

Org-mode and julia: an introduction

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Contents

1	What you need to get started	2
1.1	Julia	2
1.2	Add-on packages	2
1.3	Org-mode	3
1.4	ESS - Emacs Speaks Statistics	4
2	Prerequisites	4
2.1	Org-mode	4
2.2	ESS	4
2.3	julia	4
3	Interactive session evaluation	4
4	Evaluation inside the Org buffer	4
4.1	:results value	4
4.2	:results output	4
5	Graphics	4
5.1	Plotting with Winston	5
5.2	Plotting with Gadfly	6
6	Exporting to other formats	7
6.1	L ^A T _E X	7
6.2	HTML	7
6.3	Beamer	7
7	Other things	7

One of the reasons for this document is that I wanted to make it easier to get acquainted with `julia`.

1 What you need to get started

This document assumes you have at least a passing familiarity with Org-mode and Emacs keybindings.

```
(load "/path/to/ob-julia.el")
(org-babel-julia-initiate-session "*julia*" nil)
```

Note: a lot of the code blocks below have the header argument `:eval no-export` which means that the code block can be evaluated interactively in this session by `C-c C-c` with point in the code block but will *not* be evaluated during export. The reason is that those blocks have settings which conflict with my current setup but would be useful for others going through this document.

1.1 Julia

- First install takes the longest, later updates not so bad.
- all the dependencies

1.2 Add-on packages

Based on The State of Statistics in Julia by John Myles White.

```
Pkg.add("DataFrames", "Distributions", "GLM", "MCMC", "Optim",
        "NHST", "Clustering")
```

```
Pkg.add("RDatasets")
```

1. Winston

The most stable and fully featured of the `julia` graphics packages at the time of this writing appears to be the `Winston` package, among alternatives including `Gadfly`.

```
Pkg.add("Winston")
```

The Winston package has lots of dependencies and many of them must be built from source (on Ubuntu).

2. Gadfly

```
Pkg.add("Gadfly")
```

- packages take a lot longer to load than R

1.3 Org-mode

This document assumes that you have at least a passing familiarity with org-mode such that you likely have something like the following already in your `.emacs`:

```
(require 'org)
```

Another handy setting to have is

```
(setq org-confirm-babel-evaluate nil)
```

In order to run this org file you will need to load `ob-julia.el` at some point. One way is to edit the following code block and then `C-c C-c` with point inside the block:

```
(load "/path/to/ob-julia.el")
(org-babel-julia-initiate-session "*julia*" nil)
```

The first command loads the `ob-julia.el` file and the second initiates a julia session in a buffer called `*julia*`. An alternative method is to put the following in your `.emacs` (these should go below the `(require 'org)` line):

```
(add-to-list 'load-path "/path/to/ob-julia.el")
(org-babel-do-load-languages
 'org-babel-load-languages
 '((emacs-lisp . t)
  (julia . t)))
```

The following lines (either here or in your `.emacs`) allow for inline image display in the Emacs buffer.

```
(add-hook 'org-babel-after-execute-hook 'org-display-inline-images)
(add-hook 'org-mode-hook 'org-display-inline-images)
```

If you'd like to do \LaTeX export then put the following in your emacs.

```
(require 'ox-latex)
(require 'ox-beamer)
```

1.4 ESS - Emacs Speaks Statistics

The place to get the latest version of ESS is here.

```
(add-to-list 'load-path "/path/to/ESS/lisp")
(require 'ess-site)

(setq inferior-julia-program-name "/path/to/julia-release-basic")
```

2 Prerequisites

2.1 Org-mode

2.2 ESS

2.3 julia

3 Interactive session evaluation

This is about ESS.

4 Evaluation inside the Org buffer

4.1 :results value

4.2 :results output

5 Graphics

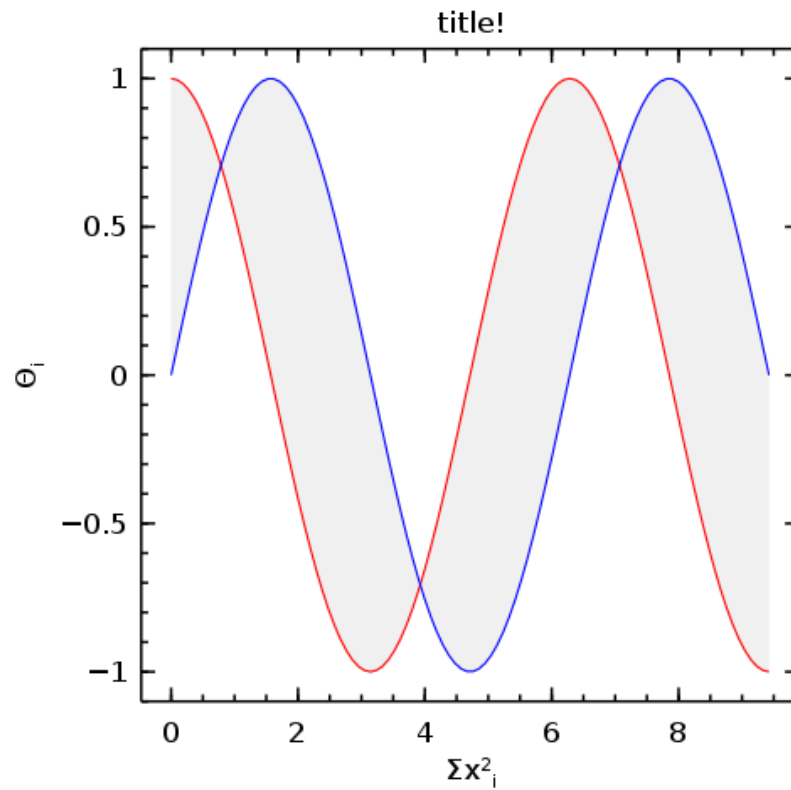
The most stable and fully featured of the `julia` graphics packages at the time of this writing appears to be the `Winston` package, among alternatives including `Gadfly`.

```
Pkg.add("Winston")
```

The Winston package has lots of dependencies and many of them must be built from source (on Ubuntu).

5.1 Plotting with Winston

```
using Winston
x = linspace(0, 3pi, 100)
c = cos(x)
s = sin(x)
p = FramedPlot();
setattr(p, "title", "title!")
setattr(p, "xlabel", L"\Sigma x^2_i")
setattr(p, "ylabel", L"\Theta_i")
add(p, FillBetween(x, c, x, s) )
add(p, Curve(x, c, "color", "red") )
add(p, Curve(x, s, "color", "blue") )
file(p, "example1.png")
```



5.2 Plotting with Gadfly

```
using RDatasets
using Gadfly
using Compose
iris = data("datasets", "iris")
p = plot(iris, { :x => "Sepal.Length", :y => "Sepal.Width"}, Geom.point);
SVG("iris_plot.svg", 6inch, 4inch)
```

6 Exporting to other formats

6.1 \LaTeX

6.2 HTML

6.3 Beamer

7 Other things

- empty lines in output for semicolon lines
- need to start session first
- when :results value be careful because of readcsv
 - characters
 - 1x1 matrix

8 Fitting (generalized) linear models

```
using RDatasets, DataFrames, Distributions, GLM
trees = data("datasets", "trees");
treeslm = lm(: (Girth ~ Height + Volume), trees);
coef(treeslm)
coeftable(treeslm)
```

```
Warning: New definition show(Any,LmMod) is ambiguous with show(IO,ANY) at show.jl:6.
        Make sure show(IO,LmMod) is defined first.
```

```
Warning: New definition show(Any,GlmMod) is ambiguous with show(IO,ANY) at show.jl:6.
        Make sure show(IO,GlmMod) is defined first.
```

```
WARNING: strcat is deprecated, use string instead.
```

```
WARNING: qrd is deprecated, use qrifact instead.
```

```
3-element Float64 Array:
```

```
10.8164
-0.0454835
0.19518
```

```
3x4 DataFrame:
```

	Estimate	Std.Error	t value	Pr(> t)
[1,]	10.8164	1.9732	5.48165	7.44691e-6
[2,]	-0.0454835	0.0282621	-1.60935	0.118759
[3,]	0.19518	0.0109553	17.8161	8.2233e-17