sweave

the easiest language you'll ever learn*

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by Lizzie Wolkovich
with thanks to Flo and Ross

^{*} Given that you know R and LaTeX to begin with.

What is Sweave?

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A way of producing 'automated reports'

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- A way of producing 'automated reports'
- Embedded R code in LaTeX documents

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2 Getting set up

The merged data files are currently on the Phenology WG website: Documents > Data > Phenology data > Compiled raw observational data and compiled derived data. You can use a right click (or command plus click) to download the .csv files themselves. You'll need to put the data in a directory.

We treat raw data (where we have phenology data for the specific year it goes with) and derived data (where we have only average phenology dates) in separate csv files.

2.1 Load data

So next, read in data. If you wanted to run the R code on your machine you would need to change the working directory.

```
> setwd("/Users/Lizzie/Documents/Subversion/phenology/Data")
> derived <- read.csv("pheno_derived.csv", header = TRUE)
> ffdfld <- read.csv("pheno_raw.csv", header = TRUE)
> dim(ffdfld)
```

Automatic updating of figures and tables.

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Wolkovich et al. 2012

3 Results using PHLAWD trees

Table S7: Site information based on models using PHLAWD trees. Compare with Table 1 in the main text for differences between Phylomatic and PHLAWD trees in species sampling.

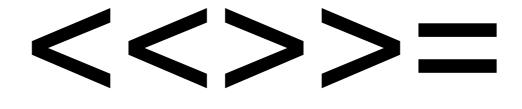
| | | | | | | | | |
|---------------------|---------------|-------------|--------------|--------------|--|--|--|--|
| | exotic spp. n | native spp. | exotic spp. | native spp. | | | | |
| | | n | n: flowering | n: flowering | | | | |
| | | | time shift | time shift | | | | |
| | | | models | models | | | | |
| Chinnor, UK | 39 | 228 | 39 | 228 | | | | |
| Concord, MA, USA | 81 | 218 | 69 | 174 | | | | |
| Fargo, ND, USA | 56 | 134 | 11 | 65 | | | | |
| Konza LTER, KS, USA | 9 | 119 | | | | | | |
| Washington, DC, USA | 157 | 215 | 158 | 215 | | | | |
| | | | | | | | | |

Table S8: Results of LMs and PGLM for Concord data using USDA Plants to establish native status.

| | $_{ m DF}$ | LM: | LM: na- | LM: p | PGLM: | PGLM: | PGLM: | PGLM: |
|-----------------------|------------|--------|---------|-------|--------|--------|-------------------|-------|
| | | ex- | tive | | lambda | exo | $_{\mathrm{nat}}$ | P |
| | | otic | | | | | | |
| mean FFD | 297 | 165.78 | 167.74 | 0.636 | 0.910 | 141.95 | 140.47 | 0.686 |
| flowering time shift | 241 | -5.11 | 0.93 | 0.006 | 0.000 | -4.57 | 0.93 | 0.014 |
| sensitivity (3 month) | 297 | -6.27 | -4.95 | 0.221 | 0.045 | -6.93 | -5.74 | 0.284 |
| aid arms | 225 | 4 2 4 | 0.00 | 0.484 | 0.000 | 4 40 | 0.44 | 0.100 |

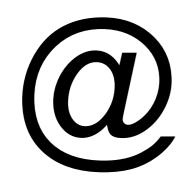
What you need to know:

- LaTeX
- R
- <<>>=
- @

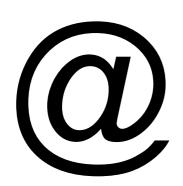








means 'stop R code here, back to TeX'



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(and that's all the magic I know of the @ part).

So...

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- You'll add a couple lines to the preamble.

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- Sweave documents will look a LOT like LaTeX
- You'll add a couple lines to the preamble.
- And otherwise you'll write LaTeX code, with some R code chunks here and there (chunks are within <<>>= and @).

^{*} I use TeX and LaTeX without much discretion, as I suspect we're all using LaTeX here.

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- results = tex : write the output of the R code with TeX formatting

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- results=hide: don't show the output of the R code
- results = tex : write the output of the R code with TeX formatting
- fig=TRUE: Yes! Show the figure I am writing.

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xtable

 xtable is the beautiful package you need installed (in R) to write out pretty tables from R/Sweave into TeX formatting.

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| Table S9: Results of LMs and PGLMs for Konza data using | g USDA Plants to establish native status. |
|---|---|
|---|---|

| | DF | LM: | LM: na- | LM: p | PGLM: | PGLM: | PGLM: | PGLM: |
|-----------------------------|-----|--------|---------|-------|--------|--------|--------|-------|
| | | ex- | tive | | lambda | exotic | native | P |
| | | otic | | | | | | |
| mean FFD | 126 | 138.70 | 161.69 | 0.158 | 0.861 | 122.56 | 120.42 | 0.866 |
| sensitivity (gdd) | 126 | -4.09 | -3.70 | 0.844 | 0.000 | -4.17 | -3.71 | 0.806 |
| sensitivity (gdd w/prec) | 126 | -1.86 | -3.91 | 0.424 | 0.000 | -1.97 | -3.86 | 0.441 |
| sensitivity (intxn) | 126 | -0.86 | 1.37 | 0.353 | 0.000 | -0.86 | 1.39 | 0.330 |
| sensitivity (prec w/gdd) | 126 | 6.24 | -2.80 | 0.089 | 0.000 | 6.25 | -2.66 | 0.082 |
| sensitivity (soil moisture) | 126 | 3.12 | -1.17 | 0.072 | 0.000 | 3.02 | -1.10 | 0.077 |
| sensitivity (3 month) | 126 | -3.40 | -3.07 | 0.842 | 0.000 | -3.47 | -3.05 | 0.794 |
| sensitivity (MAT) | 126 | -2.35 | -3.06 | 0.529 | 0.091 | -2.11 | -3.24 | 0.311 |

```
<<label=nqpugly, echo=FALSE, results=hide,
fig=TRUE>>=
qqnorm (rnorm(100))
@
```

```
<<label=nqpugly, echo=FALSE, results=hide,
fig=TRUE>>=
```

qqnorm (rnorm(100))



gives you a figure of a normal quantile plot!

```
<<label=getpinot, echo=FALSE>>=
setwd("/Users/Lizzie/Documents/git/
demoSweave")
pinot <- read.delim("data/pinotnoir.txt",
header=TRUE)
head(pinot)
range(pinot$year)
```

```
<<label=getpinot, echo=FALSE>>=
```

setwd("/Users/Lizzie/Documents/git/demoSweave")

pinot <- read.delim("data/pinotnoir.txt",
header=TRUE)</pre>

head(pinot)

range(pinot\$year)



Reads in data, looks at the top lines and takes the range.

<<label=anovatable, echo=FALSE, results=tex>>=

aov 1970 <- anova (lm(harvestdate~year, data=subset (pinot, year>1970))) # Note that I can use the regular anova command here...

library(xtable)

print(xtable(aov1970, caption = "An ANOVA table, so little effort for so much prettiness", caption.placement = "top"))



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Calculates a simple regression and writes the output to a pretty table.

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library(xtable)

| | Df | Sum Sq | Mean Sq | F value | Pr(>F) |
|-----------|----|---------|---------|---------|--------|
| year | 1 | 560.96 | 560.96 | 7.68 | 0.0095 |
| Residuals | 30 | 2190.99 | 73.03 | | |
| TD 11 4 4 | | | 1:1 0 | | |

Table 1: An ANOVA table, so little effort for so much prettiness

print(xtable(aov1970, caption = "An ANOVA table, so little effort for so much prettiness", caption.placement = "top"))



Calculates a simple regression and writes the output to a pretty table.

make.mytable <- xtable(mytable, caption="Comparisons of regression of harvest dates for Pinot Noir in Burgundy region of France across different centuries", digits=c(0, 2, 0, 2, 3))

print (make.mytable,include.rownames=TRUE, caption.placement="top", hline.after=c(-1,0))

make.mytable <- xtable(mytable, dataframe caption="Comparisons of regression of harvest dates for Pinot Noir in Burgundy region of France across different centuries", digits=c(0, 2, 0, 2, 3))

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caption here!

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caption here!

make.mytable <- xtable(mytable, dataframe caption="Comparisons of regression of works harvest dates for Pinot Noir in Burgundy region of France across different centuries", digits=c(0, 2, 0, 2, 3) control significant digits print (make.mytable,include.rownames=TRUE, caption.placement="top", hline.after=c(-1,0))

caption here!

make.mytable <- xtable(mytable, dataframe caption="Comparisons of regression of works harvest dates for Pinot Noir in Burgundy region of France across different centuries", digits=c(0, 2, 0, 2, 3) control significant digits print (make.mytable,include.rownames=TRUE, caption.placement="top", hline.after=c(-1,0))

Table 2: Comparisons of regression of harvest dates for Pinot Noir in Burgundy region of France across different centuries

| | days/year | DF | F | p-value |
|-----------|-----------|----|------|---------|
| 1970-2003 | -0.44 | 30 | 7.68 | 0.009 |
| 1770-1803 | 0.03 | 30 | 0.04 | 0.836 |
| 1570-1603 | 0.15 | 30 | 0.74 | 0.396 |
| 1370-1403 | -0.07 | 30 | 0.23 | 0.633 |

caption here!

any make.mytable <- xtable(mytable, dataframe caption="Comparisons of regression of works harvest dates for Pinot Noir in Burgundy region of France across different centuries", digits=c(0, 2, 0, 2, 3) control significant digits print (make.mytable,include.rownames=TRUE, caption.placement="top", hline.after=c(-1,0))

add lines!

Embed R values inline

- Sexpr{}
- Such as: \Sexpr{format(coef(aov19)[2], digits=2)}
- Which gives the regression estimate (change in days per year in winegrape harvest since 1970).

... and so much more!



... and so much more!

Two notes!

- I am looking for feedback. Were you confused and have a suggestion on what could have prevented it? Saw a typo here or in the Rnw file? Can help fix one of my many non-fatal TeX errors? Let me know sometime, for example, at a happy hour.
- •The real logistics of Sweave are getting it to run on your machine. This whole talk is worth next to nothing if you don't stay and let us help you figure that out.