

Introduction to Sweave

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What is Sweave?

- ▶ Created by Friedrich Leisch (member of R Core Team)
- ▶ Main site:
<http://www.ci.tuwien.ac.at/~leisch/Sweave/>
- ▶ Sweave provides a way of interfacing R code with \LaTeX documents
- ▶ A version for Open Document Format (ODF) documents (for OpenOffice V 2.0 and later) is available in package **odfWeave**

Basics of Sweave and literate programming

- ▶ **Literate programming** *is a philosophy of computer programming based on the premise that a computer program should be written similar to literature, with human readability as a primary goal.* (Wikipedia, 14 Nov. 2007)
- ▶ Sweave is based on Cweb, developed by Donald Knuth for the C programming language
- ▶ The aim is to provide high quality documentation by mixing text and programming code
- ▶ There are two main tools to handle these documents:
 - ▶ Sweave
Produces suitable documentation from the main source files
 - ▶ Stangle
Produces programming code from the main source files

Building a Rnw document

- ▶ Main structure is that of a \LaTeX document
- ▶ \LaTeX package Sweave must be included in the list of packages loaded
- ▶ R code can be included as follows:

Rnw file

```
<<>>=  
a<-1  
b<-4  
print(a+b)  
@
```

\LaTeX code

```
\begin{Schunk}  
\begin{Sinput}  
> a <- 1  
> b <- 4  
> print(a + b)  
\end{Sinput}  
\begin{Soutput}  
[1] 5  
\end{Soutput}  
\end{Schunk}
```

DVI document

```
> a <- 1  
> b <- 4  
> print(a + b)  
[1] 5
```

Processing Rnw files



- ▶ A script (*Sweave.sh*) can be used to Sweave documents from the command line:

```
#!/bin/sh  
echo "library(\"utils\"); Sweave(\"$1\")" | R --no-save --no-restore
```

- ▶ Sweave can be used as `./Sweave.sh mydocument.Rnw`

Extracting the code from the chunks

- ▶ Stangle provides a way of extracting the code in the chunks
- ▶ `Stangle("myfile.Rnw")` will create a file called `myfile.R` with the R chunks
- ▶ Each chunk is identified with a number using R comments
- ▶ Useful to identify possible problems when compiling the Rnw file
- ▶ A script (*Stangle.sh*) can be used to Stangle documents from the command line:

```
#!/bin/sh
echo "library(\"utils\"); Stangle(\"$1\")" | R --no-save --no-restore
```

- ▶ Stangle can be used as `./Stangle.sh mydocument.Rnw`

Chunk options

Several options can be placed in `<< >>=` to control how the code in the chunks is executed.

- ▶ `eval` (**TRUE**, FALSE)
Whether the R chunk is run.
- ▶ `echo` (**TRUE**, FALSE)
Whether the R chunk is shown in the \LaTeX file.
- ▶ `results` (**verbatim**, `tex`, `hide`)
Type of output used to show the printed results produced by the R code. 'hide' will show no output at all.

In-line chunks

- ▶ `\Sexpr{Rcode}` allows for a limited *in-line* computation and output
- ▶ **Rnw code**
`$e^{2\pi}$ equals \Sexpr{formatC(exp(2*pi), 5)}`
- ▶ **L^AT_EX code**
`$e^{2\pi}$ equals 535.49`
- ▶ **DVI file**
`e2π equals 535.49`

Plots in Sweave

Chunk options

- ▶ `fig` (**FALSE**, TRUE)
Whether the output is a figure. By default, EPS and PDF files are produced.
- ▶ `width`
Width of the plot
- ▶ `height`
Height of the plot

Hints

- ▶ The Sweave code can be included within a \LaTeX figure environment
- ▶ Trellis graphics must be wrapped within a `print` call:
`print(xyplot(y ~ x, data=d))`

Some issues on creating Vignettes

- ▶ R vignettes are usually developed using Sweave
- ▶ They are placed in the `pkg_name/inst/doc` directory
- ▶ A vignette index entry must be included in the header of the Rnw file.
`\VignetteIndexEntry{MCMC Example}`
- ▶ When R CMD check is run on the package source, the R chunks in the vignette are also tested

Resources

- ▶ Sweave main page
<http://www.ci.tuwien.ac.at/~leisch/Sweave/>
- ▶ Charlie Geyer's demo
<http://www.stat.umn.edu/~charlie/Sweave/>
- ▶ Literate programming (D. Knuth's web site)
<http://www-cs-faculty.stanford.edu/~knuth/lp.html>
- ▶ Literate Programming
<http://www.literateprogramming.com>