Simple knitr to PDF via LaTeX2e

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1 Introduction

This short tutorial describes the creation of attractive PDF documents incorporating R source code and output via the `knitr` R package and the LaTeX2e executable. It assumes enough proficiency with R to create source code and run source files. It further assumes no knowledge with LaTeX2e but the motivation and aptitude to learn how to create and process LaTeX2e files. It also assumes proficiency with the command line, as illustrated in this tutorial.

What you will need You will need first of all R and the `knitr` package. You will need the `pdflatex.exe` executable. You will eventually need other R libraries and LaTeX2e packages, but only for real work, not for this tutorial. You will also need a working computer with an operating system and a text editor or programming environment. This tutorial uses Windows 7 with Vim. Those who successfully complete this tutorial with other operating systems may contact the author for updates to this tutorial.

2 Getting `pdflatex.exe`

This tutorial uses the implementation of `pdflatex` from MiKTeX, `http://miktex.org/`. Download and install MiKTeX. You will find the `pdflatex.exe` executable in a directory created by the installation process. On the author's machine it is located at `C:/Program Files (x86)/MiKTeX 2.9/miktex/bin`. See figure 1You can edit your path or create an environmental variable to the executable to avoid having to type the full path to the executable with each use.

This tutorial includes a `.tex` file named `simple.tex`, see listing 2. Run `pdflatex` using this file as input, see figure 2. The tutorial also includes the source of this PDF document (named `simple-knitr2pdf.tex`), which you can also run. Make sure that the current directory includes the image files. Running this source may load several packages unless you have already loaded them.

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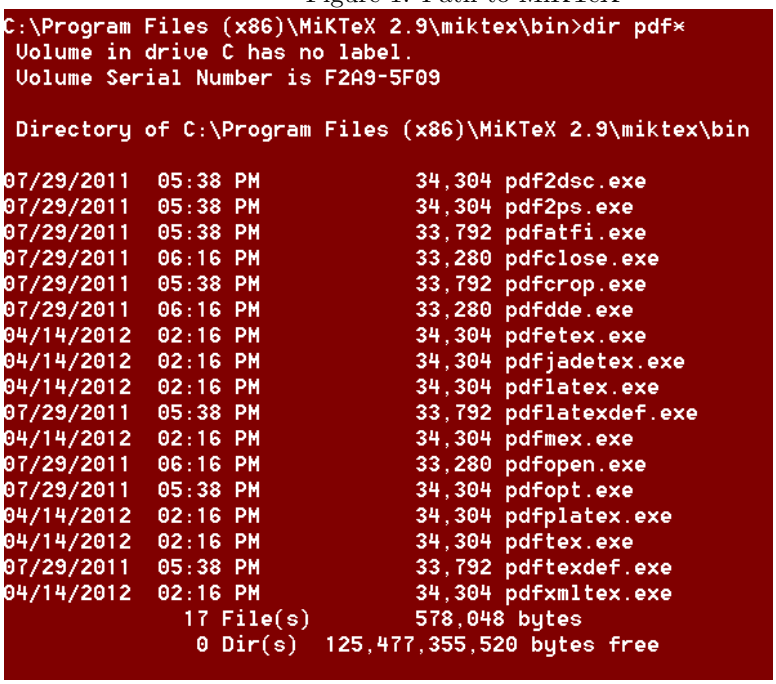
Figure 1: Path to MiKTeX



Listing 1: simple.tex

```
\documentclass{article}
\title{My First LaTeX File}
\author{My Name}
\date{}
\begin{document}
\maketitle{}
\paragraph{}This is my first .tex file, from \texttt{pdflatex.exe} to PDF using \LaTeXe{}.
\end{document}
```

3 Getting `knitr`

Invoke the R GUI, install the `knitr` package if you have not already done so, and load the `knitr` library. See listing 2.

Listing 2: Loading `knitr`

```
install.packages{knitr}
library{knitr}
```

4 Creating PDF from .Rnw files

Creating a PDF document with `knitr` requires three steps: first, create a `.Rnw` source file, second, knit the source file with `knit()`, and third, compile

Figure 2: Using `pdflatex.exe`

```
C:\Users\carter\DataSci02\5-ReproResearch\pro-1>pdflatex simple.tex
This is pdfTeX, Version 3.1415926-2.3-1.40.12 (MiKTeX 2.9)
entering extended mode
(C:\Users\carter\DataSci02\5-ReproResearch\pro-1\simple.tex
LaTeX2e <2011/06/27>
Babel <v3.8m> and hyphenation patterns for english, afrikaans, ancientgreek, ar
abic, armenian, assamese, basque, bengali, bokmal, bulgarian, catalan, coptic,
croatian, czech, danish, dutch, esperanto, estonian, farsi, finnish, french, ga
lician, german, german-x-2009-06-19, greek, gujarati, hindi, hungarian, iceland
ic, indonesian, interlingua, irish, italian, kannada, kurmanji, lao, latin, lat
vian, lithuanian, malayalam, marathi, mongolian, mongolianlmc, monogreek, ngerm
an, ngerman-x-2009-06-19, nynorsk, oriya, panjabi, pinyin, polish, portuguese,
romanian, russian, sanskrit, serbian, slovak, slovenian, spanish, swedish, swis
sgerman, tamil, telugu, turkish, turkmen, ukenglish, ukrainian, uppersorbian, u
senglishmax, welsh, loaded.
("C:\Program Files (x86)\MiKTeX 2.9\tex\latex\base\article.cls"
Document Class: article 2007/10/19 v1.4h Standard LaTeX document class
("C:\Program Files (x86)\MiKTeX 2.9\tex\latex\base\size10.clo"))
No file simple.aux.
[1{C:/Users/carter/AppData/Local/MiKTeX/2.9/pdftex/config/pdftex.map}]
(C:\Users\carter\DataSci02\5-ReproResearch\pro-1\simple.aux) )<C:/Program Files
 (x86)/MiKTeX 2.9/fonts/type1/public/amsfonts/cm/cmmi10.pfb><C:/Program Files (
x86)/MiKTeX 2.9/fonts/type1/public/amsfonts/cm/cmr10.pfb><C:/Program Files (x86
)/MiKTeX 2.9/fonts/type1/public/amsfonts/cm/cmr12.pfb><C:/Program Files (x86)/M
iKTeX 2.9/fonts/type1/public/amsfonts/cm/cmr17.pfb><C:/Program Files (x86)/MiKT
eX 2.9/fonts/type1/public/amsfonts/cm/cmr7.pfb><C:/Program Files (x86)/MiKTeX 2
.9/fonts/type1/public/amsfonts/cm/cmtt10.pfb>
Output written on simple.pdf (1 page, 61272 bytes).
Transcript written on simple.log.
```

the resulting `.tex` file with `pdflatex`. This tutorial includes a simple source file (see listing 3) named `first.Rnw`. The R code shamelessly cribbed from Yihui Xie at `http://yihui.name/knitr/`.

Listing 3: First Rnw file

```
\documentclass{article}
\title{My First Rnw File}
\author{My Name}
\date{}
\begin{document}
\maketitle{}
\paragraph{}This is my first .Rnw file, from \textsf{R} to PDF through \LaTeXe{}.

<<my-label, eval=TRUE, dev='png'>>=
set.seed(1213)  # for reproducibility
x = cumsum(rnorm(100))
mean(x)  # mean of x
plot(x, type = 'l')  # Brownian motion
@
```

In the R GUI, knit the `first.Rnw` source file. See figure 3. This will create a file named `first.tex`. Then, run `pdflatex` against this file. This will produce a PDF document names `first.pdf` that looks like figure 4.

Figure 3: Knitting

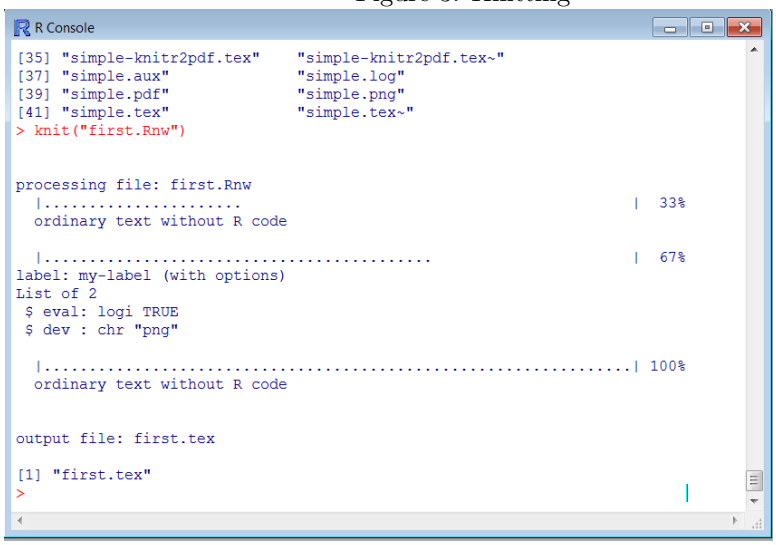


Figure 4: first.pdf

My First Rnw File

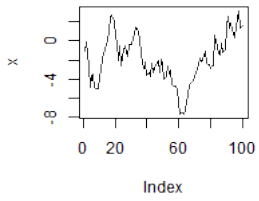
Charles Carter

This is my first .Rnw file, from R to PDF through LaTeX 2_ε.

```
set.seed(1213)  # for reproducibility
x = cumsum(rnorm(100))
mean(x)  # mean of x

## [1] -1.94

plot(x, type = 'l')  # Brownian motion
```



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