

M-file unravel.m

Help text for C MEX-file unravel:

Contains text that is displayed in response to
>> help unravel

MATLAB passes y, link, and m * n
to the C MEX file:

```
prhs [0] = y
prhs [1] = link
prhs [2] = m * n
nrhs = 3
nlhs = 1
```

Parameters nlhs and nrhs are integers
indicating the number of left- and right-
hand arguments, and prhs is a vector
containing *pointers* to MATLAB arrays
y, link, and m * n.

M-file huff2mat

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In M-file huff2mat, the
statement

```
x = unravel(y, ...
            link, m * n)
```

tells MATLAB to pass y,
link, and m * n to C MEX-
file function unravel.

On return, plhs(0) is
assigned to x.

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MATLAB passes MEX-file output
plhs[0] to M-file huff2mat.

C MEX-file unravel.c

In C MEX-file unravel, execution begins and
ends in *gateway routine* mexFunction, which calls
C *computational routine* unravel. To declare the
entry point and interface routines, use

```
#include "mex.h"
```

C function mexFunction

MEX-file *gateway routine*:

```
void mexFunction(
    int nlhs, mxArray *plhs[],
    int nrhs, const mxArray
        *prhs[])
```

where integers nlhs and nrhs indicate the
number of left- and right-hand arguments and
vectors plhs and prhs contain *pointers* to
input and output arguments of type mxArray.
The mxArray type is MATLAB's internal
array representation.

The MATLAB API provides routines to
handle the data types it supports. Here, we

1. Use mxGetM, mxGetN, mxIsDouble,
mxIsComplex, and mexErrMsgTxt to
check the input and output arguments.
2. Use mxGetData to get pointers to the data
in prhs[0] (the Huffman code) and
prhs[1] (the decoding table) and save as
C pointers hx and link, respectively.
3. Use mxGetScalar to get the output array
size from prhs[2] and save as xsz.
4. Use mxGetM to get the number of elements
in prhs[0] (the Huffman code) and save
as hxsz.
5. Use mxCreateDoubleMatrix and
mxGetData to make a decode output array
pointer and assign it to plhs[0].
6. Call *computational routine* unravel,
passing the arguments formed in Steps 2-5.

C function unravel

MEX-file *computational routine*:

```
void unravel(
    uint16_T *hx
    double *link, double *x,
    double xsz, int hxsz)
```

which contains the C code for decoding hx
based on link and putting the result in x.

FIGURE 9.6 The interaction of M-file huff2mat and MATLAB callable C function unravel. Note that MEX-file unravel contains two functions: gateway routine mexFunction and computational routine unravel. Help text for MEX-file unravel is contained in the separate M-file, also named unravel.