

# NDK\_ACF

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- C/C++
- .Net

```
int __stdcall NDK_ACF(double * X,  
                    size_t  N,  
                    size_t  K,  
                    double * retVal  
                    )
```

Calculates the sample autocorrelation function (ACF) of a stationary time series.

## 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 univariate time series data (a one dimensional array).

[in] **N** is the number of observations in X.

[in] **K** is the lag order (e.g. k=0 (no lag), k=1 (1st lag), etc.).

[out] **retVal** is the calculated sample autocorrelation value.

## Remarks

1. The time series is homogeneous or equally spaced.
2. The time series may include missing values (NaN) at either end.
3. The lag order (k) must be less than the time series size or else an error value NDK\_FAILED is returned.
4. The ACF values are bound between -1 and 1, inclusive.
5. The sample autocorrelation is computed as:

- $$\hat{\rho}(h) = \frac{\sum_{k=h}^T (y_{k-h} - \bar{y})(y_k - \bar{y})}{\sum_{k=h}^T (y_k - \bar{y})^2}$$

where:

- $y_t$  is the value of the time series at time t.
- $h$  is the lag order.
- $T$  is the number of non-missing values in the time series data.
- $\bar{y}$  is the sample average/mean of the time series.

6. Special cases: By definition,  $\hat{\rho}(0) \equiv 1.0$

## Requirements

<b>Header</b>	SFSDK.H
<b>Library</b>	SFSDK.LIB
<b>DLL</b>	SFSDK.DLL

## Examples

```
#include "SFMacros.h"
#include "SFSDK.h"

// Input time series: 110 observation
double data[110]={0.23, 0.24, 0.45, ..., 0.95}

int nRet = NDK_FAILED;
double retVal = -2.0f;
nRet = NDK_ACF(data, 110, 1, &retVal);
if( nRet < NDK_SUCCESS){
    // Error occurred
    // Call NDK_MSG to retrieve description of the error, and write it to the log
    file
    ....
}
```

```
int NDK_ACF(double[] pData,
            UIntPtr nSize,
            int nLag,
            out double retVal
            )
```

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

Calculates the sample autocorrelation function (ACF) of a stationary time series.

### Return Value

a value from [NDK\\_RETCODE](#) enumeration for the status of the call.

**NDK\_SUCCESS** operation successful

Error                      Error Code

## Parameters

- [in] **pData** is the univariate time series data (a one dimensional array).
- [in] **nSize** is the number of observations in pData.
- [in] **nLag** is the lag order (e.g. k=0 (no lag), k=1 (1st lag), etc.).
- [out] **retVal** is the calculated sample autocorrelation value.

## Remarks

1. The time series is homogeneous or equally spaced.
2. The time series may include missing values (NaN) at either end.
3. The lag order (nLag) must be less than the time series size or else an error value NDK\_FAILED is returned.
4. The ACF values are bound between -1 and 1, inclusive.
5. The sample autocorrelation is computed as:
  - $\hat{\rho}(h) = \frac{\sum_{k=h}^T (y_{k-h} - \bar{y})(y_k - \bar{y})}{\sum_{k=h}^T (y_{k-h} - \bar{y})^2}$where:
  - $y_t$  is the value of the time series at time t.
  - $h$  is the lag order.
  - $T$  is the number of non-missing values in the time series data.
  - $\bar{y}$  is the sample average/mean of the time series.
6. Special cases: By definition,  $\hat{\rho}(0) \equiv 1.0$

## Exceptions

Exception Type	Condition
None	N/A

## Requirements

<b>Namespace</b>	NumXLAPI
<b>Class</b>	SFSDK
<b>Scope</b>	Public
<b>Lifetime</b>	Static
<b>Package</b>	NumXLAPI.DLL

## Examples

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## 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

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## See Also

[template("related")]

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