NDK_STDEVTEST

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- C/C++
- .Net

```
int __stdcall NDK_STDEVTEST(double * X,
                            size_t   N,
                            double   target,
                            double   alpha,
                            WORD     method,
                            WORD     retType,
                            double * retVal
                           )
```

Calculates the p-value of the statistical test for the population standard deviation.

Returns

status code of the operation

Return values

NDK_SUCCESS Operation successful
NDK_FAILED Operation unsuccessful. See **Macros** for full list.

Parameters

[in] **X** is the sample data (a one dimensional array).
[in] **N** is the number of observations in X.
[in] **target** is the assumed standard deviation value. If missing, a default of one is assumed
[in] **alpha** is the statistical significance level. If missing, a default of 5% is assumed.
[in] **method** is the statistical test to perform (1=parametric).
[in] **retType** is a switch to select the return output:

Method	Value	Description
TEST_PVALUE	1	P-Value
TEST_SCORE	2	Test statistics (aka score)
TEST_CRITICALVALUE	3	Critical value.

[out] **retVal** is the calculated test statistics.

Remarks

1. The data sample may include missing values (NaN).
2. The test hypothesis for the population standard deviation: \[H_{o}: \sigma =\sigma_o\] \[H_{1}: \sigma \neq \sigma_o\] Where:
   - \(H_{o}\) is the null hypothesis.
   - \(H_{1}\) is the alternate hypothesis.
   - \(\sigma_o\) is the assumed population standard deviation.

- σ is the actual (real) population standard deviation.

3. For the case in which the underlying population distribution is normal, the sample standard deviation has a Chi-square sampling distribution: $$\hat \sigma^2 \sim \chi_{\nu=T-1}^2$$ Where:
   - $\hat \sigma^2$ is the sample variance.
   - $\chi_{\nu}^2()$ is the Chi-square probability distribution function.
   - ν is the degrees of freedom for the Chi-square distribution.
   - T is the number of non-missing values in the sample data.
4. Using a given data sample, the sample data standard deviation is computed as: $$\hat \sigma(x) = \sqrt{\frac{\sum_{t=1}^T(x_t-\bar x)^2}{T-1}}$$ Where:
   - $\hat \sigma(x)$ is the sample standard deviation.
   - $\bar x$ is the sample average.
   - T is the number of non-missing values in the data sample.
5. The underlying population distribution is assumed normal (Gaussian).
6. This is a two-sides (i.e. two-tails) test, so the computed p-value should be compared with half of the significance level ($\alpha/2$).

Requirements

Header	SFSDK.H
Library	SFSDK.LIB
DLL	SFSDK.DLL

```
int NDK_STDEVTEST(double[]   pData,
                  UIntPtr    nSize,
                  double     target,
                  double     alpha,
                  UInt16     argMethod,
                  UInt16     retType,
                  out double retVal
                 )
```

Namespace: NumXLAPI
Class: SFSDK
Scope: Public
Lifetime: Static

Calculates the p-value of the statistical test for the population standard deviation.

Returns

status code of the operation

Return values

NDK_SUCCESS Operation successful
NDK_FAILED Operation unsuccessful. See Macros for full list.

Parameters

[in] **pData** is the sample data (a one dimensional array).

[in] **nSize** is the number of observations in pData.

[in] **target** is the assumed standard deviation value. If missing, a default of one is assumed

[in] **alpha** is the statistical significance level. If missing, a default of 5% is assumed.

[in] **argMethod** is the statistical test to perform (1=parametric).

[in] **retType** is a switch to select the return output:

Method	Value	Description
TEST_PVALUE	1	P-Value
TEST_SCORE	2	Test statistics (aka score)
TEST_CRITICALVALUE	3	Critical value.

[out] **retVal** is the calculated test statistics.

Remarks

1. The data sample may include missing values (NaN).
2. The test hypothesis for the population standard deviation: \[H_{o}: \sigma =\sigma_o\] \[H_{1}: \sigma \neq \sigma_o\] Where:
   - \(H_{o}\) is the null hypothesis.
   - \(H_{1}\) is the alternate hypothesis.
   - \(\sigma_o\) is the assumed population standard deviation.
   - \(\sigma\) is the actual (real) population standard deviation.
3. For the case in which the underlying population distribution is normal, the sample standard deviation has a Chi-square sampling distribution: \[\hat \sigma^2 \sim \chi_{\nu=T-1}^2 \] Where:
   - \(\hat \sigma^2 \) is the sample variance.
   - \(\chi_{\nu}^2()\) is the Chi-square probability distribution function.
   - \(\nu\) is the degrees of freedom for the Chi-square distribution.
   - \(T\) is the number of non-missing values in the sample data.
4. Using a given data sample, the sample data standard deviation is computed as: \[\hat \sigma(x) = \sqrt{\frac{\sum_{t=1}^T(x_t-\bar x)^2}{T-1}}\] Where:
   - \(\hat \sigma(x)\) is the sample standard deviation.
   - \(\bar x\) is the sample average.
   - \(T\) is the number of non-missing values in the data sample.
5. The underlying population distribution is assumed normal (Gaussian).
6. This is a two-sides (i.e. two-tails) test, so the computed p-value should be compared with half of the significance level (\(\alpha/2\)).

Exceptions

Exception Type	Condition
None	N/A

Requirements

Namespace	NumXLAPI
Class	SFSDK
Scope	Public
Lifetime	Static
Package	NumXLAPI.DLL

Examples

References

Hamilton, J .D.; Time Series Analysis , Princeton University Press (1994), ISBN 0-691-04289-6

Tsay, Ruey S.; Analysis of Financial Time Series John Wiley & SONS. (2005), ISBN 0-471-690740

See Also

[template("related")]