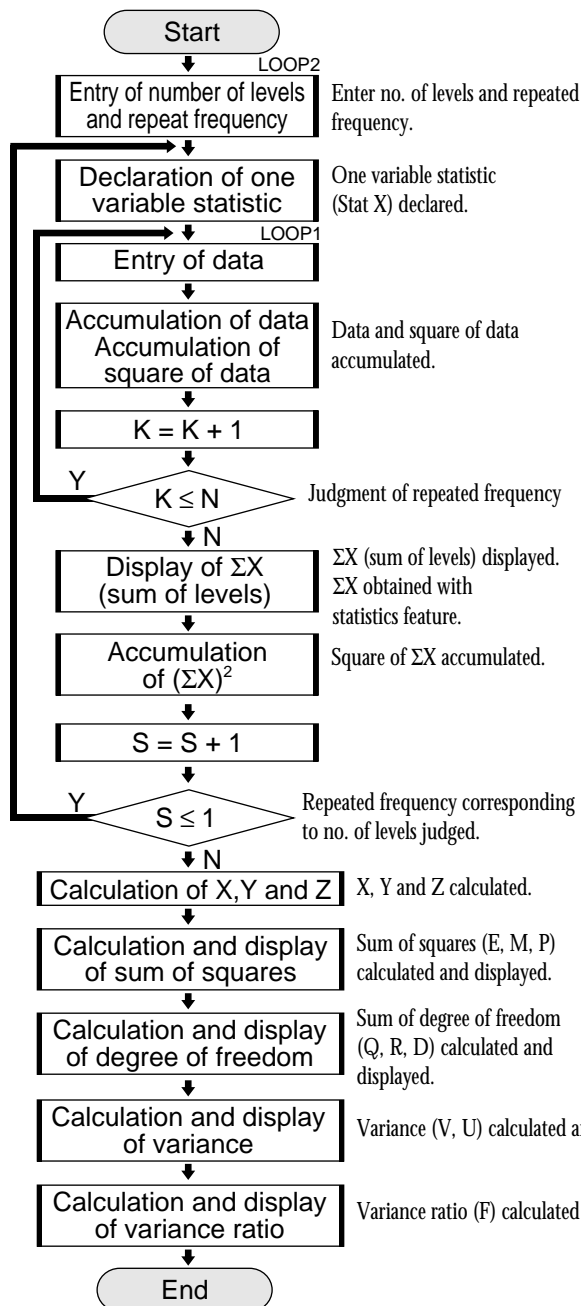
$$[AS] = \sum_i \sum_j (X_{ij})^2$$

A : number of levels

N : repeated frequency

X : number of data

FLOWCHART






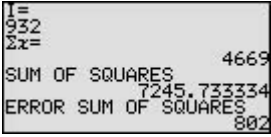
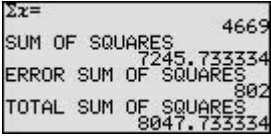
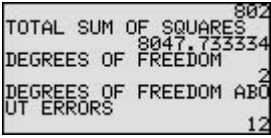
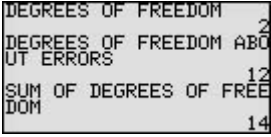
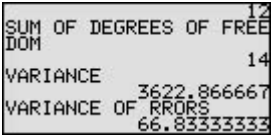
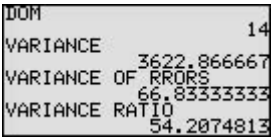
PROGRAMME LIST (STAT MODE)

Title : VARIANCE

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Rem INPUT
Print "Input LEVEL
Input L
L ÷> A
Print "Input TIMES
Input T
T ÷> N
0 ÷> W
0 ÷> B
0 ÷> C
For S, 1, A, 1
N ÷> dim(L1)
For K, 1, N, 1
ClrT
S ÷> L
K ÷> T
Print "Input DATA
Print "LEVEL
Print L
Print "TIME
Print T
Input I
I ÷> L1(K)
B+I ÷> B
C+I² ÷> C
NEXT
1_Stats L1
Σx ÷> J
Print "Σx=
Print J
Wait
W+(Σx)² ÷> W
NEXT
Rem CALCULATE
B²/A/N ÷> X
W/N ÷> Y
C ÷> Z

Rem SUM OF SQUARES
Y-X ÷> E
Z-Y ÷> M
Z-X ÷> P
Print "SUM OF SQUARES
Print E
Print "ERROR SUM OF SQUARES
Print M
Wait
Print "TOTAL SUM OF SQUARES
Print P
Wait
Rem DEGREES OF FREEDOM
A-1 ÷> Q
A*(N-1) ÷> R
A*N-1 ÷> D
Print "DEGREES OF FREEDOM
Print Q
Print "DEGREES OF FREEDOM
Print R
Print "DEGREES OF FREEDOM
Print D
Wait
Print "SUM OF DEGREES OF FREEDOM
Print D
Wait
Rem VARIANCE
E/Q ÷> V
M/R ÷> U
Print "VARIANCE
Print V
Print "VARIANCE OF ERRORS
Print U
Wait
Rem VARIANCE RATIO
V/U ÷> F
Print "VARIANCE RATIO
Print F
End
    
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Step	Key Operation	Display
4	Enter the statistical data in level 1.	
	(Display of total of hormone 10 g)	
5	Enter the statistical data in level 2.	
	(Display of total of hormone 20 g)	
6	Enter the statistical data in level 3.	
	(Display of total of hormone 30 g)	
7	(Display of sum of squares) (Display of error sum of squares)	
8	(Display of sum of squares)	
9	(Display of degrees of freedom) (Display of degrees of freedom about errors)	
10	(Display of sum of degrees of freedom)	
11	(Display of variance) (Display of variance of errors)	
12	(Display of variance ratio)	

The F-distribution chart shows that the value of F of upper probability $P = 5\%$ is 3.89. Since $f > 3.98$ in this example, the relationship between the hormone amount and the increase of mouse weight is a causal relation with 5% level of significance.