Using ESS as R programming environment

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Outline

- What is ESS?
 - Prerequisites
- Working with ESS
 - First steps
 - Storing R sessions
 - Writing R code
- ESS in teaching?
- Conclusion



Emacs Speaks Statistics

ESS is an Emacs add-on package, which

- interfaces interactive R (and S, SAS, Stata) sessions to Emacs
- acts as R help browser
- helps writing R files with a special R mode.
- is distributed via CRAN, documentation see [1]



Prerequisites needed

Software to install:

Emacs (an extensible text editor)

```
http://www.gnu.org/software/emacs/
```

ESS

http://ess.r-project.org/

R

http://cran.r-project.org/

works on Unix/Linux and Windows (on Windows manual configuration needed), e.g. installing it on Debian/Ubuntu:

```
apt-qet install r-base ess emacs
```

Skills:

- knowledge of R syntax
- (at least basic) Emacs skills
- willingness to memorize some keyboard shortcuts



Executing R within Emacs

Type

- <Alt>x (this enters the so called Emacs minibuffer commandline)
- followed by R<Enter>
- answer question for starting directory (or accept default by just pressing <Enter>)
- ...start using R.



Differences to a plain R session

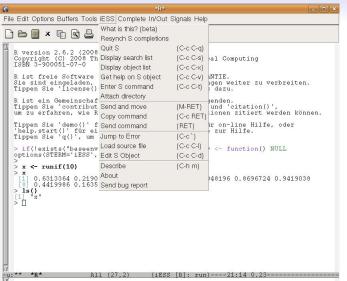
interactive ESS (iESS) mode

- adds syntax coloring
- replaces history mechanism (uses <Ctrl>-<ArrowUp/Down>)
- adds <Tab> completion¹ for
 - command and variable names
 - named list element names (e.g. columns of dataframes)
- access to help and object list via iESS menu
- help pages appear within Emacs (as new buffers)



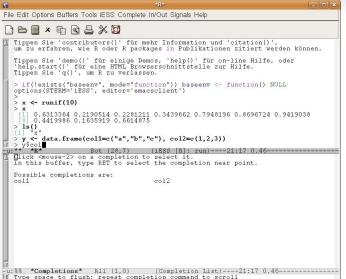
¹recent R releases already contain Tab completion

interactive ESS screenshot





Tab Completion screenshot





Using ESS as R programming environment

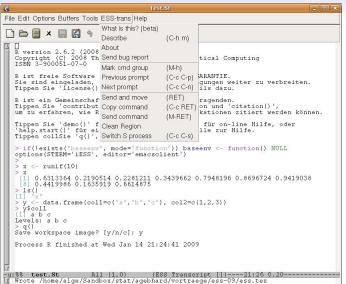
Session transcripts

ESS can

- save the complete session protocol, with input and output. (Use
 *.St filename)
- reopen and reexecute the *.St later step by step
- cleanup mixed input/output to extract the input in copy/paste ready form



Transscript mode Screenshot





ESS as R IDE

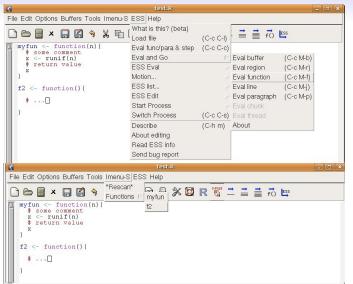
After opening an *.R file Emacs enters ESS Mode:

- adds a custom ESS menu
- activates
 - syntax highlighting
 - automatic indenting (via <Tab> key)
 - paren matching
 - object name completion via <Ctrl><Tab>
- scans for functions, adds them as shortcuts to menu
- can copy/paste
 - a line
 - a function (containing cursor)
 - a marked region
 - entire file ("buffer" in Emacs terminology)

into an already running iESS R session



ESS mode Screenshots





ESS workflow

When working with R in Emacs via ESS you

- split your Emacs frame into two windows
- edit one (or more) R script file(s) in one window
- have R running in other window
- switch back and forth via ESS menu/buttons/shortcuts while developing/testing/debugging your R functions

```
File Edit Options Buffers Tools Imenus FSS Help

| Comparison | Compar
```



ESS in teaching?

Pro:

- ESS provides help via
 - Tab completion!
 - syntax highlighting,
 - paren matching (warns on mismatch)

Con:

- Emacs skills needed (understanding Emacs terminology, e.g. frame/window/buffer)
- Installation on Windows may be challenging (R path has to be manually configured), help available, see [2].

What is ESS? Working with ESS (ESS in teaching?) Conclusion

Teaching experiences at Univ. Klagenfurt

R and ESS in statistics courses for math students at Univ. Klagenfurt

- mathematics students get an Emacs introduction (also for use with LaTeX and octave)
- together with an R/ESS basic course during the course "mathematical software"
- R and ESS is used in later statistics courses, ESS use is not obligatory for the students → advanced students partly start really using it.



What is ESS? Working with ESS ESS in teaching? Conclusion

Conclusion

- powerful tool for R programmers (maybe they are already Emacs users for other reasons (LaTeX, C/Fortran code, ...))
- certainly too complicated for introductory stats course
- worth to be presented to students in higher courses







Links

- [1] Rossini, A. J., Heiberger, R. M., Hornik, K., Maechler, M., Sparapani, R. A. and Eglen, S. J. ESS Emacs Speaks Statistics Manual http://ess.r-project.org/ess.pdf
- [2] Vincent Goulet:
 Emacs for Windows Modified
 http://vgoulet.act.ulaval.ca/en/ressources/
 emacs/windows

