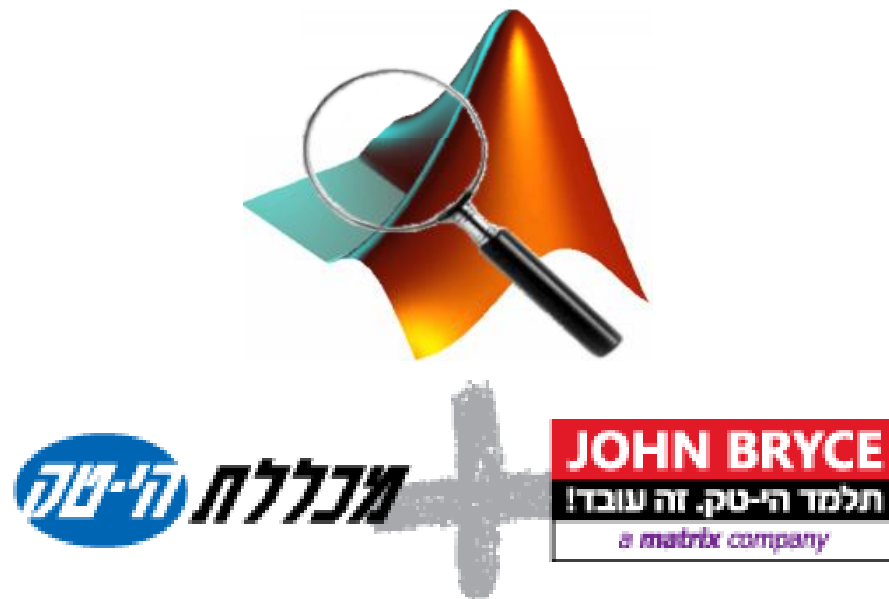


Matlab Reports

Open Day – Jan 8, 2013

Yair Altman



<http://UndocumentedMatlab.com/files/OpenDay.zip>

Reporting in Matlab

- Output to Command Window / console
- Output to data files (XLS, txt, ...)
- Matlab's Publish tool (HTML, PDF, ...)
- Export to Microsoft Office (XLS, PPT, DOC, PDF)
- Export figure plots/GUI

Output to Command Window/console

- Not suppressing assignment output
- Text formatting – `fprintf`, `disp`
- Text alignment
- Hyperlinks
- Text colors – [cprintf](#)

Formatted text data

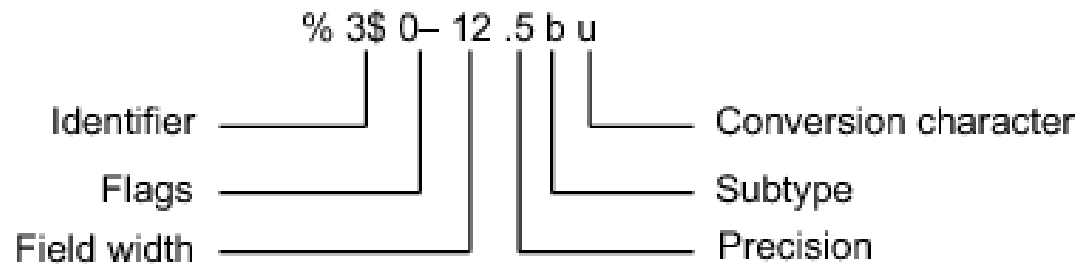
- Write formatted data:

- `fprintf(fid,format,...{data})`
- Use `fid=1` (STDOUT) for Command Window output (**black**, default `fid`)
- Use `fid=2` (STDERR) for Command Window output (**red**)
- `` tags are treated as hyperlinks; "matlab:" protocol can be used

- Usage examples:

- `fprintf('This is test #d\n',n);`
- `fprintf('formatted data: %5.2f \t %3.1d\n',data1,data2);`
- `fprintf(2,'Error occurred: %s\n',lasterr);`
- `fprintf('restart app\n');`

fprintf formats



- Accepted subtypes & conversion chars:
 - Integer: `%d`, `%u`, `%o`, `%x`, `%X`, `%l{d/u/o/x/X}`, `%h{d/u/o/x/X}`
 - Floating point: `%f`, `%e`, `%E`, `%g`, `%G`
 - Characters: `%c`, `%s`
- Accepted flags:
 - `-` = left-justify
 - `+` = sign character (+ or -)
 - `' '` = leading space
 - `0` = leading zeros
 - `#` = modifies the way some conversions are displayed

`fprintf` special characters

- `"` = a single quote mark: `'`
- `%%` = a single percent mark: `%`
- `\\` = a single backslash mark: `\`
- `\f` = form-feed character
- `\n` = new-line character
- `\t` = tab character

FEX: *cprintf* (#24093)

```
>> fprintf('text',      'regular black text ');
fprintf('hyper',      'followed %s', 'by ');
fprintf('key',        '%d colored ', 5);
fprintf('-comment', '%& underlined ');
fprintf('err',        'elements:\n');
fprintf('cyan',       'cyan ');
fprintf('_green',     'underlined green ');
fprintf(-[1,0,1],    'underlined magenta ');
fprintf([1,0.5,0],    'and multi-\nline orange\n');
fprintf('*blue',      'and *bold* (R2011b+ only)\n');
```

regular black text followed by 5 colored & underlined elements:
cyan underlined green underlined magenta and multi-
line orange
and *bold* (R2011b+ only)
>> |

Alternative outputs to a text file

```
>> data = magic(3);  
>> save file.txt data -ascii  
>> save('file.txt','data','-ascii')  
  
>> dlmwrite('file.txt',data, ...  
           'delimiter','\t');  
  
>> fileId = fopen('file.txt','wt');  
>> fprintf(fileId,'%d\t%d\t%d\n',data);  
>> fclose(fileId);
```


Matlab's Publish tool

- Runs and records the outputs of an m-file
- Saves source code and the outputs in output file
 - HTML (default)
 - PDF
 - DOC
 - Latex
 - PPT
 - XML
- Multiple parameters to customize the output

sine wave.m:

```
>> publish('sine_wave.m')
>> web('html/sine_wave.html')
```



The Publish tool

- Mini-markup accepted:
 - Use Cell > Insert test markup in the Editor
 - %% - title line
 - % ... **bold** *_italic_* |monospaced| or combination
 - % \$...\$ \$\$...\$\$ - Latex (inline, full)
 - % # - numbered line
 - % * - bullet line
 - % <html>...</html>
 - % <url description text>
 - % <<file:///C:/Images/Yair.png>>
 - % (2 spaces) – preformatted segment (monospaced black font)
 - % (3 spaces) – code segment (monospaced, syntax highlighting)
- Supported formats:
 - With syntax highlighting: HTML, PDF, XML
 - Without syntax highlighting: DOC, Latex, PPT
 - XSL (CSS) file supported
 - Multiple output options
- Header comment has to come before main function line

The Publish tool's mini markup

- Mini-markup accepted:
 - Use Cell > Insert test markup in the Editor
 - %% - title line
 - % ... **bold** *_italic_* |monospaced| or combination
 - % \$...\$ \$\$...\$\$ - Latex (inline, full)
 - % # - numbered line
 - % * - bullet line
 - % <html>...</html>
 - % <url description text>
 - % <<file:///C:/Images/Yair.png>>
 - % (2 spaces) – preformatted segment (monospaced black font)
 - % (3 spaces) – code segment (monospaced, syntax highlight)

Publish tool markup example

perfTest.m:

```
%% Sample LaTeX equation
(<http://en.wikibooks.org/wiki/LaTeX/Mathematics>)
%
% $$E=mc^2$$
%
% $$\delta=\frac{FL^3}{3EI}$$

%% Black holes
% Kerr-Newman solution (rotating black hole):
%
% $$
% \partial s^2 = c^2 \partial t^2
% -
% (r^2+a^2)\sin^2\Theta \cdot \partial \Theta^2
% - \frac{2mr \cdot (c \partial t +
% a \sin^2\Theta \cdot \partial \Theta)^2}
% \{r^2+a^2 \cos^2\Theta\}
% -(r^2+a^2 \cos^2\Theta) \cdot \frac{\partial
% r^2}{\{r^2-2mr+a^2\} + \partial \Theta^2}
% $$
%
% where:
%
```

```
% $$ a \equiv L/Mc $$
%
% $$ m \equiv GM/c^2 $$

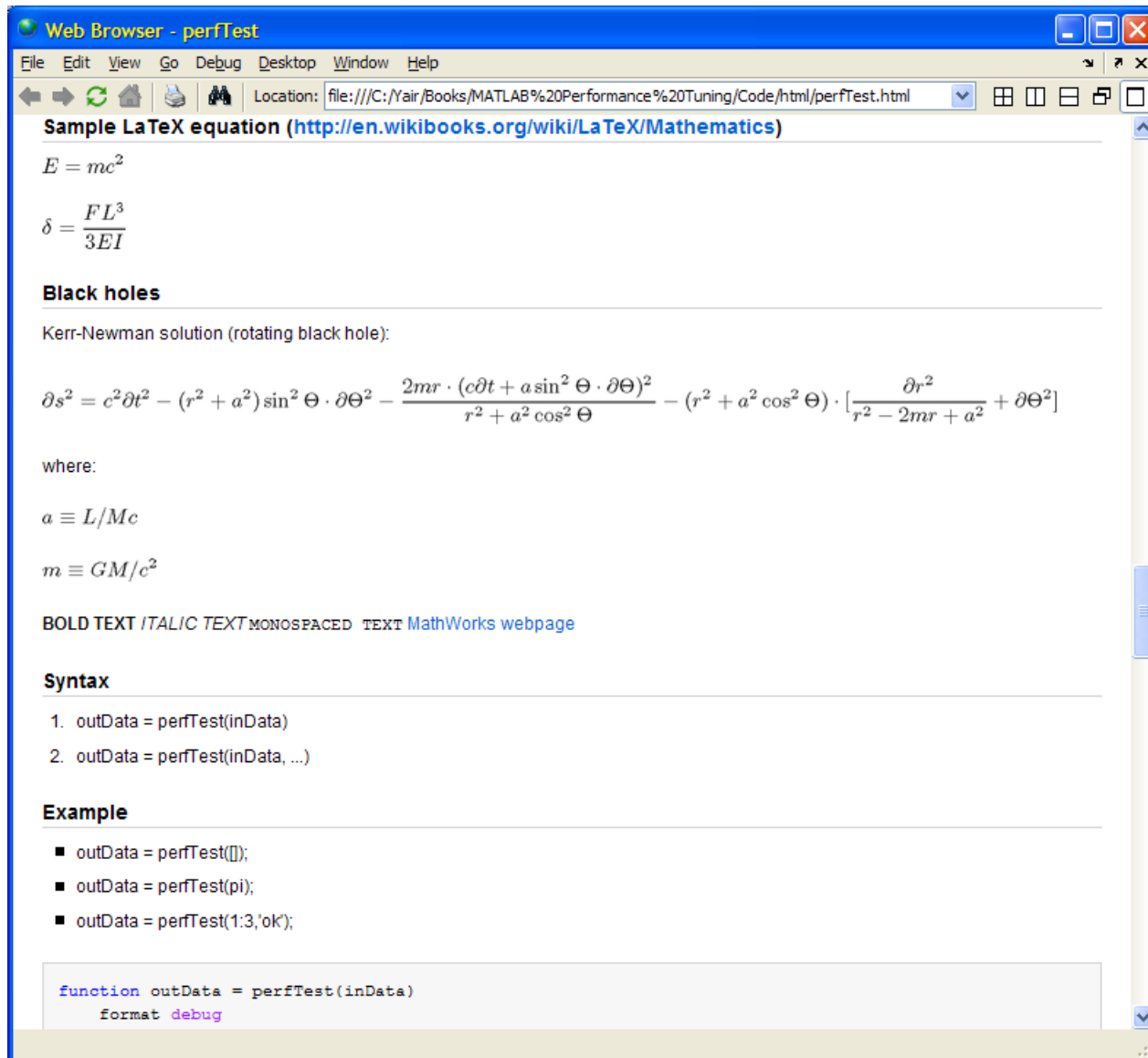
%%
% *BOLD TEXT*
% _ITALIC TEXT_
% |MONOSPACED TEXT|
% <http://www.mathworks.com MathWorks webpage>
```

```
%% Syntax
% # outData = perfTest(inData)
% # outData = perfTest(inData, ...)
```

```
%% Example
% * outData = perfTest([]);
% * outData = perfTest(pi);
% * outData = perfTest(1:3,'ok');
function outData = perfTest(inData)
    format debug
    ...
```

```
>> publish('perfTest.m')
>> web('html/perfTest.html')
```

Publish tool markup example



Publish tool limitations

- Supported formats:
 - With syntax highlighting: HTML, PDF, XML
 - Without syntax highlighting: DOC, Latex, PPT
 - XSL (CSS) file supported
 - Multiple output options (customizable via editor)
- Header comment must come before main function line
- Incompatible with block comments:

```
% {  
...  
% }
```

Output to Excel

- Simple XLS output
- Excel data formatting
- Fonts
- Colors
- Graphs, images

Simple Excel output

- `xlswrite('file.xls',magic(3),'Sheet1','B3');`
- Problem: slowww... (start Excel.exe, write, close Excel)
- Alternatives on File Exchange:
 - `xlswrite1` – reuses an open XLS process, does not close Excel
 - `officedoc` - same, with additional text formatting

Low-level XLS output

- Connect to an Excel process

```
try
    Excel=actxGetRunningServer('excel.application');
catch
    Excel=actxserver('excel.application');
end
%Excel.Visible = true; % for debugging
```

- Output data to XLS workbook

```
%workbook = Excel.workbooks.Open(filename,0,true);
workbook = Excel.workbooks.Add; % =new file
Excel.Range('B3:E6').Value = cellData;
```

- Apply VBA formatting to the workbook (*see next slide*)
- Close the connection

```
workbook.SaveAs(filename,39); % 39=xlExcel5
workbook.Close(false);
Excel.Quit;
```

Formatting XLS output – examples

- Simple text formatting:

```
Excel.Range('B3:E6').Select;  
Excel.Selection.Font.Bold = true;  
Excel.Selection.Font.Color = hex2dec('FF0000'); % blue  
Excel.Selection.Border.Item(4).Weight = 3; % bottom border  
Excel.Selection.HorizontalAlignment = -4108; % =xlCenter  
  
Excel.Range('B3:E6').NumberFormat = '0.00';  
  
Excel.ActiveSheet.Cells.EntireColumn.AutoFit
```

Formatting XLS output – examples

- Conditional formatting:

```
% Bright yellow background if value < 5%
formatsObj = Excel.Selection.FormatConditions;
formatsObj.Delete;
condStr = ['=$C' num2str(startRow+1) '<=5'];
formatsObj.Add(2, 3, condStr);
bgcolor = hex2dec('00FFFF'); % =bright yellow background
formatsObj.Item(formatsObj.Count).Interior.Color = bgcolor;
```

Sample XLS output (as PDF)



- PC Ratios - GLD P-C RATIO analysis -

25/10/2011 21:01

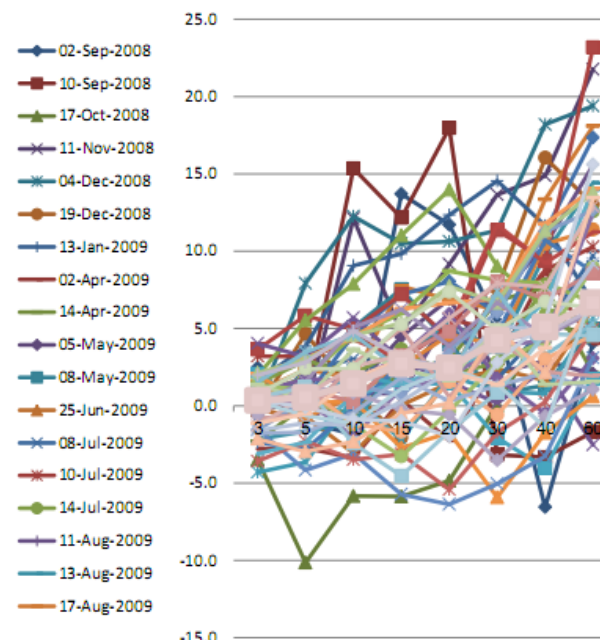
Periods	Any period returns	Avg return signal	Avg gain	Avg draw	Gain/ draw	Max gain	Max draw	Random % pos	Signal % pos	Payout	% p- value	Lower vol cone	Mean realized vol	Upper vol cone	Realized vol after signal	Realized vol var after sig	% p- value
3	0.3	0.1	1.5	-1.7	-1.1	4.0	-4.3	58	56	0.1	56	10.2	19.0	24.5	16.2	121.9	8
5	0.5	0.6	2.2	-2.1	1.1	7.9	-10.1	58	64	0.6	72	12.5	20.2	24.7	17.5	90.3	5
10	1.0	2.0	3.9	-2.0	2.0	15.4	-5.8	62	67	2.0	8	13.7	20.8	24.2	17.8	100.9	4
15	1.5	2.8	4.3	-2.8	1.6	13.7	-5.9	65	78	2.8	3	14.5	20.9	24.5	18.4	94.3	7
20	1.9	3.7	4.9	-2.8	1.8	18.0	-6.4	67	84	3.7	1	14.5	20.9	25.1	18.2	87.1	4
30	2.7	4.1	5.2	-3.2	1.6	14.5	-5.9	70	87	4.1	3	14.7	21.0	24.8	18.5	89.4	6
40	3.4	5.5	6.9	-2.7	2.6	18.2	-6.6	71	85	5.5	1	14.7	21.0	25.5	18.4	80.1	4
60	5.1	8.3	8.7	-2.1	4.1	23.2	-2.5	76	96	8.3	0	14.7	21.1	24.3	18.3	64.9	2

Signal Dates	Periods 3	5	10	15	20	30	40	60	Max gain	Max draw
02-Sep-2008	2.5	-1.0	-1.9	13.7	11.7	5.4	-6.6	4.1	13.7	-6.6
10-Sep-2008	-0.3	0.3	15.4	12.2	18.0	-3.2	-3.3	-1.7	18.0	-3.3
17-Oct-2008	-3.5	-10.1	-5.8	-5.9	-4.8	0.0	5.5	4.5	5.5	-10.1
11-Nov-2008	1.1	-0.3	12.1	4.7	9.2	13.7	14.9	21.8	21.8	-0.3
04-Dec-2008	0.0	7.9	12.3	10.5	10.6	11.4	18.2	19.4	19.4	0.0
19-Dec-2008	-0.2	4.7	0.9	-2.1	1.7	7.6	16.0	13.0	16.0	-2.1
13-Jan-2009	1.6	3.8	9.1	9.8	12.3	14.5	11.7	6.7	14.5	1.6
02-Apr-2009	-2.8	-2.7	-3.4	0.4	-2.3	2.7	8.7	4.0	8.7	-3.4
14-Apr-2009	-2.3	0.1	-0.5	2.2	3.0	6.8	7.7	2.1	7.7	-2.3
05-May-2009	0.0	0.8	1.0	4.5	6.9	2.1	2.9	2.1	6.9	0.0
08-May-2009	0.8	1.6	5.1	7.5	4.0	0.8	1.3	5.0	7.5	0.8
25-Jun-2009	-0.3	-0.7	-3.1	0.0	1.5	2.4	1.6	6.3	6.3	-3.1
08-Jul-2009	-0.7	2.3	3.0	1.7	5.3	1.7	5.1	9.7	9.7	-0.7
10-Jul-2009	3.2	3.2	4.7	2.9	5.6	4.9	8.8	10.3	10.3	2.9
14-Jul-2009	1.4	2.9	2.1	3.7	2.0	2.8	7.8	12.6	12.6	1.4
11-Aug-2009	1.3	-0.9	0.8	0.8	5.7	7.0	10.4	15.6	15.6	-0.9
13-Aug-2009	-2.2	-1.6	-1.1	2.8	5.4	3.4	9.8	14.4	14.4	-2.2
17-Aug-2009	0.9	2.4	1.8	7.7	6.8	6.2	13.4	18.1	18.1	0.9
20-Aug-2009	1.2	0.5	4.6	7.2	8.0	6.0	11.3	17.3	17.3	0.5
31-Aug-2009	3.6	5.8	5.0	7.2	4.4	11.3	9.4	23.2	23.2	3.6
28-Oct-2009	2.0	5.5	7.9	11.0	14.0	9.0	6.3	5.3	14.0	2.0
13-Nov-2009	4.0	3.2	5.7	2.9	1.6	0.2	2.4	-2.5	5.7	-2.5
03-Feb-2010	-4.3	-3.6	0.5	-2.2	2.0	0.9	0.8	5.7	5.7	-4.3
15-Mar-2010	1.8	-0.8	0.7	2.5	4.6	4.0	10.5	11.4	11.4	-0.8
18-Mar-2010	-2.4	-2.8	-0.1	2.7	2.2	4.7	10.7	8.7	10.7	-2.8
30-Mar-2010	1.8	3.0	4.3	3.0	5.0	11.7	9.2	11.2	11.7	1.8
19-Apr-2010	0.8	1.8	4.5							

Upper channel, crossing up

PC Ratios - GLD P-C RATIO analysis.pdf

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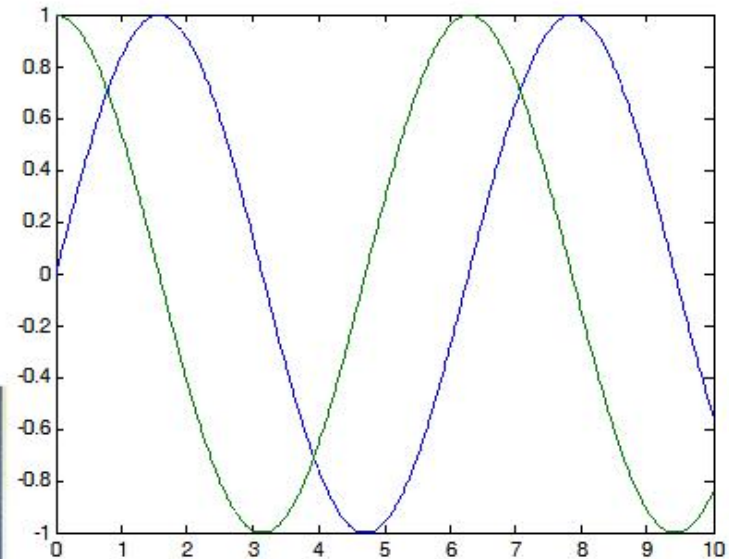
Another sample XLS output

==> www.YMASoftware.com <==

My nice plot

17	24	1	8	15
23	5	7	14	16
4	6	13	20	22
10	12	19	21	3
11	18	25	2	9

this is an example
of data written to
an Excel worksheet
(the data above is
the output of magic(5))



Conclusion

- Many ways to present data reports in Matlab
- Not at all limited to simple text / screenshots
- We can easily add color, hyperlinks, formatting