Documentation Center

Functions

R2013b

By Category | Alphabetical List

Language Fundamentals

Entering Commands

ans	Most recent answer
clc	Clear Command Window
diary	Save Command Window text to file
format	Set display format for output
home	Send cursor home
iskeyword	Determine whether input is MATLAB keyword
more	Control paged output for Command Window
commandhistory	Open Command History window, or select it if already open
commandwindow	Open Command Window, or select it if already open

Matrices and Arrays

Array Creation and Concatenation

accumarray	Construct array with accumulation

blkdiag	Construct block diagonal matrix from input arguments
diag	Diagonal matrices and diagonals of matrix
eye	Identity matrix
false	Logical 0 (false)
freqspace	Frequency spacing for frequency response
linspace	Generate linearly spaced vectors
logspace	Generate logarithmically spaced vectors
meshgrid	Rectangular grid in 2-D and 3-D space
ndgrid	Rectangular grid in N-D space
ones	Create array of all ones
rand	Uniformly distributed pseudorandom numbers
true	Logical 1 (true)
zeros	Create array of all zeros
cat	Concatenate arrays along specified dimension
horzcat	Concatenate arrays horizontally
vertcat	Concatenate arrays vertically

Indexing

colon	Create vectors, array subscripting, and for-loop iterators
end	Terminate block of code, or indicate last array index
ind2sub	Subscripts from linear index
sub2ind	Convert subscripts to linear indices

Array Dimensions

length	Length of vector or largest array dimension
ndims	Number of array dimensions
numel	Number of array elements
size	Array dimensions

height	Number of table rows
width	Number of table variables
iscolumn	Determine whether input is column vector
isempty	Determine whether array is empty
ismatrix	Determine whether input is matrix
isrow	Determine whether input is row vector
isscalar	Determine whether input is scalar
isvector	Determine whether input is vector

Sorting and Reshaping Arrays

blkdiag	Construct block diagonal matrix from input arguments
circshift	Shift array circularly
ctranspose	Complex conjugate transpose
diag	Diagonal matrices and diagonals of matrix
flip	Flip order of elements
flipdim	Flip array along specified dimension
fliplr	Flip matrix left to right
flipud	Flip matrix up to down
ipermute	Inverse permute dimensions of N-D array
permute	Rearrange dimensions of N-D array
repmat	Replicate and tile array
reshape	Reshape array
rot90	Rotate matrix 90 degrees
shiftdim	Shift dimensions
issorted	Determine whether set elements are in sorted order
sort	Sort array elements in ascending or descending order
sortrows	Sort rows in ascending order
squeeze	Remove singleton dimensions
transpose	Transpose

`vectorize`	Vectorize expression

Operators and Elementary Operations

Arithmetic

`plus`	Addition
`uplus`	Unary plus
`minus`	Subtraction
`uminus`	Unary minus
`times`	Element-wise multiplication
`rdivide`	Right array division
`ldivide`	Left array division
`power`	Element-wise power
`mtimes`	Matrix Multiplication
`mrdivide`	Solve systems of linear equations xA = B for x
`mldivide`	Solve systems of linear equations Ax = B for x
`mpower`	Matrix power
`cumprod`	Cumulative product
`cumsum`	Cumulative sum
`diff`	Differences and Approximate Derivatives
`prod`	Product of array elements
`sum`	Sum of array elements
`ceil`	Round toward positive infinity
`fix`	Round toward zero
`floor`	Round toward negative infinity
`idivide`	Integer division with rounding option
`mod`	Modulus after division
`rem`	Remainder after division
`round`	Round to nearest integer

Relational Operations

`Relational Operators`	Relational operations
`eq`	Determine equality
`ge`	Determine greater than or equal to
`gt`	Determine greater than
`le`	Determine less than or equal to
`lt`	Determine less than
`ne`	Determine inequality
`isequal`	Determine array equality
`isequaln`	Determine array equality, treating NaN values as equal

Logical Operations

`Logical Operators: Elementwise`	Elementwise logical operations on arrays
`Logical Operators: Short-circuit`	Logical operations, with short-circuiting capability
`and`	Find logical AND of array or scalar inputs
`not`	Find logical NOT of array or scalar input
`or`	Find logical OR of array or scalar inputs
`xor`	Logical exclusive-OR
`all`	Determine if all array elements are nonzero or true
`any`	Determine if any array elements are nonzero
`false`	Logical 0 (false)
`find`	Find indices and values of nonzero elements
`islogical`	Determine if input is logical array
`logical`	Convert numeric values to logicals
`true`	Logical 1 (true)

Set Operations

intersect	Set intersection of two arrays
ismember	Array elements that are members of set array
issorted	Determine whether set elements are in sorted order
setdiff	Set difference of two arrays
setxor	Set exclusive OR of two arrays
union	Set union of two arrays
unique	Unique values in array
join	Merge two tables by matching up rows using key variables
innerjoin	Inner join between two tables
outerjoin	Outer join between two tables

Bit-Wise Operations

bitand	Bit-wise AND
bitcmp	Bit-wise complement
bitget	Get bit at specified position
bitor	Bit-wise OR
bitset	Set bit at specific location
bitshift	Shift bits specified number of places
bitxor	Bit-wise XOR
swapbytes	Swap byte ordering

Special Characters

Special Characters	Special characters
colon	Create vectors, array subscripting, and for-loop iterators

Data Types

Numeric Types

double	Convert to double precision

`single`	Convert to single precision
`int8`	Convert to 8-bit signed integer
`int16`	Convert to 16-bit signed integer
`int32`	Convert to 32-bit signed integer
`int64`	Convert to 64-bit signed integer
`uint8`	Convert to 8-bit unsigned integer
`uint16`	Convert to 16-bit unsigned integer
`uint32`	Convert to 32-bit unsigned integer
`uint64`	Convert to 64-bit unsigned integer
`cast`	Cast variable to different data type
`typecast`	Convert data types without changing underlying data
`isinteger`	Determine if input is integer array
`isfloat`	Determine if input is floating-point array
`isnumeric`	Determine if input is numeric array
`isreal`	Check if input is real array
`isfinite`	Array elements that are finite
`isinf`	Array elements that are infinite
`isnan`	Array elements that are NaN
`eps`	Floating-point relative accuracy
`flintmax`	Largest consecutive integer in floating-point format
`Inf`	Infinity
`intmax`	Largest value of specified integer type
`intmin`	Smallest value of specified integer type
`NaN`	Not-a-Number
`realmax`	Largest positive floating-point number
`realmin`	Smallest positive normalized floating-point number

Characters and Strings

Create and Concatenate Strings

blanks	Create string of blank characters
cellstr	Create cell array of strings from character array
char	Convert to character array (string)
iscellstr	Determine whether input is cell array of strings
ischar	Determine whether item is character array
sprintf	Format data into string
strcat	Concatenate strings horizontally
strjoin	Join strings in cell array into single string

Parse Strings

ischar	Determine whether item is character array
isletter	Array elements that are alphabetic letters
isspace	Array elements that are space characters
isstrprop	Determine whether string is of specified category
sscanf	Read formatted data from string
strfind	Find one string within another
strrep	Find and replace substring
strsplit	Split string at specified delimiter
strtok	Selected parts of string
validatestring	Check validity of text string
symvar	Determine symbolic variables in expression
regexp	Match regular expression (case sensitive)
regexpi	Match regular expression (case insensitive)
regexprep	Replace string using regular expression
regexptranslate	Translate string into regular expression

Compare Strings

strcmp	Compare strings with case sensitivity

strcmpi	Compare strings (case insensitive)
strncmp	Compare first n characters of strings (case sensitive)
strncmpi	Compare first n characters of strings (case insensitive)

Change String Case, Blanks, and Justification

blanks	Create string of blank characters
deblank	Strip trailing blanks from end of string
strtrim	Remove leading and trailing white space from string
lower	Convert string to lowercase
upper	Convert string to uppercase
strjust	Justify character array

Categorical Arrays

categorical	Create categorical array
iscategorical	Determine whether input is categorical array
categories	Categories of categorical array
iscategory	Test for categorical array categories
isordinal	Determine whether input is ordinal categorical array
isprotected	Determine whether categories of categorical array are protected
addcats	Add categories to categorical array
mergecats	Merge categories in categorical array
removecats	Remove categories from categorical array
renamecats	Rename categories in categorical array
reordercats	Reorder categories in categorical array
summary	Print summary of table or categorical array
countcats	Count occurrences of categorical array elements by category
isundefined	Find undefined elements in categorical array

Tables

`table`	Create table from workspace variables
`array2table`	Convert homogeneous array to table
`cell2table`	Convert cell array to table
`struct2table`	Convert structure array to table
`table2array`	Convert table to homogenous array
`table2cell`	Convert table to cell array
`table2struct`	Convert table to structure array
`readtable`	Create table from file
`writetable`	Write table to file
`istable`	Determine whether input is table
`height`	Number of table rows
`width`	Number of table variables
`summary`	Print summary of table or categorical array
`intersect`	Set intersection of two arrays
`ismember`	Array elements that are members of set array
`setdiff`	Set difference of two arrays
`setxor`	Set exclusive OR of two arrays
`unique`	Unique values in array
`union`	Set union of two arrays
`join`	Merge two tables by matching up rows using key variables
`innerjoin`	Inner join between two tables
`outerjoin`	Outer join between two tables
`sortrows`	Sort rows in ascending order
`stack`	Stack data from multiple variables into single variable
`unstack`	Unstack data from single variable into multiple variables
`ismissing`	Find table elements with missing values
`standardizeMissing`	Insert missing value indicators into table
`varfun`	Apply function to table variables

`rowfun`	Apply function to table rows

Structures

`struct`	Create structure array
`fieldnames`	Field names of structure, or public fields of object
`getfield`	Field of structure array
`isfield`	Determine whether input is structure array field
`isstruct`	Determine whether input is structure array
`orderfields`	Order fields of structure array
`rmfield`	Remove fields from structure
`setfield`	Assign values to structure array field
`arrayfun`	Apply function to each element of array
`structfun`	Apply function to each field of scalar structure
`cell2struct`	Convert cell array to structure array
`struct2cell`	Convert structure to cell array

Cell Arrays

`cell`	Create cell array
`cell2mat`	Convert cell array to numeric array
`cell2struct`	Convert cell array to structure array
`celldisp`	Cell array contents
`cellfun`	Apply function to each cell in cell array
`cellplot`	Graphically display structure of cell array
`cellstr`	Create cell array of strings from character array
`iscell`	Determine whether input is cell array
`iscellstr`	Determine whether input is cell array of strings
`mat2cell`	Convert array to cell array with potentially different sized cells
`num2cell`	Convert array to cell array with consistently sized cells

strjoin	Join strings in cell array into single string
strsplit	Split string at specified delimiter
struct2cell	Convert structure to cell array

Function Handles

function_handle (@)	Handle used in calling functions indirectly
feval	Evaluate function
func2str	Construct function name string from function handle
str2func	Construct function handle from function name string
localfunctions	Function handles to all local functions in MATLAB file
functions	Information about function handle

Map Containers

containers.Map	Map values to unique keys
isKey	Determine if containers.Map object contains key
keys	Identify keys of containers.Map object
remove	Remove key-value pairs from containers.Map object
values	Identify values in containers.Map object

Time Series

Time Series Basics

append	Concatenate time series objects in time dimension
get	Query timeseries object property values
getdatasamplesize	Size of data sample in timeseries object
getqualitydesc	Data quality descriptions
getsamples	Subset of time series samples using subscripted index array
plot	Plot time series
set	Set properties of timeseries object

tsdata.event	Construct event object for timeseries object
timeseries	Create timeseries object

Data Manipulation

addsample	Add data sample to timeseries object
ctranspose	Transpose timeseries object
delsample	Remove sample from timeseries object
detrend	Subtract mean or best-fit line and all NaNs from timeseries object
filter	Shape frequency content of time-series
getabstime	Extract date-string time vector into cell array
getinterpmethod	Interpolation method for timeseries object
getsampleusingtime	Extract data samples into new timeseries object
idealfilter	Apply ideal (noncausal) filter to timeseries object
resample	Select or interpolate timeseries data using new time vector
setabstime	Set times of timeseries object as date strings
setinterpmethod	Set default interpolation method for timeseries object
synchronize	Synchronize and resample two timeseries objects using common time vector
transpose	Transpose timeseries object

Event Data

addevent	Add event to timeseries object
delevent	Remove tsdata.event objects from timeseries object
gettsafteratevent	New timeseries object with samples occurring at or after event
gettsafterevent	New timeseries object with samples occurring after event
gettsatevent	New timeseries object with samples occurring at event
gettsbeforeatevent	New timeseries object with samples occurring before or at event
gettsbeforeevent	New timeseries object with samples occurring before event
gettsbetweenevents	New timeseries object with samples occurring between events

Descriptive Statistics

iqr	Interquartile range of timeseries data
max	Maximum value of timeseries data
mean	Mean value of timeseries data
median	Median value of timeseries data
min	Minimum value of timeseries data
std	Standard deviation of timeseries data
sum	Sum of timeseries data
var	Variance of timeseries data

Time Series Collections

get (tscollection)	Query tscollection object property values
isempty (tscollection)	Determine whether tscollection object is empty
length (tscollection)	Length of time vector
plot	Plot time series
set (tscollection)	Set properties of tscollection object
size (tscollection)	Size of tscollection object
tscollection	Create tscollection object
addsampletocollection	Add sample to tscollection object
addts	Add timeseries object to tscollection object
delsamplefromcollection	Remove sample from tscollection object
getabstime (tscollection)	Extract date-string time vector into cell array
getsampleusingtime (tscollection)	Extract data samples into new tscollection object
gettimeseriesnames	Cell array of names of timeseries objects in tscollection object
horzcat (tscollection)	Horizontal concatenation for tscollection objects
removets	Remove timeseries objects from tscollection object

resample (tscollection)	Select or interpolate data in tscollection using new time vector
setabstime (tscollection)	Set times of tscollection object as date strings
settimeseriesnames	Change name of timeseries object in tscollection
vertcat (tscollection)	Vertical concatenation for tscollection objects

Data Type Identification

is*	Detect state
isa	Determine if input is object of specified class
iscategorical	Determine whether input is categorical array
iscell	Determine whether input is cell array
iscellstr	Determine whether input is cell array of strings
ischar	Determine whether item is character array
isfield	Determine whether input is structure array field
isfloat	Determine if input is floating-point array
ishghandle	True for Handle Graphics object handles
isinteger	Determine if input is integer array
isjava	Determine if input is Java object
islogical	Determine if input is logical array
isnumeric	Determine if input is numeric array
isobject	Determine if input is MATLAB object
isreal	Check if input is real array
isscalar	Determine whether input is scalar
isstr	Determine whether input is character array
isstruct	Determine whether input is structure array
istable	Determine whether input is table
isvector	Determine whether input is vector
class	Determine class of object
validateattributes	Check validity of array
whos	List variables in workspace, with sizes and types

Data Type Conversion

`char`	Convert to character array (string)
`int2str`	Convert integer to string
`mat2str`	Convert matrix to string
`num2str`	Convert number to string
`str2double`	Convert string to double-precision value
`str2num`	Convert string to number
`native2unicode`	Convert numeric bytes to Unicode character representation
`unicode2native`	Convert Unicode character representation to numeric bytes
`base2dec`	Convert base N number string to decimal number
`bin2dec`	Convert binary number string to decimal number
`dec2base`	Convert decimal to base N number in string
`dec2bin`	Convert decimal to binary number in string
`dec2hex`	Convert decimal to hexadecimal number in string
`hex2dec`	Convert hexadecimal number string to decimal number
`hex2num`	Convert hexadecimal number string to double-precision number
`num2hex`	Convert singles and doubles to IEEE hexadecimal strings
`table2array`	Convert table to homogenous array
`table2cell`	Convert table to cell array
`table2struct`	Convert table to structure array
`array2table`	Convert homogeneous array to table
`cell2table`	Convert cell array to table
`struct2table`	Convert structure array to table
`cell2mat`	Convert cell array to numeric array
`cell2struct`	Convert cell array to structure array
`cellstr`	Create cell array of strings from character array
`mat2cell`	Convert array to cell array with potentially different sized cells
`num2cell`	Convert array to cell array with consistently sized cells

struct2cell	Convert structure to cell array

Dates and Time

datenum	Convert date and time to serial date number
datevec	Convert date and time to vector of components
datestr	Convert date and time to string format
now	Current date and time as serial date number
clock	Current date and time as date vector
date	Current date string
calendar	Calendar for specified month
eomday	Last day of month
weekday	Day of week
addtodate	Modify date number by field
etime	Time elapsed between date vectors

Mathematics

Elementary Math

Arithmetic

plus	Addition
uplus	Unary plus
minus	Subtraction
uminus	Unary minus
times	Element-wise multiplication
rdivide	Right array division
ldivide	Left array division
power	Element-wise power
mtimes	Matrix Multiplication
mrdivide	Solve systems of linear equations xA = B for x

mldivide	Solve systems of linear equations Ax = B for x
mpower	Matrix power
cumprod	Cumulative product
cumsum	Cumulative sum
diff	Differences and Approximate Derivatives
prod	Product of array elements
sum	Sum of array elements
ceil	Round toward positive infinity
fix	Round toward zero
floor	Round toward negative infinity
idivide	Integer division with rounding option
mod	Modulus after division
rem	Remainder after division
round	Round to nearest integer

Trigonometry

sin	Sine of argument in radians
sind	Sine of argument in degrees
asin	Inverse sine in radians
asind	Inverse sine in degrees
sinh	Hyperbolic sine of argument in radians
asinh	Inverse hyperbolic sine
cos	Cosine of argument in radians
cosd	Cosine of argument in degrees
acos	Inverse cosine in radians
acosd	Inverse cosine in degrees
cosh	Hyperbolic cosine
acosh	Inverse hyperbolic cosine

`tan`	Tangent of argument in radians
`tand`	Tangent of argument in degrees
`atan`	Inverse tangent in radians
`atand`	Inverse tangent in degrees
`atan2`	Four-quadrant inverse tangent
`atan2d`	Four-quadrant inverse tangent in degrees
`tanh`	Hyperbolic tangent
`atanh`	Inverse hyperbolic tangent
`csc`	Cosecant of argument in radians
`cscd`	Cosecant of argument in degrees
`acsc`	Inverse cosecant in radians
`acscd`	Inverse cosecant in degrees
`csch`	Hyperbolic cosecant
`acsch`	Inverse hyperbolic cosecant
`sec`	Secant of argument in radians
`secd`	Secant of argument in degrees
`asec`	Inverse secant in radians
`asecd`	Inverse secant in degrees
`sech`	Hyperbolic secant
`asech`	Inverse hyperbolic secant
`cot`	Cotangent of argument in radians
`cotd`	Cotangent of argument in degrees
`acot`	Inverse cotangent in radians
`acotd`	Inverse cotangent in degrees
`coth`	Hyperbolic cotangent
`acoth`	Inverse hyperbolic cotangent
`hypot`	Square root of sum of squares

Exponents and Logarithms

exp	Exponential
expm1	Compute exp(x)-1 accurately for small values of x
log	Natural logarithm
log10	Common (base 10) logarithm
log1p	Compute log(1+x) accurately for small values of x
log2	Base 2 logarithm and dissect floating-point numbers into exponent and mantissa
nextpow2	Exponent of next higher power of 2
nthroot	Real nth root of real numbers
pow2	Base 2 power and scale floating-point numbers
reallog	Natural logarithm for nonnegative real arrays
realpow	Array power for real-only output
realsqrt	Square root for nonnegative real arrays
sqrt	Square root

Complex Numbers

abs	Absolute value and complex magnitude
angle	Phase angle
complex	Construct complex data from real and imaginary components
conj	Complex conjugate
cplxpair	Sort complex numbers into complex conjugate pairs
i	Imaginary unit
imag	Imaginary part of complex number
isreal	Check if input is real array
j	Imaginary unit
real	Real part of complex number
sign	Signum function
unwrap	Correct phase angles to produce smoother phase plots

Discrete Math

`factor`	Prime factors
`factorial`	Factorial of input
`gcd`	Greatest common divisor
`isprime`	Determine which array elements are prime
`lcm`	Least common multiple
`nchoosek`	Binomial coefficient or all combinations
`perms`	All possible permutations
`primes`	Prime numbers less than or equal to input value
`rat, rats`	Rational fraction approximation

Polynomials

`poly`	Polynomial with specified roots
`polyder`	Polynomial derivative
`polyeig`	Polynomial eigenvalue problem
`polyfit`	Polynomial curve fitting
`polyint`	Integrate polynomial analytically
`polyval`	Polynomial evaluation
`polyvalm`	Matrix polynomial evaluation
`residue`	Convert between partial fraction expansion and polynomial coefficients
`roots`	Polynomial roots

Special Functions

`airy`	Airy Functions
`besselh`	Bessel function of third kind (Hankel function)
`besseli`	Modified Bessel function of first kind
`besselj`	Bessel function of first kind
`besselk`	Modified Bessel function of second kind

bessely	Bessel function of second kind
beta	Beta function
betainc	Incomplete beta function
betaincinv	Beta inverse cumulative distribution function
betaln	Logarithm of beta function
ellipj	Jacobi elliptic functions
ellipke	Complete elliptic integrals of first and second kind
erf	Error function
erfc	Complementary error function
erfcinv	Inverse complementary error function
erfcx	Scaled complementary error function
erfinv	Inverse error function
expint	Exponential integral
gamma	Gamma function
gammainc	Incomplete gamma function
gammaincinv	Inverse incomplete gamma function
gammaln	Logarithm of gamma function
legendre	Associated Legendre functions
psi	Psi (polygamma) function

Cartesian Coordinate System Conversion

cart2pol	Transform Cartesian coordinates to polar or cylindrical
cart2sph	Transform Cartesian coordinates to spherical
pol2cart	Transform polar or cylindrical coordinates to Cartesian
sph2cart	Transform spherical coordinates to Cartesian

Constants and Test Matrices

eps	Floating-point relative accuracy

flintmax	Largest consecutive integer in floating-point format
i	Imaginary unit
j	Imaginary unit
Inf	Infinity
pi	Ratio of circle's circumference to its diameter
NaN	Not-a-Number
isfinite	Array elements that are finite
isinf	Array elements that are infinite
isnan	Array elements that are NaN
compan	Companion matrix
gallery	Test matrices
hadamard	Hadamard matrix
hankel	Hankel matrix
hilb	Hilbert matrix
invhilb	Inverse of Hilbert matrix
magic	Magic square
pascal	Pascal matrix
rosser	Classic symmetric eigenvalue test problem
toeplitz	Toeplitz matrix
vander	Vandermonde matrix
wilkinson	Wilkinson's eigenvalue test matrix

Linear Algebra

Matrix Operations

cross	Vector cross product
dot	Vector dot product
kron	Kronecker tensor product
surfnorm	Compute and display 3-D surface normals
tril	Lower triangular part of matrix

`triu`	Upper triangular part of matrix
`transpose`	Transpose

Linear Equations

`cond`	Condition number with respect to inversion
`condest`	1-norm condition number estimate
`funm`	Evaluate general matrix function
`inv`	Matrix inverse
`linsolve`	Solve linear system of equations
`lscov`	Least-squares solution in presence of known covariance
`lsqnonneg`	Solve nonnegative least-squares constraints problem
`pinv`	Moore-Penrose pseudoinverse of matrix
`rcond`	Matrix reciprocal condition number estimate
`mldivide`	Solve systems of linear equations Ax = B for x
`mrdivide`	Solve systems of linear equations xA = B for x

Matrix Decomposition

`chol`	Cholesky factorization
`ichol`	Incomplete Cholesky factorization
`cholupdate`	Rank 1 update to Cholesky factorization
`ilu`	Sparse incomplete LU factorization
`lu`	LU matrix factorization
`qr`	Orthogonal-triangular decomposition
`qrdelete`	Remove column or row from QR factorization
`qrinsert`	Insert column or row into QR factorization
`qrupdate`	Rank 1 update to QR factorization
`planerot`	Givens plane rotation
`ldl`	Block LDL' factorization for Hermitian indefinite matrices

cdf2rdf	Convert complex diagonal form to real block diagonal form
rsf2csf	Convert real Schur form to complex Schur form
gsvd	Generalized singular value decomposition
svd	Singular value decomposition

Eigenvalues and Singular Values

balance	Diagonal scaling to improve eigenvalue accuracy
cdf2rdf	Convert complex diagonal form to real block diagonal form
condeig	Condition number with respect to eigenvalues
eig	Eigenvalues and eigenvectors
eigs	Largest eigenvalues and eigenvectors of matrix
gsvd	Generalized singular value decomposition
hess	Hessenberg form of matrix
ordeig	Eigenvalues of quasitriangular matrices
ordqz	Reorder eigenvalues in QZ factorization
ordschur	Reorder eigenvalues in Schur factorization
poly	Polynomial with specified roots
polyeig	Polynomial eigenvalue problem
qz	QZ factorization for generalized eigenvalues
rsf2csf	Convert real Schur form to complex Schur form
schur	Schur decomposition
sqrtm	Matrix square root
ss2tf	Convert state-space filter parameters to transfer function form
svd	Singular value decomposition
svds	Find singular values and vectors

Matrix Analysis

cond	Condition number with respect to inversion

condeig	Condition number with respect to eigenvalues
det	Matrix determinant
norm	Vector and matrix norms
normest	2-norm estimate
null	Null space
orth	Orthonormal basis for range of matrix
rank	Rank of matrix
rcond	Matrix reciprocal condition number estimate
rref	Reduced row echelon form
subspace	Angle between two subspaces
trace	Sum of diagonal elements

Matrix Functions

expm	Matrix exponential
logm	Matrix logarithm
sqrtm	Matrix square root
bsxfun	Apply element-by-element binary operation to two arrays with singleton expansion enabled
arrayfun	Apply function to each element of array
accumarray	Construct array with accumulation
mpower	Matrix power

Statistics and Random Numbers

Descriptive Statistics

corrcoef	Correlation coefficients
cov	Covariance matrix
max	Largest elements in array
mean	Average or mean value of array
median	Median value of array

min	Smallest elements in array
mode	Most frequent values in array
std	Standard deviation
var	Variance

Random Number Generation

rand	Uniformly distributed pseudorandom numbers
randn	Normally distributed pseudorandom numbers
randi	Uniformly distributed pseudorandom integers
randperm	Random permutation
rng	Control random number generation
RandStream	Random number stream

Interpolation

1-D Interpolation

interp1	1-D data interpolation (table lookup)
griddedInterpolant	Gridded data interpolation
pchip	Piecewise Cubic Hermite Interpolating Polynomial (PCHIP)
spline	Cubic spline data interpolation
ppval	Evaluate piecewise polynomial
mkpp	Make piecewise polynomial
unmkpp	Piecewise polynomial details
padecoef	Padé approximation of time delays
interpft	1-D interpolation using FFT method

Gridded Data Interpolation

interp2	Interpolation for 2-D gridded data in meshgrid format
interp3	Interpolation for 3-D gridded data in meshgrid format

interpn	Interpolation for 1-D, 2-D, 3-D, and N-D gridded data in ndgrid format
griddedInterpolant	Gridded data interpolation
ndgrid	Rectangular grid in N-D space
meshgrid	Rectangular grid in 2-D and 3-D space

Scattered Data Interpolation

griddata	Interpolate scattered data
griddatan	Data gridding and hypersurface fitting (dimension ≥ 2)
scatteredInterpolant	Scattered data interpolation

Optimization

fminbnd	Find minimum of single-variable function on fixed interval
fminsearch	Find minimum of unconstrained multivariable function using derivative-free method
fzero	Root of nonlinear function
lsqnonneg	Solve nonnegative least-squares constraints problem
optimget	Optimization options values
optimset	Create or edit optimization options structure

Numerical Integration and Differential Equations

Ordinary Differential Equations

ode45	Solve nonstiff differential equations; medium order method
ode15s	Solve stiff differential equations and DAEs; variable order method
ode23	Solve nonstiff differential equations; low order method
ode113	Solve nonstiff differential equations; variable order method
ode23t	Solve moderately stiff ODEs and DAEs; trapezoidal rule
ode23tb	Solve stiff differential equations; low order method
ode23s	Solve stiff differential equations; low order method
ode15i	Solve fully implicit differential equations, variable order method

decic	Compute consistent initial conditions for ode15i
odextend	Extend solution of initial value problem for ordinary differential equation
odeget	Ordinary differential equation options parameters
odeset	Create or alter options structure for ordinary differential equation solvers
deval	Evaluate solution of differential equation problem

Boundary Value Problems

bvp4c	Solve boundary value problems for ordinary differential equations
bvp5c	Solve boundary value problems for ordinary differential equations
bvpinit	Form initial guess for BVP solvers
bvpxtend	Form guess structure for extending boundary value solutions
bvpget	Extract properties from options structure created with bvpset
bvpset	Create or alter options structure of boundary value problem
deval	Evaluate solution of differential equation problem

Delay Differential Equations

dde23	Solve delay differential equations (DDEs) with constant delays
ddesd	Solve delay differential equations (DDEs) with general delays
ddensd	Solve delay differential equations (DDEs) of neutral type
ddeget	Extract properties from delay differential equations options structure
ddeset	Create or alter delay differential equations options structure
deval	Evaluate solution of differential equation problem

Partial Differential Equations

pdepe	Solve initial-boundary value problems for parabolic-elliptic PDEs in 1-D
pdeval	Evaluate numerical solution of PDE using output of pdepe

Numerical Integration and Differentiation

integral	Numerically evaluate integral
integral2	Numerically evaluate double integral
integral3	Numerically evaluate triple integral
quadgk	Numerically evaluate integral, adaptive Gauss-Kronrod quadrature
quad2d	Numerically evaluate double integral, tiled method
cumtrapz	Cumulative trapezoidal numerical integration
trapz	Trapezoidal numerical integration
polyint	Integrate polynomial analytically
del2	Discrete Laplacian
diff	Differences and Approximate Derivatives
gradient	Numerical gradient
polyder	Polynomial derivative

Fourier Analysis and Filtering

abs	Absolute value and complex magnitude
angle	Phase angle
cplxpair	Sort complex numbers into complex conjugate pairs
fft	Fast Fourier transform
fft2	2-D fast Fourier transform
fftn	N-D fast Fourier transform
fftshift	Shift zero-frequency component to center of spectrum
fftw	Interface to FFTW library run-time algorithm tuning control
ifft	Inverse fast Fourier transform
ifft2	2-D inverse fast Fourier transform
ifftn	N-D inverse fast Fourier transform
ifftshift	Inverse FFT shift
nextpow2	Exponent of next higher power of 2
unwrap	Correct phase angles to produce smoother phase plots

conv	Convolution and polynomial multiplication
conv2	2-D convolution
convn	N-D convolution
deconv	Deconvolution and polynomial division
detrend	Remove linear trends
filter	1-D digital filter
filter2	2-D digital filter

Sparse Matrices

Sparse Matrix Creation

spdiags	Extract and create sparse band and diagonal matrices
speye	Sparse identity matrix
sprand	Sparse uniformly distributed random matrix
sprandn	Sparse normally distributed random matrix
sprandsym	Sparse symmetric random matrix
sparse	Create sparse matrix
spconvert	Import matrix from sparse matrix external format

Sparse Matrix Manipulation

issparse	Determine whether input is sparse
nnz	Number of nonzero matrix elements
nonzeros	Nonzero matrix elements
nzmax	Amount of storage allocated for nonzero matrix elements
spalloc	Allocate space for sparse matrix
spfun	Apply function to nonzero sparse matrix elements
spones	Replace nonzero sparse matrix elements with ones
spparms	Set parameters for sparse matrix routines
spy	Visualize sparsity pattern

find	Find indices and values of nonzero elements
full	Convert sparse matrix to full matrix

Reordering Algorithms

amd	Approximate minimum degree permutation
colamd	Column approximate minimum degree permutation
colperm	Sparse column permutation based on nonzero count
dmperm	Dulmage-Mendelsohn decomposition
randperm	Random permutation
symamd	Symmetric approximate minimum degree permutation
symrcm	Sparse reverse Cuthill-McKee ordering

Sparse Linear Algebra

condest	1-norm condition number estimate
eigs	Largest eigenvalues and eigenvectors of matrix
ichol	Incomplete Cholesky factorization
ilu	Sparse incomplete LU factorization
normest	2-norm estimate
spaugment	Form least squares augmented system
sprank	Structural rank
svds	Find singular values and vectors

Linear Equations (Iterative Methods)

bicg	Biconjugate gradients method
bicgstab	Biconjugate gradients stabilized method
bicgstabl	Biconjugate gradients stabilized (l) method
cgs	Conjugate gradients squared method
gmres	Generalized minimum residual method (with restarts)

`lsqr`	LSQR method
`minres`	Minimum residual method
`pcg`	Preconditioned conjugate gradients method
`qmr`	Quasi-minimal residual method
`symmlq`	Symmetric LQ method
`tfqmr`	Transpose-free quasi-minimal residual method

Graph and Tree Algorithms

`etree`	Elimination tree
`etreeplot`	Plot elimination tree
`gplot`	Plot nodes and links representing adjacency matrix
`symbfact`	Symbolic factorization analysis
`treelayout`	Lay out tree or forest
`treeplot`	Plot picture of tree
`unmesh`	Convert edge matrix to coordinate and Laplacian matrices

Computational Geometry

Triangulation Representation

`triangulation`	Triangulation in 2-D or 3-D
`tetramesh`	Tetrahedron mesh plot
`trimesh`	Triangular mesh plot
`triplot`	2-D triangular plot
`trisurf`	Triangular surface plot

Delaunay Triangulation

`delaunayTriangulation`	Delaunay triangulation in 2-D and 3-D
`delaunay`	Delaunay triangulation
`delaunayn`	N-D Delaunay triangulation

`tetramesh`	Tetrahedron mesh plot
`trimesh`	Triangular mesh plot
`triplot`	2-D triangular plot
`trisurf`	Triangular surface plot

Spatial Search

`triangulation`	Triangulation in 2-D or 3-D
`delaunayTriangulation`	Delaunay triangulation in 2-D and 3-D
`dsearchn`	N-D nearest point search
`tsearchn`	N-D closest simplex search
`delaunay`	Delaunay triangulation
`delaunayn`	N-D Delaunay triangulation

Convex Hull

`convhull`	Convex hull
`convhulln`	N-D convex hull
`patch`	Create one or more filled polygons
`trisurf`	Triangular surface plot

Voronoi Diagram

`patch`	Create one or more filled polygons
`voronoi`	Voronoi diagram
`voronoin`	N-D Voronoi diagram

Elementary Polygons

`polyarea`	Area of polygon
`inpolygon`	Points inside polygonal region

rectint	Rectangle intersection area

Graphics

2-D and 3-D Plots

Line Plots

plot	2-D line plot
plotyy	2-D line plots with y-axes on both left and right side
plot3	3-D line plot
loglog	Log-log scale plot
semilogx	Semilogarithmic plot
semilogy	Semilogarithmic plot
errorbar	Plot error bars along curve
fplot	Plot function between specified limits
ezplot	Easy-to-use function plotter
ezplot3	Easy-to-use 3-D parametric curve plotter
LineSpec (Line Specification)	Line specification string syntax
ColorSpec (Color Specification)	Color specification

Pie Charts, Bar Plots, and Histograms

bar	Bar graph
bar3	Plot 3-D bar graph
barh	Plot bar graph horizontally
bar3h	Plot horizontal 3-D bar graph
hist	Histogram plot
histc	Histogram bin count
rose	Angle histogram plot
pareto	Pareto chart
area	Filled area 2-D plot

pie	Pie chart
pie3	3-D pie chart

Discrete Data Plots

stem	Plot discrete sequence data
stairs	Stairstep graph
stem3	Plot 3-D discrete sequence data
scatter	scatter plot
scatter3	3-D scatter plot
spy	Visualize sparsity pattern
plotmatrix	scatter plot matrix

Polar Plots

polar	Polar coordinate plot
rose	Angle histogram plot
compass	Plot arrows emanating from origin
ezpolar	Easy-to-use polar coordinate plotter
LineSpec (Line Specification)	Line specification string syntax
ColorSpec (Color Specification)	Color specification

Contour Plots

contour	Contour plot of matrix
contourf	Filled 2-D contour plot
contourc	Low-level contour plot computation
contour3	3-D contour plot
contourslice	Draw contours in volume slice planes
ezcontour	Easy-to-use contour plotter
ezcontourf	Easy-to-use filled contour plotter

Vector Fields

`feather`	Plot velocity vectors
`quiver`	Quiver or velocity plot
`compass`	Plot arrows emanating from origin
`quiver3`	3-D quiver or velocity plot
`streamslice`	Plot streamlines in slice planes
`streamline`	Plot streamlines from 2-D or 3-D vector data

Surfaces, Volumes, and Polygons

Surface and Mesh Plots

`surf`	3-D shaded surface plot
`surfc`	Contour plot under a 3-D shaded surface plot
`surface`	Create surface object
`surfl`	Surface plot with colormap-based lighting
`surfnorm`	Compute and display 3-D surface normals
`mesh`	Mesh plot
`meshc`	Plot a contour graph under mesh graph
`meshz`	Plot a curtain around mesh plot
`waterfall`	Waterfall plot
`ribbon`	Ribbon plot
`contour3`	3-D contour plot
`peaks`	Example function of two variables
`cylinder`	Generate cylinder
`ellipsoid`	Generate ellipsoid
`sphere`	Generate sphere
`pcolor`	Pseudocolor (checkerboard) plot
`surf2patch`	Convert surface data to patch data

ezsurf	Easy-to-use 3-D colored surface plotter
ezsurfc	Easy-to-use combination surface/contour plotter
ezmesh	Easy-to-use 3-D mesh plotter
ezmeshc	Easy-to-use combination mesh/contour plotter

Volume Visualization

contourslice	Draw contours in volume slice planes
flow	Simple function of three variables
isocaps	Compute isosurface end-cap geometry
isocolors	Calculate isosurface and patch colors
isonormals	Compute normals of isosurface vertices
isosurface	Extract isosurface data from volume data
reducepatch	Reduce number of patch faces
reducevolume	Reduce number of elements in volume data set
shrinkfaces	Reduce size of patch faces
slice	Volumetric slice plot
smooth3	Smooth 3-D data
subvolume	Extract subset of volume data set
volumebounds	Coordinate and color limits for volume data
coneplot	Plot velocity vectors as cones in 3-D vector field
curl	Compute curl and angular velocity of vector field
divergence	Compute divergence of vector field
interpstreamspeed	Interpolate stream-line vertices from flow speed
stream2	Compute 2-D streamline data
stream3	Compute 3-D streamline data
streamline	Plot streamlines from 2-D or 3-D vector data
streamparticles	Plot stream particles
streamribbon	3-D stream ribbon plot from vector volume data
streamslice	Plot streamlines in slice planes

streamtube	Create 3-D stream tube plot

Polygons

fill	Filled 2-D polygons
fill3	Filled 3-D polygons
patch	Create one or more filled polygons
surf2patch	Convert surface data to patch data

Animation

movie	Play recorded movie frames
noanimate	Change EraseMode of all objects to normal
drawnow	Flush event queue and update figure window
refreshdata	Refresh data in graph when data source is specified
frame2im	Return image data associated with movie frame
getframe	Capture movie frame
im2frame	Convert image to movie frame
comet	2-D comet plot
comet3	3-D comet plot

Formatting and Annotation

Titles and Labels

title	Add title to current axes
xlabel	Label x-axis
ylabel	Label y-axis
zlabel	Label z-axis
clabel	Contour plot elevation labels
datetick	Date formatted tick labels

texlabel	Format text into TeX string
legend	Graph legend for lines and patches
colorbar	Colorbar showing color scale

Coordinate System

xlim	Set or query x-axis limits
ylim	Set or query y-axis limits
zlim	Set or query z-axis limits
box	Axes border
grid	Grid lines for 2-D and 3-D plots
daspect	Set or query axes data aspect ratio
pbaspect	Set or query plot box aspect ratio
axes	Create axes graphics object
axis	Axis scaling and appearance
subplot	Create axes in tiled positions
hold	Retain current graph when adding new graphs
gca	Current axes handle
cla	Clear current axes

Annotation

annotation	Create annotation objects
text	Create text object in current axes
legend	Graph legend for lines and patches
title	Add title to current axes
xlabel	Label x-axis
ylabel	Label y-axis
zlabel	Label z-axis
datacursormode	Enable, disable, and manage interactive data cursor mode

ginput	Graphical input from mouse or cursor
gtext	Mouse placement of text in 2-D view

Colormaps

colormap	Set and get current colormap
colormapeditor	Open colormap editor
colorbar	Colorbar showing color scale
brighten	Brighten or darken colormap
contrast	Grayscale colormap for contrast enhancement
shading	Set color shading properties
graymon	Set default figure properties for grayscale monitors
caxis	Color axis scaling
hsv2rgb	Convert HSV colormap to RGB colormap
rgb2hsv	Convert RGB colormap to HSV colormap
rgbplot	Plot colormap
spinmap	Spin colormap
colordef	Set default property values to display different color schemes
whitebg	Change axes background color

Data Exploration

hidden	Remove hidden lines from mesh plot
pan	Pan view of graph interactively
reset	Reset graphics object properties to their defaults
rotate	Rotate object about specified origin and direction
rotate3d	Rotate 3-D view using mouse
selectmoveresize	Select, move, resize, or copy axes and uicontrol graphics objects
zoom	Turn zooming on or off or magnify by factorMagnify by a factor
datacursormode	Enable, disable, and manage interactive data cursor mode

figurepalette	Show or hide Figure Palette
plotbrowser	Show or hide figure Plot Browser
plotedit	Interactively edit and annotate plots
plottools	Show or hide plot tools
propertyeditor	Show or hide Property Editor
showplottool	Show or hide figure plot tool

Data Brushing

brush	Interactively mark, delete, modify, and save observations in graphs
datacursormode	Enable, disable, and manage interactive data cursor mode
linkdata	Automatically update graphs when variables change
refreshdata	Refresh data in graph when data source is specified

3-D Scene Control

Camera Views

view	Viewpoint specification
makehgtform	Create 4-by-4 transform matrix
viewmtx	View transformation matrices
cameratoolbar	Control camera toolbar programmatically
campan	Rotate camera target around camera position
camzoom	Zoom in and out on scene
camdolly	Move camera position and target
camlookat	Position camera to view object or group of objects
camorbit	Rotate camera position around camera target
campos	Set or query camera position
camproj	Set or query projection type
camroll	Rotate camera about view axis
camtarget	Set or query location of camera target

camup	Set or query camera up vector
camva	Set or query camera view angle

Lighting and Transparency

camlight	Create or move light object in camera coordinates
light	Create light object
lightangle	Create or position light object in spherical coordinates
lighting	Specify lighting algorithm
diffuse	Calculate diffuse reflectance
material	Control reflectance properties of surfaces and patches
specular	Calculate specular reflectance
alim	Set or query axes alpha limits
alpha	Set transparency properties for objects in current axes
alphamap	Specify figure alphamap (transparency)

Images

Image File Operations

image	Display image object
imagesc	Scale data and display image object
imread	Read image from graphics file
imwrite	Write image to graphics file
imfinfo	Information about graphics file
imformats	Manage image file format registry
frame2im	Return image data associated with movie frame
im2frame	Convert image to movie frame
im2java	Convert image to Java image

Modifying Images

ind2rgb	Convert indexed image to RGB image
rgb2ind	Convert RGB image to indexed image
imapprox	Approximate indexed image by reducing number of colors
dither	Convert image, increasing apparent color resolution by dithering
cmpermute	Rearrange colors in colormap
cmunique	Eliminate duplicate colors in colormap; convert grayscale or truecolor image to indexed image

Printing and Exporting

print	Print figure or save to file
printopt	Configure printer defaults
printdlg	Print dialog box
printpreview	Preview figure to print
orient	Hardcopy paper orientation
savefig	Save figure to FIG-file
openfig	Open new copy or raise existing copy of saved figure
hgexport	Export figure
hgsave	Save Handle Graphics object hierarchy to file
hgload	Load Handle Graphics object hierarchy from file
saveas	Save figure or Simulink block diagram using specified format

Graphics Objects

Graphics Object Identification

gca	Current axes handle
gcf	Current figure handle
gcbf	Handle of figure containing object whose callback is executing
gcbo	Handle of object whose callback is executing
gco	Handle of current object
ancestor	Ancestor of graphics object

`allchild`	Find all children of specified objects
`findall`	Find all graphics objects
`findfigs`	Find visible offscreen figures
`findobj`	Locate graphics objects with specific properties
`gobjects`	Create array of graphics handles
`ishghandle`	True for Handle Graphics object handles
`copyobj`	Copy graphics objects and their descendants
`delete`	Remove files or objects
`get`	Query Handle Graphics object properties
`set`	Set Handle Graphics object properties
`propedit`	Open Property Editor

Core Objects

`root object`	Root
`figure`	Create figure graphics object
`axes`	Create axes graphics object
`image`	Display image object
`light`	Create light object
`line`	Create line object
`patch`	Create one or more filled polygons
`rectangle`	Create 2-D rectangle object
`surface`	Create surface object
`text`	Create text object in current axes

Annotation Objects

`annotation`	Create annotation objects

Plot Objects

`set`	Set Handle Graphics object properties
`get`	Query Handle Graphics object properties

Group Objects

`hggroup`	Create hggroup object
`hgtransform`	Create hgtransform graphics object
`makehgtform`	Create 4-by-4 transform matrix

Figure Windows

`figure`	Create figure graphics object
`gcf`	Current figure handle
`close`	Remove specified figure
`clf`	Clear current figure window
`refresh`	Redraw current figure
`newplot`	Determine where to draw graphics objects
`shg`	Show most recent graph window
`closereq`	Default figure close request function
`dragrect`	Drag rectangles with mouse
`drawnow`	Flush event queue and update figure window
`rbbox`	Create rubberband box for area selection
`opengl`	Control OpenGL rendering

Axes Property Operations

`axes`	Create axes graphics object
`hold`	Retain current graph when adding new graphs
`ishold`	Current hold state
`newplot`	Determine where to draw graphics objects

Object Property Operations

`linkaxes`	Synchronize limits of specified 2-D axes
`linkprop`	Keep same value for corresponding properties of graphics objects
`refreshdata`	Refresh data in graph when data source is specified
`waitfor`	Block execution and wait for event or condition
`get`	Query Handle Graphics object properties
`set`	Set Handle Graphics object properties

Programming Scripts and Functions

Control Flow

`if/elseif/else`	Execute statements if condition is true
`for`	Execute statements specified number of times
`parfor`	Parallel for loop
`switch/case/otherwise`	Switch among several cases based on expression
`try/catch`	Execute statements and catch resulting errors
`while`	Repeatedly execute statements while condition is true
`break`	Terminate execution of for or while loop
`continue`	Pass control to next iteration of for or while loop
`end`	Terminate block of code, or indicate last array index
`pause`	Halt execution temporarily
`return`	Return to invoking function

Scripts

`edit`	Edit or create file
`input`	Request user input
`publish`	Generate view of MATLAB file in specified format
`notebook`	Open MATLAB Notebook in Microsoft Word software (on Microsoft Windows platforms)
`grabcode`	Extract MATLAB code from file published to HTML

snapnow	Force snapshot of image for inclusion in published document

Functions

Function Basics

function	Declare function name, inputs, and outputs

Input and Output Arguments

nargin	Number of function input arguments
nargout	Number of function output arguments
varargin	Variable-length input argument list
varargout	Variable-length output argument list
narginchk	Validate number of input arguments
nargoutchk	Validate number of output arguments
validateattributes	Check validity of array
validatestring	Check validity of text string
inputParser	Parse function inputs
inputname	Variable name of function input

Variables

persistent	Define persistent variable
genvarname	Construct valid variable name from string
isvarname	Determine whether input is valid variable name
namelengthmax	Maximum identifier length
assignin	Assign value to variable in specified workspace
global	Declare global variables
isglobal	Determine whether input is global variable

Error Handling

`try/catch`	Execute statements and catch resulting errors
`error`	Display message and abort function
`warning`	Warning message
`lastwarn`	Last warning message
`assert`	Generate error when condition is violated
`onCleanup`	Cleanup tasks upon function completion

Debugging

`dbclear`	Clear breakpoints
`dbcont`	Resume execution
`dbdown`	Reverse workspace shift performed by dbup, while in debug mode
`dbquit`	Quit debug mode
`dbstack`	Function call stack
`dbstatus`	List all breakpoints
`dbstep`	Execute one or more lines from current breakpoint
`dbstop`	Set breakpoints for debugging
`dbtype`	List text file with line numbers
`dbup`	Shift current workspace to workspace of caller, while in debug mode
`checkcode`	Check MATLAB code files for possible problems
`keyboard`	Input from keyboard
`mlintrpt`	Run checkcode for file or folder, reporting results in browser

Coding and Productivity Tips

`edit`	Edit or create file

Programming Utilities

`echo`	Display statements during function execution

eval	Execute MATLAB expression in text string
evalc	Evaluate MATLAB expression with capture
evalin	Execute MATLAB expression in specified workspace
feval	Evaluate function
run	Run MATLAB script
builtin	Execute built-in function from overloaded method
depdir	List dependent folders for function or P-file
depfun	List dependencies of function or P-file
mfilename	File name of currently running function
pcode	Create protected function file
timer	Create object to schedule execution of MATLAB commands

Data and File Management

Workspace Variables

clear	Remove items from workspace, freeing up system memory
clearvars	Clear variables from memory
disp	Display text or array
openvar	Open workspace variable in Variables editor or other graphical editing tool
who	List variables in workspace
whos	List variables in workspace, with sizes and types
load	Load variables from file into workspace
save	Save workspace variables to file
matfile	Access and change variables directly in MAT-files, without loading into memory
workspace	Open Workspace browser to manage workspace

Data Import and Export

Import and Export Basics

importdata	Load data from file

uiimport	Import data interactively

Text Files

csvread	Read comma-separated value file
csvwrite	Write comma-separated value file
dlmread	Read ASCII-delimited file of numeric data into matrix
dlmwrite	Write matrix to ASCII-delimited file
fileread	Read contents of file into string
textread	Read data from text file; write to multiple outputs
textscan	Read formatted data from text file or string
readtable	Create table from file
writetable	Write table to file
type	Display contents of file

Spreadsheets

xlsfinfo	Determine if file contains Microsoft Excel spreadsheet
xlsread	Read Microsoft Excel spreadsheet file
xlswrite	Write Microsoft Excel spreadsheet file
readtable	Create table from file
writetable	Write table to file

Low-Level File I/O

fclose	Close one or all open files
feof	Test for end-of-file
ferror	Information about file I/O errors
fgetl	Read line from file, removing newline characters
fgets	Read line from file, keeping newline characters
fopen	Open file, or obtain information about open files

fprintf	Write data to text file
fread	Read data from binary file
frewind	Move file position indicator to beginning of open file
fscanf	Read data from text file
fseek	Move to specified position in file
ftell	Position in open file
fwrite	Write data to binary file

Images

exifread	Read EXIF information from JPEG and TIFF image files
im2java	Convert image to Java image
imfinfo	Information about graphics file
imread	Read image from graphics file
imwrite	Write image to graphics file
Tiff	MATLAB Gateway to LibTIFF library routines

Scientific Data

netCDF Files

nccreate	Create variable in NetCDF file
ncdisp	Display contents of NetCDF data source in Command Window
ncinfo	Return information about NetCDF data source
ncread	Read data from variable in NetCDF data source
ncreadatt	Read attribute value from NetCDF data source
ncwrite	Write data to NetCDF file
ncwriteatt	Write attribute to NetCDF file
ncwriteschema	Add NetCDF schema definitions to NetCDF file
netcdf	Summary of MATLAB Network Common Data Form (NetCDF) capabilities

HDF5 Files

High-Level Functions

`h5create`	Create HDF5 data set
`h5disp`	Display contents of HDF5 file
`h5info`	Return information about HDF5 file
`h5read`	Read data from HDF5 data set
`h5readatt`	Read attribute from HDF5 file
`h5write`	Write to HDF5 data set
`h5writeatt`	Write HDF5 attribute

Low-Level Functions

Library (H5)

`H5.close`	Close HDF5 library
`H5.garbage_collect`	Free unused memory in HDF5 library
`H5.get_libversion`	Version of HDF5 library
`H5.open`	Open HDF5 library
`H5.set_free_list_limits`	Set size limits on free lists

Attribute (H5A)

`H5A.close`	Close specified attribute
`H5A.create`	Create attribute
`H5A.delete`	Delete attribute
`H5A.get_info`	Information about attribute
`H5A.get_name`	Attribute name
`H5A.get_space`	Copy of attribute data space
`H5A.get_type`	Copy of attribute data type
`H5A.iterate`	Execute function for attributes attached to object
`H5A.open`	Open attribute

H5A.open_by_idx	Open attribute specified by index
H5A.open_by_name	Open attribute specified by name
H5A.read	Read attribute
H5A.write	Write attribute

Dataset (H5D)

H5D.close	Close dataset
H5D.create	Create new dataset
H5D.get_access_plist	Copy of dataset access property list
H5D.get_create_plist	Copy of dataset creation property list
H5D.get_offset	Location of dataset in file
H5D.get_space	Copy of dataset data space
H5D.get_space_status	Determine if space is allocated
H5D.get_storage_size	Determine required storage size
H5D.get_type	Copy of datatype
H5D.open	Open specified dataset
H5D.read	Read data from HDF5 dataset
H5D.set_extent	Change size of dataset dimensions
H5D.vlen_get_buf_size	Determine variable length storage requirements
H5D.write	Write data to HDF5 dataset

Dimension Scale (H5DS)

H5DS.attach_scale	Attach dimension scale to specific dataset dimension
H5DS.detach_scale	Detach dimension scale from specific dataset dimension
H5DS.get_label	Retrieve label from specific dataset dimension
H5DS.get_num_scales	Number of scales attached to dataset dimension
H5DS.get_scale_name	Name of dimension scale
H5DS.is_scale	Determine if dataset is a dimension scale

H5DS.iterate_scales	Iterate on scales attached to dataset dimension
H5DS.set_label	Set label for dataset dimension
H5DS.set_scale	Convert dataset to dimension scale

Error (H5E)

H5E.clear	Clear error stack
H5E.get_major	Description of major error number
H5E.get_minor	Description of minor error number
H5E.walk	Walk error stack

File (H5F)

H5F.close	Close HDF5 file
H5F.create	Create HDF5 file
H5F.flush	Flush buffers to disk
H5F.get_access_plist	File access property list
H5F.get_create_plist	File creation property list
H5F.get_filesize	Size of HDF5 file
H5F.get_freespace	Amount of free space in file
H5F.get_info	Global information about file
H5F.get_mdc_config	Metadata cache configuration
H5F.get_mdc_hit_rate	Metadata cache hit-rate
H5F.get_mdc_size	Metadata cache size data
H5F.get_name	Name of HDF5 file
H5F.get_obj_count	Number of open objects in HDF5 file
H5F.get_obj_ids	List of open HDF5 file objects
H5F.is_hdf5	Determine if file is HDF5
H5F.mount	Mount HDF5 file onto specified location
H5F.open	Open HDF5 file

H5F.reopen	Reopen HDF5 file
H5F.set_mdc_config	Configure HDF5 file metadata cache
H5F.unmount	Unmount file or group from mount point

Group (H5G)

H5G.close	Close group
H5G.create	Create group
H5G.get_info	Information about group
H5G.open	Open specified group

Identifier (H5I)

H5I.dec_ref	Decrement reference count
H5I.get_file_id	File identifier for specified object
H5I.get_name	Name of object
H5I.get_ref	Reference count of object
H5I.get_type	Type of object
H5I.inc_ref	Increment reference count of specified object
H5I.is_valid	Determine if specified identifier is valid

Link (H5L)

H5L.copy	Copy link from source location to destination location
H5L.create_external	Create soft link to external object
H5L.create_hard	Create hard link
H5L.create_soft	Create soft link
H5L.delete	Remove link
H5L.exists	Determine if link exists
H5L.get_info	Information about link
H5L.get_name_by_idx	Information about link specified by index

H5L.get_val	Value of symbolic link
H5L.iterate	Iterate over links
H5L.iterate_by_name	Iterate through links in group specified by name
H5L.move	Rename link
H5L.visit	Recursively iterate through links in group specified by group identifier
H5L.visit_by_name	Recursively iterate through links in group specified by location and group name

MATLAB (H5ML)

H5ML.compare_values	Numerically compare two HDF5 values
H5ML.get_constant_names	Constants known by HDF5 library
H5ML.get_constant_value	Value corresponding to a string
H5ML.get_function_names	Functions provided by HDF5 library
H5ML.get_mem_datatype	Data type for dataset ID

Object (H5O)

H5O.close	Close object
H5O.copy	Copy object from source location to destination location
H5O.get_comment	Get comment for object specified by object identifier
H5O.get_comment_by_name	Get comment for object specified by location and object name
H5O.get_info	Object metadata
H5O.link	Create hard link to specified object
H5O.open	Open specified object
H5O.open_by_idx	Open object specified by index
H5O.set_comment	Set comment for object specified by object identifier
H5O.set_comment_by_name	Set comment for object specified by location and object name
H5O.visit	Visit objects specified by object identifier
H5O.visit_by_name	Visit objects specified by location and object name

Property (H5P) General Property List Operations

H5P.close	Close property list
H5P.copy	Copy of property list
H5P.create	Create new property list
H5P.get_class	Property list class

Generic Property List Operations

H5P.close_class	Close property list class
H5P.equal	Determine equality of property lists
H5P.exist	Determine if specified property exists in property list
H5P.get	Value of specified property in property list
H5P.get_class_name	Name of property list class
H5P.get_class_parent	Identifier for parent class
H5P.get_nprops	Query number of properties in property list or class
H5P.get_size	Query size of property value in bytes
H5P.isa_class	Determine if property list is member of class
H5P.iterate	Iterate over properties in property list
H5P.set	Set property list value

Dataset Access, Memory, and Transfer Properties

H5P.get_btree_ratios	B-tree split ratios
H5P.get_chunk_cache	Raw data chunk cache parameters
H5P.get_dxpl_multi	Data access property lists for multiple files
H5P.get_edc_check	Determine if error detection is enabled
H5P.get_hyper_vector_size	Number of I/O vectors
H5P.set_btree_ratios	Set B-tree split ratios for dataset transfer
H5P.set_chunk_cache	Set raw data chunk cache parameters

H5P.set_dxpl_multi	Set data transfer property list for multifile driver
H5P.set_edc_check	Enable error detection for dataset transfer
H5P.set_hyper_vector_size	Set number of I/O vectors for hyperslab I/O

Dataset Creation Properties

H5P.all_filters_avail	Determine availability of all filters
H5P.fill_value_defined	Determine if fill value is defined
H5P.get_alloc_time	Return timing of storage space allocation
H5P.get_chunk	Return size of chunks
H5P.get_external	Return information about external file
H5P.get_external_count	Return count of external files
H5P.get_fill_time	Return time when fill values are written to dataset
H5P.get_fill_value	Return dataset fill value
H5P.get_filter	Return information about filter in pipeline
H5P.get_filter_by_id	Return information about specified filter
H5P.get_layout	Determine layout of raw data for dataset
H5P.get_nfilters	Return number of filters in pipeline
H5P.modify_filter	Modify filter in pipeline
H5P.remove_filter	Remove filter from property list
H5P.set_alloc_time	Set timing for storage space allocation
H5P.set_chunk	Set chunk size
H5P.set_deflate	Set compression method and compression level
H5P.set_external	Add additional file to external file list
H5P.set_fill_time	Set time when fill values are written to dataset
H5P.set_fill_value	Set fill value for dataset creation property list
H5P.set_filter	Add filter to filter pipeline
H5P.set_fletcher32	Set Fletcher32 checksum filter in dataset creation
H5P.set_layout	Set type of storage for dataset
H5P.set_nbit	Set N-Bit filter

H5P.set_scaleoffset	Set Scale-Offset filter
H5P.set_shuffle	Set shuffle filter

File Access Properties

H5P.get_alignment	Retrieve alignment properties
H5P.get_driver	Low-level file driver
H5P.get_family_offset	Offset for family file driver
H5P.get_fapl_core	Information about core file driver properties
H5P.get_fapl_family	File access property list information
H5P.get_fapl_multi	Information about multifile access property list
H5P.get_fclose_degree	File close degree
H5P.get_libver_bounds	Library version bounds settings
H5P.get_gc_references	Garbage collection references setting
H5P.get_mdc_config	Metadata cache configuration
H5P.get_meta_block_size	Metadata block size setting
H5P.get_multi_type	Type of data property for MULTI driver
H5P.get_sieve_buf_size	Maximum data sieve buffer size
H5P.get_small_data_block_size	Small data block size setting
H5P.set_alignment	Set alignment properties for file access property list
H5P.set_family_offset	Set offset property for family of files
H5P.set_fapl_core	Modify file access to use H5FD_CORE driver
H5P.set_fapl_family	Set file access to use family driver
H5P.set_fapl_log	Set use of logging driver
H5P.set_fapl_multi	Set use of multifile driver
H5P.set_fapl_sec2	Set file access for sec2 driver
H5P.set_fapl_split	Set file access for emulation of split file driver
H5P.set_fapl_stdio	Set file access for standard I/O driver
H5P.set_fclose_degree	Set file access for file close degree

H5P.set_gc_references	Set garbage collection references flag
H5P.set_libver_bounds	Set library version bounds for objects
H5P.set_mdc_config	Set initial metadata cache configuration
H5P.set_meta_block_size	Set minimum metadata block size
H5P.set_multi_type	Specify type of data accessed with MULTI driver
H5P.set_sieve_buf_size	Set maximum size of data sieve buffer
H5P.set_small_data_block_size	Set size of block reserved for small data

File Creation Properties

H5P.get_istore_k	Return 1/2 rank of indexed storage B-tree
H5P.get_sizes	Return size of offsets and lengths
H5P.get_sym_k	Return size of B-tree 1/2 rank and leaf node 1/2 size
H5P.get_userblock	Return size of user block
H5P.get_version	Return version information for file creation property list
H5P.set_istore_k	Set size of parameter for indexing chunked datasets
H5P.set_sizes	Set byte size of offsets and lengths
H5P.set_sym_k	Set size of parameters used to control symbol table nodes
H5P.set_userblock	Set user block size

Object Copy and Object Creation Properties

H5P.get_attr_creation_order	Return tracking order and indexing settings
H5P.get_attr_phase_change	Retrieve attribute phase change thresholds
H5P.get_copy_object	Return properties to be used when object is copied
H5P.set_attr_creation_order	Set tracking of attribute creation order
H5P.set_attr_phase_change	Set attribute storage phase change thresholds
H5P.set_copy_object	Set properties to be used when objects are copied

Group Creation Properties

H5P.get_create_intermediate_group	Determine creation of intermediate groups
H5P.get_link_creation_order	Query if link creation order is tracked
H5P.get_link_phase_change	Query settings for conversion between groups
H5P.set_create_intermediate_group	Set creation of intermediate groups
H5P.set_link_creation_order	Set creation order tracking and indexing
H5P.set_link_phase_change	Set parameters for group conversion

HDF5 String Properties

H5P.get_char_encoding	Return character encoding
H5P.set_char_encoding	Set character encoding used to encode strings

Reference (H5R)

H5R.create	Create reference
H5R.dereference	Open object specified by reference
H5R.get_name	Name of referenced object
H5R.get_obj_type	Type of referenced object
H5R.get_region	Copy of data space of specified region

Dataspace (H5S)

H5S.copy	Create copy of data space
H5S.create	Create new data space
H5S.close	Close data space
H5S.create_simple	Create new simple data space
H5S.extent_copy	Copy extent from source to destination data space
H5S.is_simple	Determine if data space is simple
H5S.offset_simple	Set offset of simple data space
H5S.select_all	Select entire extent of data space

H5S.select_elements	Specify coordinates to include in selection
H5S.select_hyperslab	Select hyperslab region
H5S.select_none	Reset selection region to include no elements
H5S.select_valid	Determine validity of selection
H5S.set_extent_none	Remove extent from data space
H5S.set_extent_simple	Set size of data space
H5S.get_select_bounds	Bounding box of data space selection
H5S.get_select_elem_npoints	Number of element points in selection
H5S.get_select_elem_pointlist	Element points in data space selection
H5S.get_select_hyper_blocklist	List of hyperslab blocks
H5S.get_select_hyper_nblocks	Number of hyperslab blocks
H5S.get_select_npoints	Number of elements in data space selection
H5S.get_select_type	Type of data space selection
H5S.get_simple_extent_dims	Data space size and maximum size
H5S.get_simple_extent_ndims	Data space rank
H5S.get_simple_extent_npoints	Number of elements in data space
H5S.get_simple_extent_type	Data space class

Datatype (H5T) General Data Type Operation

H5T.close	Close data type
H5T.commit	Commit transient data type
H5T.committed	Determine if data type is committed
H5T.copy	Copy data type
H5T.create	Create new data type
H5T.detect_class	Determine of data type contains specific class
H5T.equal	Determine equality of data types
H5T.get_class	Data type class identifier
H5T.get_create_plist	Copy of data type creation property list
H5T.get_native_type	Native data type of dataset data type

H5T.get_size	Size of data type in bytes
H5T.get_super	Base data type
H5T.lock	Lock data type
H5T.open	Open named data type

Array Data Type

H5T.array_create	Create array data type object
H5T.get_array_dims	Array dimension extents
H5T.get_array_ndims	Rank of array data type

Atomic Data Type Properties

H5T.get_cset	Character set of string data type
H5T.get_ebias	Exponent bias of floating-point type
H5T.get_fields	Floating-point data type bit field information
H5T.get_inpad	Internal padding type for floating-point data types
H5T.get_norm	Mantissa normalization type
H5T.get_offset	Bit offset of first significant bit
H5T.get_order	Byte order of atomic data type
H5T.get_pad	Padding type of least and most-significant bits
H5T.get_precision	Precision of atomic data type
H5T.get_sign	Sign type for integer data type
H5T.get_strpad	Storage mechanism for string data type
H5T.set_cset	Set character dataset for string data type
H5T.set_ebias	Set exponent bias of floating-point data type
H5T.set_fields	Set sizes and locations of floating-point bit fields
H5T.set_inpad	Specify how unused internal bits are to be filled
H5T.set_norm	Set mantissa normalization of floating-point data type
H5T.set_offset	Set bit offset of first significant bit

`H5T.set_order`	Set byte ordering of atomic data type
`H5T.set_pad`	Set padding type for least and most significant bits
`H5T.set_precision`	Set precision of atomic data type
`H5T.set_sign`	Set sign property for integer data type
`H5T.set_size`	Set size of data type in bytes
`H5T.set_strpad`	Set storage mechanism for string data type

Compound Data Type

`H5T.get_member_class`	Data type class for compound data type member
`H5T.get_member_index`	Index of compound or enumeration type member
`H5T.get_member_name`	Name of compound or enumeration type member
`H5T.get_member_offset`	Offset of field of compound data type
`H5T.get_member_type`	Data type of specified member
`H5T.get_nmembers`	Number of elements in enumeration type
`H5T.insert`	Add member to compound data type
`H5T.pack`	Recursively remove padding from compound data type

Enumeration Data Type

`H5T.enum_create`	Create new enumeration data type
`H5T.enum_insert`	Insert enumeration data type member
`H5T.enum_nameof`	Name of enumeration data type member
`H5T.enum_valueof`	Value of enumeration data type member
`H5T.get_member_value`	Value of enumeration data type member

Opaque Data Type Properties

`H5T.get_tag`	Tag associated with opaque data type
`H5T.set_tag`	Tag opaque data type with description

Variable-length Data Type

`H5T.is_variable_str`	Determine if data type is variable-length string
`H5T.vlen_create`	Create new variable-length data type

Filters and Compression (H5Z)

`H5Z.filter_avail`	Determine if filter is available
`H5Z.get_filter_info`	Information about filter

HDF4 Files

`hdfinfo`	Information about HDF4 or HDF-EOS file
`hdfread`	Read data from HDF4 or HDF-EOS file
`hdf`	Summary of MATLAB HDF4 capabilities

FITS Files

High-Level Functions

`fitsdisp`	Display FITS metadata
`fitsinfo`	Information about FITS file
`fitsread`	Read data from FITS file
`fitswrite`	Write image to FITS file

Low-Level Functions

File Access

`createFile`	Create FITS file
`openFile`	Open FITS file
`closeFile`	Close FITS file
`deleteFile`	Delete FITS file

`fileName`	Name of FITS file
`fileMode`	I/O mode of FITS file

Image Manipulation

`createImg`	Create FITS image
`getImgSize`	Size of image
`getImgType`	Data type of image
`insertImg`	Insert FITS image after current image
`readImg`	Read image data
`setBscale`	Reset image scaling
`writeImg`	Write to FITS image

Keywords

`readCard`	Header record of keyword
`readKey`	Keyword
`readKeyCmplx`	Keyword as complex scalar value
`readKeyDbl`	Keyword as double precision value
`readKeyLongLong`	Keyword as int64
`readKeyLongStr`	Long string value
`readKeyUnit`	Physical units string from keyword
`readRecord`	Header record specified by number
`writeComment`	Write or append COMMENT keyword to CHU
`writeDate`	Write DATE keyword to CHU
`writeKey`	Update or add new keyword into current HDU
`writeKeyUnit`	Write physical units string
`writeHistory`	Write or append HISTORY keyword to CHU
`deleteKey`	Delete key by name
`deleteRecord`	Delete key by record number

`getHdrSpace`	Number of keywords in header

Header Data Unit (HDU) Access

`copyHDU`	Copy current HDU from one file to another
`getHDUnum`	Number of current HDU in FITS file
`getHDUtype`	Type of current HDU
`getNumHDUs`	Total number of HDUs in FITS file
`movAbsHDU`	Move to absolute HDU number
`movNamHDU`	Move to first HDU having specific type and keyword values
`movRelHDU`	Move relative number of HDUs from current HDU
`writeChecksum`	Compute and write checksum for current HDU
`deleteHDU`	Delete current HDU in FITS file

Image Compression

`imgCompress`	Compress HDU from one file into another
`isCompressedImg`	Determine if current image is compressed
`setCompressionType`	Set image compression type
`setHCompScale`	Set scale parameter for HCOMPRESS algorithm
`setHCompSmooth`	Set smoothing for images compressed with HCOMPRESS
`setTileDim`	Set tile dimensions

ASCII and Binary Tables

`createTbl`	Create new ASCII or binary table extension
`insertCol`	Insert column into table
`insertRows`	Insert rows into table
`insertATbl`	Insert ASCII table after current HDU
`insertBTbl`	Insert binary table after current HDU
`deleteCol`	Delete column from table

deleteRows	Delete rows from table
getAColParms	ASCII table information
getBColParms	Binary table information
getColName	Table column name
getColType	Scaled column data type, repeat value, width
getEqColType	Column data type, repeat value, width
getNumCols	Number of columns in table
getNumRows	Number of rows in table
readATblHdr	Read header information from current ASCII table
readBTblHdr	Read header information from current binary table
readCol	Read rows of ASCII or binary table column
setTscale	Reset image scaling
writeCol	Write elements into ASCII or binary table column

Utilities

getConstantValue	Numeric value of named constant
getVersion	Revision number of the CFITSIO library
getOpenFiles	List of open FITS files

Band-Interleaved Files

multibandread	Read band-interleaved data from binary file
multibandwrite	Write band-interleaved data to file

Common Data Format

cdfepoch	Convert MATLAB formatted dates to CDF formatted dates
cdfinfo	Information about Common Data Format (CDF) file
cdfread	Read data from Common Data Format (CDF) file

cdfwrite	Write data to Common Data Format (CDF) file
todatenum	Convert CDF epoch object to MATLAB datenum
cdflib	Summary of Common Data Format (CDF) capabilities

Audio and Video

Reading and Writing Files

audioinfo	Information about audio file
audioread	Read audio file
audiowrite	Write audio file
mmfileinfo	Information about multimedia file
movie2avi	Create Audio/Video Interleaved (AVI) file from MATLAB movie
VideoReader	Read video files
VideoWriter	Write video files

Recording and Playback

audiodevinfo	Information about audio device
audioplayer	Create object for playing audio
audiorecorder	Create object for recording audio
sound	Convert matrix of signal data to sound
soundsc	Scale data and play as sound

Utilities

beep	Produce beep sound
lin2mu	Convert linear audio signal to mu-law
mu2lin	Convert mu-law audio signal to linear

XML Documents

xmlread	Read XML document and return Document Object Model node
xmlwrite	Write XML Document Object Model node
xslt	Transform XML document using XSLT engine

Memory Mapping

disp (memmapfile)	Information about memory map
get (memmapfile)	Memory map properties
memmapfile	Create memory map to a file

File Operations

Files and Folders

dir	List folder contents
ls	List folder contents
pwd	Identify current folder
fileattrib	Set or get attributes of file or folder
exist	Check existence of variable, function, folder, or class
isdir	Determine whether input is folder
type	Display contents of file
visdiff	Compare two text files, MAT-Files, binary files, Zip files, or folders
what	List MATLAB files in folder
which	Locate functions and files
cd	Change current folder
copyfile	Copy file or folder
delete	Remove files or objects
recycle	Set option to move deleted files to recycle folder
mkdir	Make new folder
movefile	Move file or folder
rmdir	Remove folder

open	Open file in appropriate application
winopen	Open file in appropriate application (Windows)
filebrowser	Open Current Folder browser, or select it if already open

File Name Construction

fileparts	Parts of file name and path
fullfile	Build full file name from parts
filemarker	Character to separate file name and internal function name
filesep	File separator for current platform
tempdir	Name of system's temporary folder
tempname	Unique name for temporary file
matlabroot	Root folder
toolboxdir	Root folder for specified toolbox

File Compression

gunzip	Uncompress GNU zip files
gzip	Compress files into GNU zip files
tar	Compress files into tar file
untar	Extract contents of tar file
unzip	Extract contents of zip file
zip	Compress files into zip file

Search Path

addpath	Add folders to search path
rmpath	Remove folders from search path
path	View or change search path
savepath	Save current search path
userpath	View or change user portion of search path

genpath	Generate path string
pathsep	Search path separator for current platform
pathtool	Open Set Path dialog box to view and change search path
restoredefaultpath	Restore default search path

Operating System Commands

clipboard	Copy and paste strings to and from system clipboard
computer	Information about computer on which MATLAB software is running
dos	Execute DOS command and return output
getenv	Environment variable
perl	Call Perl script using appropriate operating system executable
setenv	Set environment variable
system	Execute operating system command and return output
unix	Execute UNIX command and return output
winqueryreg	Item from Windows registry

Internet File Access

ftp	Connect to FTP server
sendmail	Send email message to address list
urlread	Download URL content to MATLAB string
urlwrite	Download URL content and save to file
web	Open Web page or file in browser

Serial Port Devices

delete (serial)	Remove serial port object from memory
fclose (serial)	Disconnect serial port object from device
fgetl (serial)	Read line of text from device and discard terminator
fgets (serial)	Read line of text from device and include terminator

fopen (serial)	Connect serial port object to device
fprintf (serial)	Write text to device
fread (serial)	Read binary data from device
fscanf (serial)	Read data from device, and format as text
fwrite (serial)	Write binary data to device
get (serial)	Serial port object properties
instrcallback	Event information when event occurs
instrfind	Read serial port objects from memory to MATLAB workspace
instrfindall	Find visible and hidden serial port objects
isvalid (serial)	Determine whether serial port objects are valid
readasync	Read data asynchronously from device
record	Record data and event information to file
serial	Create serial port object
serialbreak	Send break to device connected to serial port
set (serial)	Configure or display serial port object properties
stopasync	Stop asynchronous read and write operations
clear (serial)	Remove serial port object from MATLAB workspace
load (serial)	Load serial port objects and variables into MATLAB workspace
save (serial)	Save serial port objects and variables to file
disp (serial)	Serial port object summary information
length (serial)	Length of serial port object array
size (serial)	Size of serial port object array

GUI Building

GUI Building Basics

guide	Open GUI Layout Editor

Component Selection

GUI Controls and Indicators

figure	Create figure graphics object
axes	Create axes graphics object
uicontrol	Create user interface control object
uitable	Create 2-D graphic table GUI component
uipanel	Create panel container object
uibuttongroup	Create container object to exclusively manage radio buttons and toggle buttons
actxcontrol	Create Microsoft ActiveX control in figure window

Menus and Toolbars

uimenu	Create menus and menu items on figure windows
uicontextmenu	Create context menu
uitoolbar	Create toolbar on figure
uipushtool	Create push button on toolbar
uitoggletool	Create toggle button on toolbar

Predefined Dialog Boxes

dialog	Create and display empty dialog box
errordlg	Create and open error dialog box
helpdlg	Create and open help dialog box
msgbox	Create and open message dialog box
questdlg	Create and open question dialog box
uigetpref	Specify and conditionally open dialog box according to user preference
uisetpref	Manage preferences used in uigetpref
waitbar	Open or update wait bar dialog box
warndlg	Open warning dialog box
export2wsdlg	Export variables to workspace
inputdlg	Create and open input dialog box

listdlg	Create and open list-selection dialog box
uisetcolor	Open standard dialog box for setting object's ColorSpec
uisetfont	Open standard dialog box for setting object's font characteristics
printdlg	Print dialog box
printpreview	Preview figure to print
uigetdir	Open standard dialog box for selecting directory
uigetfile	Open standard dialog box for retrieving files
uiopen	Interactively select file to open and load data
uiputfile	Open standard dialog box for saving files
uisave	Interactively save workspace variables to MAT-file

Component Layout

align	Align user interface controls (uicontrols) and axes
movegui	Move GUI figure to specified location on screen
getpixelposition	Get component position in pixels
setpixelposition	Set component position in pixels
listfonts	List available system fonts
textwrap	Wrapped string matrix for given uicontrol
uistack	Reorder visual stacking order of objects

Coding GUI Behavior

guidata	Store or retrieve GUI data
guihandles	Create structure of handles
openfig	Open new copy or raise existing copy of saved figure
getappdata	Value of application-defined data
isappdata	True if application-defined data exists
rmappdata	Remove application-defined data
setappdata	Specify application-defined data

uiresume	Resume execution of blocked program
uiwait	Block program execution and wait to resume
waitfor	Block execution and wait for event or condition
waitforbuttonpress	Wait for key press or mouse-button click
addpref	Add preference
getpref	Preference
ispref	Test for existence of preference
rmpref	Remove preference
setpref	Set preference

Packaging GUIs as Apps

matlab.apputil.create	Create or modify app project file for packaging app into .mlappinstall file using interactive dialog box
matlab.apputil.package	Package app files into .mlappinstall file
matlab.apputil.install	Install app from a .mlappinstall file
matlab.apputil.run	Run app programmatically
matlab.apputil.getInstalledAppInfo	List installed app information
matlab.apputil.uninstall	Uninstall app

Advanced Software Development

Object-Oriented Programming

Class Syntax Fundamentals

classdef	Class definition keywords
class	Determine class of object
isa	Determine if input is object of specified class
isequal	Determine array equality
isobject	Determine if input is MATLAB object
enumeration	Display class enumeration members and names

`events`	Event names
`methods`	Class method names
`properties`	Class property names

Defining MATLAB Classes

Class Definition and Organization

`classdef`	Class definition keywords
`import`	Add package or class to current import list

Properties

`properties`	Class property names
`isprop`	Determine if property of object
`dynamicprops`	Abstract class used to derive handle class with dynamic properties
`meta.property`	meta.property class describes MATLAB class properties

Methods

`methods`	Class method names
`ismethod`	Determine if method of object
`meta.method`	meta.method class describes MATLAB class methods

Handle Classes

`handle`	Abstract class for deriving handle classes
`hgsetget`	Abstract class used to derive handle class with set and get methods
`dynamicprops`	Abstract class used to derive handle class with dynamic properties
`matlab.mixin.Copyable`	Superclass providing copy functionality for handle objects
`delete`	Handle object destructor
`findobj`	Find handle objects matching specified conditions

`isa`	Determine if input is object of specified class
`isvalid`	Is object valid handle class object
`findprop`	Find meta.property object associated with property name
`relationaloperators`	Equality and sorting of handle objects

Events

`events`	Event names
`notify`	Notify listeners that event is occurring
`addlistener`	Create event listener
`event.EventData`	Base class for all data objects passed to event listeners
`event.listener`	Class defining listener objects
`event.PropertyEvent`	Data for property events
`event.proplistener`	Define listener object for property events

Object Arrays

`empty`	Create empty array
`matlab.mixin.Heterogeneous`	Superclass for heterogeneous array formation

Class Hierarchies

`superclasses`	Superclass names
`matlab.mixin.Heterogeneous`	Superclass for heterogeneous array formation

Enumerations

`enumeration`	Display class enumeration members and names
`meta.EnumeratedValue`	Describes enumeration members of MATLAB class

Control Save and Load

`save`	Save workspace variables to file
`load`	Load variables from file into workspace
`saveobj`	Modify save process for object
`loadobj`	Modify load process for object

Customize MATLAB Behavior

`cat`	Concatenate arrays along specified dimension
`horzcat`	Concatenate arrays horizontally
`vertcat`	Concatenate arrays vertically
`empty`	Create empty array
`disp`	Display text or array
`display`	Display text and numeric expressions
`numel`	Number of array elements
`size`	Array dimensions
`end`	Terminate block of code, or indicate last array index
`subsref`	Redefine subscripted reference for objects
`subsasgn`	Subscripted assignment
`subsindex`	Subscript indexing with object
`substruct`	Create structure argument for subsasgn or subsref

Customizing Object Display

`matlab.mixin.CustomDisplay`	Display customization interface class
`matlab.mixin.util.PropertyGroup`	Custom property list for object display

Getting Information About Classes and Objects

`metaclass`	Obtain meta.class object
`meta.abstractDetails`	Find abstract methods and properties

meta.class.fromName	Return meta.class object associated with named class
meta.package.fromName	Return meta.package object for specified package
meta.package.getAllPackages	Get all top-level packages
meta.class	meta.class class describes MATLAB classes
meta.property	meta.property class describes MATLAB class properties
meta.method	meta.method class describes MATLAB class methods
meta.event	meta.event class describes MATLAB class events
meta.package	meta.package class describes MATLAB packages
meta.DynamicProperty	meta.DynamicProperty class describes dynamic property of MATLAB object
meta.EnumeratedValue	Describes enumeration members of MATLAB class
meta.MetaData	Superclass for MATLAB object metadata

Exception Handling

try/catch	Execute statements and catch resulting errors
addCause (MException)	Record additional causes of exception
getReport (MException)	Get error message for exception
last (MException)	Last uncaught exception
rethrow (MException)	Reissue existing exception
throw (MException)	Issue exception and terminate function
throwAsCaller (MException)	Throw exception as if from calling function
MException	Capture error information

Performance and Memory

Code Performance

bench	MATLAB benchmark
cputime	Elapsed CPU time
memory	Display memory information
profile	Profile execution time for function

profsave	Save profile report in HTML format
tic	Start stopwatch timer
timeit	Measure time required to run function
toc	Read elapsed time from stopwatch

Memory Usage

clear	Remove items from workspace, freeing up system memory
inmem	Names of functions, MEX-files, classes in memory
memory	Display memory information
pack	Consolidate workspace memory
whos	List variables in workspace, with sizes and types

Unit Testing Framework

Write Unit Tests

functiontests	Create array of tests from handles to local functions
matlab.unittest.TestCase	Superclass of all matlab.unittest test classes

Run Unit Tests

runtests	Run set of tests
matlab.unittest.TestCase.run	Run TestCase test
matlab.unittest.TestSuite.run	Run TestSuite array using TestRunner object configured for text output
matlab.unittest.TestRunner.run	Run all tests in TestSuite array
matlab.unittest.TestRunner.addPlugin	Add plugin to TestRunner object
matlab.unittest.TestSuite	Class for grouping tests to run
matlab.unittest.Test	Specification of a single test method
matlab.unittest.TestRunner	Class for running tests in matlab.unittest framework

Analyze Test Results

matlab.unittest.TestResult	Result of running test suite

Custom Documentation

builddocsearchdb	Build searchable documentation database

External Programming Language Interfaces

Java Libraries

javaArray	Construct Java array object
javaclasspath	Return Java class path or specify dynamic path
javaaddpath	Add entries to dynamic Java class path
javarmpath	Remove entries from dynamic Java class path
javachk	Error message based on Java feature support
isjava	Determine if input is Java object
usejava	Determine if Java feature is available
javaMethod	Call Java method
javaMethodEDT	Call Java method from Event Dispatch Thread (EDT)
javaObject	Call Java constructor
javaObjectEDT	Call Java constructor on Event Dispatch Thread (EDT)
cell	Create cell array
class	Determine class of object
clear	Remove items from workspace, freeing up system memory
depfun	List dependencies of function or P-file
exist	Check existence of variable, function, folder, or class
fieldnames	Field names of structure, or public fields of object
im2java	Convert image to Java image
import	Add package or class to current import list
inmem	Names of functions, MEX-files, classes in memory
inspect	Open Property Inspector

isa	Determine if input is object of specified class
methods	Class method names
methodsview	View class methods
which	Locate functions and files
matlab.exception.JavaException	Capture error information for Java exception

.NET Libraries

Getting Started

NET.addAssembly	Make .NET assembly visible to MATLAB
NET.isNETSupported	Check for supported Microsoft .NET Framework
NET	Summary of functions in MATLAB .NET interface
enableNETfromNetworkDrive	Enable access to .NET commands from network drive
NET.Assembly	Members of .NET assembly
NET.NetException	Capture error information for .NET exception

Data Types

NET.createArray	Array for nonprimitive .NET types
cell	Create cell array
NET.disableAutoRelease	Lock .NET object representing a RunTime Callable Wrapper (COM Wrapper) so that MATLAB does not release COM object
NET.enableAutoRelease	Unlock .NET object representing a RunTime Callable Wrapper (COM Wrapper) so that MATLAB releases COM object

Properties

NET.setStaticProperty	Static property or field name

Events and Delegates

BeginInvoke	Initiate asynchronous .NET delegate call

`EndInvoke`	Retrieve result of asynchronous call initiated by .NET System.Delegate BeginInvoke method
`Combine`	Convenience function for static .NET System.Delegate Combine method
`Remove`	Convenience function for static .NET System.Delegate Remove method
`RemoveAll`	Convenience function for static .NET System.Delegate RemoveAll method

Enumerations

`bitand`	Bit-wise AND
`bitor`	Bit-wise OR
`bitxor`	Bit-wise XOR
`bitnot`	.NET enumeration object bit-wise NOT instance method

Generic Classes

`NET.convertArray`	Convert numeric MATLAB array to .NET array
`NET.createGeneric`	Create instance of specialized .NET generic type
`NET.invokeGenericMethod`	Invoke generic method of object
`NET.GenericClass`	Represent parameterized generic type definitions

Call MEX-Files

`mexext`	Binary MEX-file-name extension
`inmem`	Names of functions, MEX-files, classes in memory

COM Interface

COM Objects

`actxserver`	Create COM server
`actxcontrol`	Create Microsoft ActiveX control in figure window
`actxcontrollist`	List currently installed Microsoft ActiveX controls
`actxcontrolselect`	Create Microsoft ActiveX control from GUI

`iscom`	Determine whether input is COM or ActiveX object
`isprop`	Determine whether input is COM object property
`get`	Get property value from interface, or display properties
`set`	Set object or interface property to specified value
`addproperty`	Add custom property to COM object
`deleteproperty`	Remove custom property from COM object
`inspect`	Open Property Inspector
`propedit`	Open built-in property page for control
`fieldnames`	Field names of structure, or public fields of object
`ismethod`	Determine whether input is COM object method
`methods`	Class method names
`methodsview`	View class methods
`invoke`	Invoke method on COM object or interface, or display methods
`isevent`	Determine whether input is COM object event
`events`	List of events COM object can trigger
`eventlisteners`	List event handler functions associated with COM object events
`registerevent`	Associate event handler for COM object event at run time
`unregisterallevents`	Unregister all event handlers associated with COM object events at run time
`unregisterevent`	Unregister event handler associated with COM object event at run time
`isinterface`	Determine whether input is COM interface
`interfaces`	List custom interfaces exposed by COM server object
`release`	Release COM interface
`delete`	Remove COM control or server
`move`	Move or resize control in parent window
`load`	Initialize control object from file
`save`	Serialize control object to file

Call MATLAB COM Automation Server

`Execute`	Execute MATLAB command in Automation server

Feval	Evaluate MATLAB function in Automation server
GetCharArray	Character array from Automation server
PutCharArray	Store character array in Automation server
GetFullMatrix	Matrix from Automation server workspace
PutFullMatrix	Matrix in Automation server workspace
GetVariable	Data from variable in Automation server workspace
GetWorkspaceData	Data from Automation server workspace
PutWorkspaceData	Data in Automation server workspace
MaximizeCommandWindow	Open Automation server window
MinimizeCommandWindow	Minimize size of Automation server window
actxGetRunningServer	Handle to running instance of Automation server
enableservice	Enable, disable, or report status of MATLAB Automation server
Quit	Terminate MATLAB Automation server

Web Services

callSoapService	Send SOAP message to endpoint
createClassFromWsdl	Create MATLAB class based on WSDL document
createSoapMessage	Create SOAP message to send to server
parseSoapResponse	Convert response string from SOAP server into MATLAB types

C Shared Libraries

loadlibrary	Load shared library into MATLAB
unloadlibrary	Unload shared library from memory
libisloaded	Determine if shared library is loaded
calllib	Call function in shared library
libfunctions	Return information on functions in shared library
libfunctionsview	Display shared library function signatures in window
libstruct	Convert MATLAB structure to C-style structure for use with shared library

`libpointer`	Pointer object for use with shared library
`lib.pointer`	Pointer object compatible with C pointer

Application Programming Interfaces to MATLAB

Use and Create MEX-Files

Call MEX-Files

`mexext`	Binary MEX-file-name extension
`inmem`	Names of functions, MEX-files, classes in memory

Build C/C++ MEX-Files

`mex`	Build MEX-function from C/C++ or Fortran source code
`dbmex`	Enable MEX-file debugging (on UNIX platforms)
`mex.getCompilerConfigurations`	Get compiler configuration information for building MEX-files

Build Fortran MEX-Files

`mex`	Build MEX-function from C/C++ or Fortran source code
`dbmex`	Enable MEX-file debugging (on UNIX platforms)
`mex.getCompilerConfigurations`	Get compiler configuration information for building MEX-files

Share MEX-Files

`ver`	Version information for MathWorks products
`computer`	Information about computer on which MATLAB software is running
`mex.getCompilerConfigurations`	Get compiler configuration information for building MEX-files
`mexext`	Binary MEX-file-name extension

Troubleshoot MEX-Files

`dbmex`	Enable MEX-file debugging (on UNIX platforms)

inmem	Names of functions, MEX-files, classes in memory
mex	Build MEX-function from C/C++ or Fortran source code
mex.getCompilerConfigurations	Get compiler configuration information for building MEX-files
mexext	Binary MEX-file-name extension

Source Control Integration

checkin	Check files into source control system (UNIX platforms)
checkout	Check files out of source control system (UNIX platforms)
cmopts	Name of source control system
customverctrl	Allow custom source control system (UNIX platforms)
undocheckout	Undo previous checkout from source control system (UNIX platforms)
verctrl	Source control actions (Windows platforms)

Desktop Environment

Startup and Shutdown

matlab (Windows)	Start MATLAB program (Windows platforms)
matlab (UNIX)	Start MATLAB program (UNIX platforms)
exit	Terminate MATLAB program (same as quit)
quit	Terminate MATLAB program
matlabrc	Startup file for MATLAB program
startup	Startup file for user-defined options
finish	Termination file for MATLAB program

Basic Settings

prefdir	Folder containing preferences, history, and layout files
preferences	Open Preferences dialog box

Platform and License

ismac	Determine if version is for Mac OS X platform
ispc	Determine if version is for Windows (PC) platform
isstudent	Determine if version is Student Version
isunix	Determine if version is for UNIX platform
javachk	Error message based on Java feature support
license	Return license number or perform licensing task
usejava	Determine if Java feature is available
ver	Version information for MathWorks products
verLessThan	Compare toolbox version to specified version string
version	Version number for MATLAB and libraries

Help and Support

doc	Reference page in Help browserSearch for term in documentation
help	Help for functions in Command Window
docsearch	Help browser search
lookfor	Search for keyword in all help entries
demo	Access product examples in Help browser
echodemo	Run example script step-by-step in Command Window