MatrixFactor

MatrixFactor [*flags*] *srcWave*

The MatrixFactor operation computes two real-valued output matrices, conceptually called matA and matB, whose matrix product minimizes the Frobenius norm of:

`| srcWave - (matA x matB) |`

The MatrixFactor operation was added in Igor Pro 9.00.

Flags

/COMC=*cCols*	Sets the common dimension in the factorization so that, for *srcWave* with m rows and n columns, the factorization will be (m x *cCols*) matA and (*cCols* x n) matB. If you omit /COMC, *cCols* defaults to m/2.
/CORR=*cRate*	Sets the correction factor for the learning rate. The default value is 0.9.
/DSTA=*wA*	Specifies the output wave representing matA.
/DSTB=*wB*	Specifies the output wave representing matB.
/FREE	Creates output waves as free waves.
/INIA=*iwA*	Specifies an initial solution matrix for matA. The wave must have the same dimensions as matA and the same numeric type as *srcWave*.
/INIB=*iwB*	Specifies an initial solution matrix for matB. The wave must have the same dimensions as matB and the same numeric type as *srcWave*.
/ITER=*nIters*	Sets the maximum number of iterations. By default *nIters* is 1E7.
/LRNR=*lRate*	Sets the initial learning rate of the algorithm. The default value of *lRate* is 0.01.
/OUT=*type*	Sets restrictions on the output. The default value for *type* is 0 and there are no restrictions on the elements of the output. Set *type*=1 for non-negative output elements or *type*=2 for positive output elements.
/TOL=*tolerance*	Use /TOL to terminate iterations when the average Frobenius norm per input point falls below the tolerance value. By default *tolerance* is 1E-9 for single precision floating point input wave and 1E-15 for double precision input.
/Q	Quiet - do not print diagnostic information to the history area and do not display progress bar.
/Z	Errors are not fatal and do not abort procedure execution. Your procedure can inspect the V_flag variable to see if the operation succeeded. V_flag will be zero if it succeeded or nonzero if it failed.

Details

srcWave must be a single or double precision real wave.

If you specify the factorization output waves using /DSTA and /DSTB, they must have the same numeric type.

If you omit /DSTA or /DSTB, MatrixFactor produces output waves named factorAMat and factorBMat with the same numeric type as *srcWave*.

The algorithm produces a non-unique solution that may depend on the initialization of the two factors. The default initialization, used if you omit /INIA and /INIB, uses Igor's random number generator. If you want to investigate convergence you can generate your own initial values and specify them using the /INIA and /INIB flags. If you want to provide your own initial values you must provide them for both matA and matB via both /INIA and /INIB. You can run MatrixFactor once and use the outputs as initial values for a second run.

We recommend using double precision waves because the algorithm involves iterations where the Frobenius norm is computed. For large matrices or for a large number of iterations the calculation is strongly susceptible to roundoff errors which may cause it to fail to converge.