20-02-2020

The Moses Test

another test for equality of dispersion parameter was purposed by moses unlike mood test. the moses test does not assume equality of location parameter a fact that gives this test wider applicability

Assumptions.

① The data consist of two random samples $X_1, X_2 \ldots X_m$ and $Y_1, Y_2 \ldots Y_n$ from population one and two respectively

② The population distribution are continuous and have the same shape.

③ The two samples are independent

Hypothesis

Two Sided

(A) $H_0: \sigma_1 = \sigma_2$

$H_1: \sigma_1 \neq \sigma_2$

One Sided

(B) $H_0: \sigma_1 > \sigma_2$

$H_1: \sigma_1 < \sigma_2$

(C) $H_0: \sigma_1 \leq \sigma_2$

$H_1: \sigma_1 > \sigma_2$

Test Statistic

Briefly we oblain the test Statistic by

1. Subdeviding the Sample of X at random into Subsample of equal Size
2. Subdeviding the Sample of Y at random into Sub Sample of equal Size.
3. Computing for each Subsamples the Sum of Square deviation of the obs from their mean $\Sigma(\cancel{X}-\bar{X})^2$
4. and apply the Mann whitney location test to the result.

The test Statistic is then

$$T = S - \frac{m_1(m_1+1)}{2}$$

where S - The Sum of the ranks assign to the Sum of Squares Computed from Subsamples of X

Decision Rule.

Same mann whitney wala bus n ki jaga m

24-02-2020

Q.

Eexample of Moses Test

From the following data we wish to know weather these data provide Sufficient to indicate a difference in dispersion between the two Population represented by the observed Samples we Choose a level of Significance of 0.05

X	Y
26	47
30	66
32	61
17	44

21	80
27	65
26	58
44	65
35	61
14	64
18	51
18	56
17	76
23	58
29	61
16	48
13	55
36	68
28	59
23	60
24	58
34	
52	
35	

Solution

Hypothesis

$H_0 : \sigma_1 = \sigma_2$

$H_1 : \sigma_1 \neq \sigma_2$

Level of Significance

$\alpha = 0.05$

Test Statistic

$k \rightarrow$ Size

$m \rightarrow$ Subsamples.

If we let the number "k" of obs in each Subsamples = 4

$k = 4$

then the 24 "X" obs yield $m_1 = 6$ and the 21 "Y" Obs yield $m_2 = 5$

we must discard 1 "Y" obs when we randomly devide the "X" obs into "6" Subsamples "1" Possible Set of Subsamples and the Corresponding Sum of Squares are as follow.

Samples	Observations	Sum of Squares $\Sigma(X-\bar{X})^2$
1	26, 32, 35, 24	78.75
2	26, 36, 18, 23	172.75

3	18, 16, 30, 13	38.75
4	35, 27, 29, 28	978
5	52, 17, 14, 17	341
6	21, 44, 23, 34	

Random Subdivission of the y obs leads to the following Possible Set of Subsamples and Computing Sum of Squares.

Samples	Observations	Sum of Squares $\Sigma(X-\bar{X})^2$
1	60, 58, 48, 61	106.75
2	80, 58, 58, 61	336.75
3	64, 56, 51, 51	113
4	55, 44, 66, 65	317
5	54, 76, 62, 47	465

(1 discard)

* (Sum of Squares and Corresponding Ranks)

Combine ranking.

Sum of Squares of X group	Rank	Sum of Squares of Y groups.	Rank.
38.75	1	106.75	3
78.75	2	113	4
166.75	5	317	7
172.75	6	336	8
341	9	465	10
478	11		

$$T = S - \frac{m_1(m_1+1)}{2}$$

$$= 34 - \frac{6(7)}{2}$$

$T = 13$

$$\boxed{\begin{array}{l} w_{\alpha/2} = 4 \\ 1-\alpha/2 = 26 \end{array}}$$

Table Value.

Decision

Table 8.A Shows that the critical values for this test are 4 and 26

$4 < 13 < 26$

So we cannot reject H_0 and we cannot conclude that the two pop differ with respect to dispersion.