Merging a LaTeX and an m-File to Generate Professional Documentation
merge2latex
Version 1.0

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Abstract

This tool takes a new approach to documenting the results of a MATLAB simulation in LATEX. Two simple commands are defined `\importMCell` in LaTeX and the command `\cellName` in MATLAB. The complete MATLAB file is executed: the code, screen output and graphics are captured. A .tex file is created in memory documenting the simulation

The `\importMCell{<cell-name>}` then imports the necessary portions of the .tex data so that the requested cells are documented in a merged .tex file. A major advantage of this approach is that you write your LaTeX markup in your LaTeX environment. There are no restrictions on the use of LaTeX syntax.

This document has been produced using `merge2latex`.

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1 Introduction

This tool takes a new approach to including m-code documentation in LaTeX files. It is based on merging a .tex file with the output from an m-file. To be more accurate: the command `\cellName{<name>}` is placed as a comment at the start of a cell in MATLAB, this gives the cell a name by which it can be referenced in LaTeX. The code for this cell together with the screen output it generates are captured and converted to a temporary LaTeX file in memory. The graphics are saved as an .eps file.

latex command `\importMCell{<name>}` marks the position where the LaTeX code documenting the respective cell is to be imported. This enables a very simple generation of for selected cells in an m-file. The cells may be referenced in LaTeXin a different sequence to their definition in the m-file. The original m-file line numbers are maintained.

You write your LaTeX code in the program of your preference and the `merge2latex` tool generates a merged .tex file which you can use in your environment. In this manner full LaTeX markup is available with all the pleasantries of a good writing environment. A major advantage of this approach is that you can test your LaTeXand m-code independently. This also makes finding errors simpler.

The `listings` package is used to document the MATLAB m-code. Embedded postscript is used as a format for saving figures.

This tool is closely related to the `publish2latex` tool available at:

```
http://www.mathworks.com/matlabcentral/fileexchange/41207
```

The `publish2latex` tool has the LaTeX markup in the m-code file. The tool `merge2latex` uses two files which are interlinked using `\cellName{Example}` and `\importMCell{Example}`.

This document has been generated using this tool, the source files `introduction.tex` and `introduction.m` provide the required source code. They serve as an example for using this tool.

2 Command Definition in LaTeX

The command is defined as follows:

```
\newcommand{\importMCell}[1]{}
```

This command is passive in LaTeX, the parameter used defines the name of the cell to be imported, e.g.

```
\importMCell{Cell1}
```

defines that the documentation of the cell with the name `Cell1` should be introduced at this position in the LaTeXfile. The `\importMCell` must be at the start of a line if it is to be recognized, this avoids misinterpretations. The name should be restricted to alpha-numeric strings, they case sensitive.

3 Command Definition in MATLAB

The command to define a cell name in MATLAB is:

```
% \cellName{<>}
```

for example:

```
% \cellName{Cell1}.
```

The name defined in MATLAB must correspond to the cell name used in LaTeXif it is to be recognized.

4 Cell Structure, Labelling and Captions

Each cell in MATLAB contains one and only one code section and should only contain one figure. The labels assigned to the code are `\label{code:cellName}` and to the figures `\label{fig:cellName}`. In this manner the figures and code generated from the m-file can be referenced in the LaTeX markup.

A caption may be added as a comment after the code section in the MATLAB cell. the standard LaTeXsyntax is used.

5 Starting `merge2latex` and the Processing Sequence

After downloading the package you will need to place the directory in you file path in MATLAB. The tool is then started by issuing the command `merge2latex`. A menu is opened and you select what you wish to do.

The simples starting point is to apply the tool to the `introduction.tex` file provided in the documentation for this library.

The complete MATLAB m-code is executed, and for each cell corresponding .tex code is produced and the necessary graphics files are created. Only those sections of the .tex code which correspond to the cells called by the `\importMCell` command in LaTeXare merged into a final .tex file.

The import sequence in LaTeX may be different to the definition sequence in MATLAB, this enables a more flexible documentation. The original line numbers from the m-file are maintained.

Running on windows it is also possible to automatically generate the .DVI, .PS and .PDF files.

6 Example

Let us import the cells from the file introduction.m:

```
h = figure;
plot( a,b,'k');
```

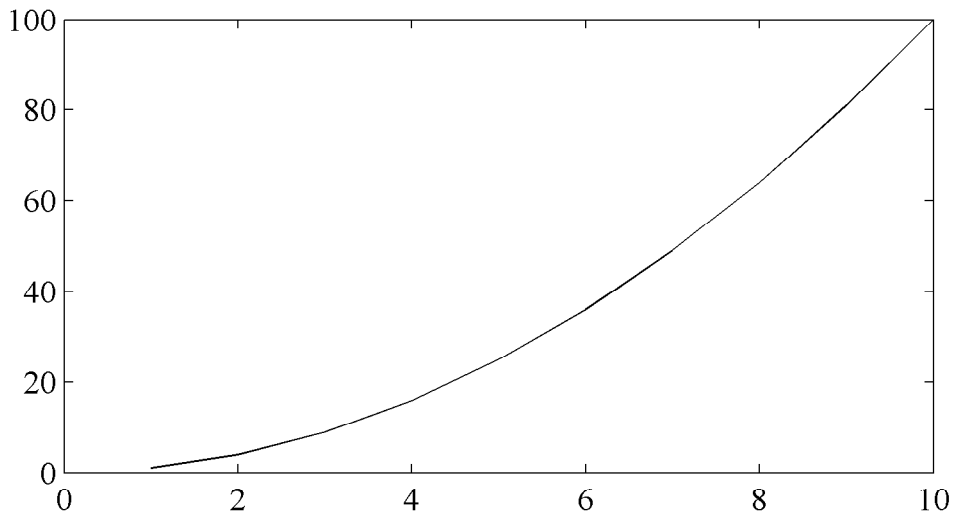

Figure 1: Plot of a vs b.

Now the next cell is imported.

```
a=1:10;
b = a.^2;
for k = 1:5
   c(k) = a(k) * b(k)
end;
```

```
c =

     1


c =

     1     8


c =

     1     8    27
```

```
c =

     1     8    27    64


c =

     1     8    27    64   125
```

Note `cell2` has been imported before `cell1`. The following is a citation to a bibliography just to demonstrate the full LaTeX functionality [1].

6.1 Final import

Now the final cell is imported.

```
figure
plot(a,b,'h');
xlabel('Hier');
ylabel('there');
```

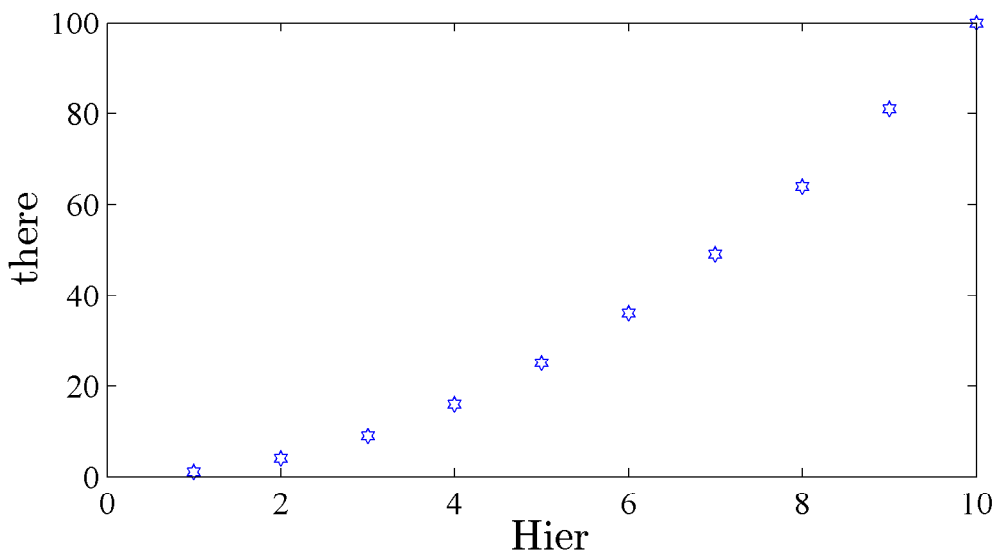

Figure 2: Plot of a vs b with markers.

References

[1] Paul O'Leary and Matthew Harker. A framework for the evaluation of inclinometer data in the measurement of structures. *IEEE T. Instrumentation and Measurement*, 61(5):1237–1251, 2012.