Org-mode Org-babel talk

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Introduction

Tired of cutting/pasting or highlighting/executing your R commands? Looking for a way to document your work as you do it? Learn about Org-babel in Emacs and literate programming to streamline your work paradigm!

About Tim

Tim is a bioinformatics scientist who has been using R for 10 years. He made the agonizing switch from vi enthusiast to emacs evangalist when he discovered org-babel three years ago.

About this talk

Note: emacs commands are written in *italics*. C- means control key plus . . . , and M- means meta(alt) key plus . . . .

About Emacs

The kitchen-sink editor!

- I won't list features here, trust me, it's a long list.
- Runs on Windows and Mac and Linux (I'm using Ubuntu)

Drawbacks

Learning Curve Ahead! Installation of some features may be a pain. You have to learn a lot of arcane kestroke combinations, for example: instead of C-c, C-v it's M-w, C-y

- Really? WTF?

About Org-mode for Emacs

- Easy, just edit a file in Emacs with the .org extension and you are in org mode!
- Motto: Your Life in Plain Text
- Org-mode includes many features like:
  - Outlines (what you've seen so far)
  - Planning (ToDo, schedules, dates, tags)
  - Clocking
  - Agendas
  - Tables
  - Import/Export
  - Working with source code = Org-babel

Finally, Org-babel in Org-mode

Getting Started

Let's use the famous 1936 iris data set from R.A. Fisher, evolutionary biologist and the father of modern statistics. `http://en.wikipedia.org/wiki/Iris_flower_data_set` It comes installed with R.

Language markup

Create a code block for your code C-c C-c to execute!

What version of R am I using?

```
getRversion()
```

Here is a peek at the first few lines of the iris data set.

```
head(iris)
```

We have seen a variable and a data frame, how about a list?

```
R.Version()
```

Other header arguments

results

:results [collection] [type] [format] [handling]

- collection: value|output
- type: table|vector|list|scalar|file|graphics
- format: raw|org|html|latex|code|pp|drawer
- handling: silent|replace|append|prepend

```
head(iris)
```

session

:session <name>

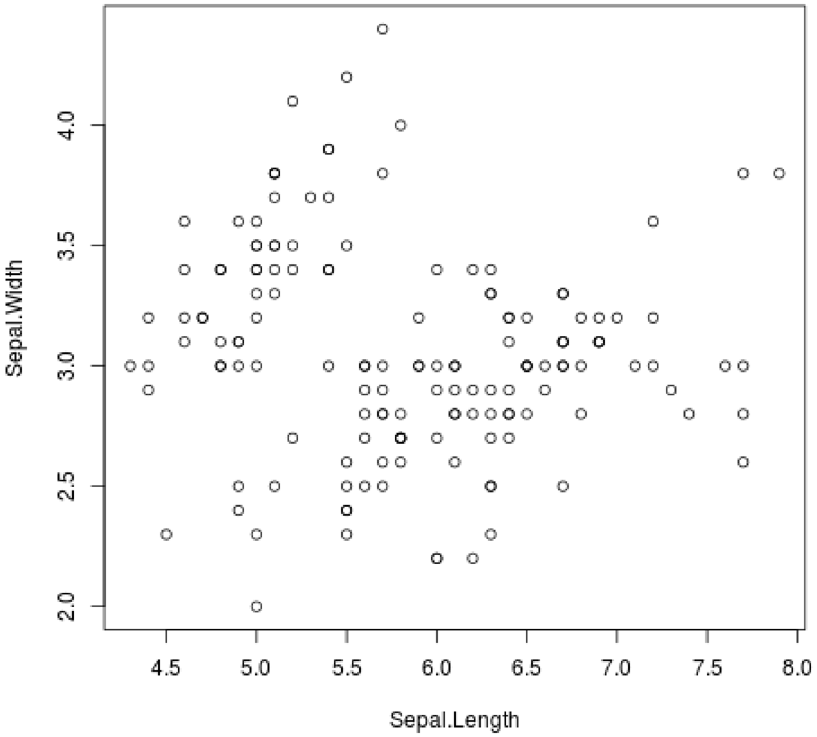
- Make up a name that makes sense to you.
- I put stars around the name so that it looks like an emacs named interactive shell (which it is)
- FIELDTRIP: visit the session buffer yourself!

```
iris.head<-head(iris)
```

```
dim(iris.head)
```

plots

- Use :results output graphics
- A session needs to be named, otherwise the default session closes immediately and you don't see your plot.
- A file needs to be specified.



- Lots of additional options avaiable for captions, labels, plot position, plot size, etc.

exports

:exports code|results|both|none

- :exports code

  ```
  head(iris)
  ```

- :exports results

  ```
    Sepal.Length Sepal.Width Petal.Length Petal.Width Species
  1          5.1         3.5          1.4         0.2  setosa
  ```

```
2          4.9         3.0          1.4         0.2  setosa
3          4.7         3.2          1.3         0.2  setosa
4          4.6         3.1          1.5         0.2  setosa
5          5.0         3.6          1.4         0.2  setosa
6          5.4         3.9          1.7         0.4  setosa
```

- :exports both

  ```
  head(iris)
  ```

  ```
    Sepal.Length Sepal.Width Petal.Length Petal.Width Species
  1          5.1         3.5          1.4         0.2  setosa
  2          4.9         3.0          1.4         0.2  setosa
  3          4.7         3.2          1.3         0.2  setosa
  4          4.6         3.1          1.5         0.2  setosa
  5          5.0         3.6          1.4         0.2  setosa
  6          5.4         3.9          1.7         0.4  setosa
  ```

- :exports none
- Export to a web page
  - Specify which program will open your html file *In my example I want chrome-browser to open my html:
  - *M-x customize-variable* then type *org-file-apps*. Then associate Extension \.pdf\’ with Command: chrome-browser %s
  - Don’t forget to save and exit!
- Export to a pdf via LaTeX
  - Requirements:
    - Install LaTeX to pdf (texlive-latex-extra for pdflatex on Ubuntu)
    - Specify which program will open your pdf file *In my example I want evince to open my pdf:
    - *M-x customize-variable* then type *org-file-apps*. Then associate Extension \.pdf\’ with Command: evince %s
    - Don’t forget to save and exit!
- Export to beamer An excercise left for the reader. ;p

For more header arguments, see Links & Resources DOUBLE BRACKETS!

Literate Programming

- Idea of Donald Knuth, 1984, the father of analysis of algorithms
- Instead of commenting your code, code to your comments.
- You already know how to do it, this document is an example! (sort of)
- Reasons for reproducible research
  - The paradigm of science
  - Pure egoism... imagine that

Installation

- Edit your .emacs file, add this (for example):

```
;; Org-babel
(package-initialize)
(require 'ob)

(org-babel-do-load-languages
 'org-babel-load-languages
 '(
   (R . t)
  ))

(provide 'ob-R)

(setq org-src-fontify-natively t)
(setq org-confirm-babel-evaluate nil)

(org-reload)
```

- Take a look at `http://orgmode.org/worg/org-faq.html`
- What I showed here was for Ubuntu. Windows (and other Linux) etc. may be different.

Tips and Tricks

- Explore the menus
- Not just for R! You can org-babel in shell, python, perl, ruby, C/C++ and many, many more. Just add them to your .emacs configuration definition.
- Attaching to a remove R Server

```
 /M-x shell/
 /M-x ess-remote/
 /M-x rename-buffer *something*/
I like to put stars around the buffer name so that it looks like an interactive shell
```

- To open all org-babel blocks at once

```
/M-x org-show-block-all/
```

- Org-mode and Org-babel are still evolving! Things you have learned today may change.

Links & Resources

- Emacs
- Org-mode `http://orgmode.org/`
  - `http://orgmode.org/talks.html` Tech Talk at Google video, plus more
  - `http://orgmode.org/worg/index.html` Org-Mode Resources
- Org-babel `http://orgmode.org/worg/org-contrib/babel/` General
  - `http://orgmode.org/manual/Working-With-Source-Code.html` More specific
  - `http://orgmode.org/worg/org-contrib/babel/how-to-use-Org-Babel-for-R.html` with R
  - `http://orgmode.org/manual/Specific-header-arguments.html#Specific-header-arguments` Header arguments
- Literate Progamming `http://www.cs.tufts.edu/~nr/noweb/`

- Reproducible Research `http://www.rrplanet.com/`
  - `http://reproducibleresearch.net/`