

Documentation of the MATLAB function ProjDirectMV.m

The function's arguments and returned quantities are listed in the help section of the function which is reproduced below.

```
function [prest,prvar] =ProjDirectMV(x,Gi)
% projects time series missing values onto observed for m by n series x
% Uses inverse covariance matrix Gi of x taken by columns of x giving blocks of size mxm
% Solves equations directly for the missing values in terms of know series values
% prest is the original series with missing values replaced by projected
% prvar has same with zeros except variances in place of missing values
```

To be specific, the given array \mathbf{x} of size $m \times n$, which is determined in the function, has elements $x_{i,t}$ for $i = 1 \dots m, t = 1 \dots n$ that contain the values $x_{i,t}$ of stationary times series with lagged covariances

$$\Gamma_{i,j,k} = \text{Cov}(x_{i,t}, x_{j,t-k}).$$

Any desired (strict) subset of elements of \mathbf{x} may be set to NaN as indicating unknown values to be predicted by the function from the complementary set of elements (which should not be empty).

The square array \mathbf{Gi} should then be of size mn with elements $\mathbf{Gi}(i,j)$ that are the elements of the matrix G^{-1} , where G is the covariance matrix of $(x'_1, x'_2, \dots, x'_n)'$ and therefore has elements

$$G_{u,v} = \text{Cov}(x_{i,s}, x_{j,t}) = \Gamma_{i,j,s-t}$$

where $u = (s-1)m + i$ and $v = (t-1)m + j$ for $i, j = 1 \dots m$ and $s, t = 1 \dots n$.

The returned array **prest** is identical to \mathbf{x} except that the missing (unknown) values are replaced by their minimum error variance linear predictions (or projections) from the supplied (known) values.

The returned array **prvar** is identical in size to \mathbf{x} and contains, where \mathbf{x} had missing values, the (minimum error) variance of those values. Elsewhere, the elements of **prvar** are set to zero.