STAT:5400 (22S:166) Computing in Statistics

More on LaTeX

Lecture 4
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Including PDF graphics files in a LaTeX file

- include in the preamble

```
\usepackage{graphics}
```

- include in the body of the document

```
\begin{figure}[ <h,t,b, or p> ]
    \begin{center}
        \scalebox{ <size> }{\includegraphics{ <filename.pdf>
     \end{center}
     \caption{ <caption> }
\end{figure}
```

  - letters h, t, b, and p mean the same as in table
  - `<size>` in `scalebox` command means what multiple of size of original figure to use (e.g. 0.5 for half)
  - graphics do not have to be put in *figure* environment

∗ *figure* environment makes graph "floating" and enables adding caption

Adding a bibliography using BibTeX

- associated product that can be used with LaTeX to prepare bibliographies
- enables you to keep all your references in a database
- extracts only those that are cited in a particular paper
- different style files available to format the bibliographic entries and citations in different standard ways
- `http://www.reed.edu/cis/help/LaTeX/bibtexstyles.html#disc`
- to use reference formats that are standard in statistics publications, include in your preamble

```
\usepackage{natbib}
```

BibTEXcontinued

- example `.bib` file

```
@Article{Cow96,
  author =       {Mary Kathryn Cowles},
  title =        {Accelerating {M}arkov chain {M}onte {C}arl
       for cumulative-link generalized linear models},
  journal =      {Statistics and Computing},
  year =         {1996},
  volume =    {6},
  number =    {},
  month =     {},
  pages =     {101-111},
  note =      {},
  annote =    {}
}
```

- inserting the bibliography at the end of the article (`apalike` style together with `natbib` package formats the references as desired)

```
\bibliographystyle{apalike}
\bibliography{lectref.bib}
```

- citing references in the body of the text

```
Blocking may solve the problem of slow convergence
in a Gibbs sampler for a cumulative link GLM as shown
in~\citet{Cow96}.
```


Blocking may solve the problem of slow convergence in a Gibbs sampler for a cumulative link GLM as shown in Cowles (1996).

```
Blocking may solve the problem of slow convergence
in a Gibbs sampler for a cumulative link GLM
~\citep{Cow96}.
```

Blocking may solve the problem of slow convergence in a Gibbs sampler for a cumulative link GLM (Cowles, 1996).

- be sure the style file you referenced in `bibliographystyle` is where LATEX can find it (e.g. in the subdirectory the `.tex` file is in). This is NOT necessary with standard style files (such as `apalike` that are installed by the system administrators.

Compiling a LATEX file with BibTEX

- `pdflatex` to create `.aux` file

```
pdflatex <filename>
```


- `bibtex` to start matching referencs in `.bib` file to start matching references in `.bib` file

```
bibtex <filename>
```

- 3 more steps to finish process!

```
pdflatex <filename>
bibtex <filename>
pdflatex <filename>
```


Some math in LATEX

- Greek letters

```
$\theta$, $\Theta$, $\omega$, and $\Omega$
```

θ, Θ, ω, and Ω

```
$\mbox{\boldmath $\theta$}$
```

$\boldsymbol{\theta}$

- aligned equations

```
\begin{eqnarray}
   {\bf y} & \sim & N \left( {\bf X} \mbox{\boldmath $\beta$},
          \mbox{\boldmath $\Sigma$} \right ) \nonumber \\
   \mbox{\boldmath $\Sigma$} & = &
         \left [ \begin{array}{cc} \sigma_{11} & \sigma_{12} \\
         \sigma_{21} & \sigma{22} \end{array} \right ]
\end{eqnarray}
```

$$\begin{aligned} \mathbf{y} &\sim N\left(\mathbf{X}\boldsymbol{\beta}, \boldsymbol{\Sigma}\right) \\ \boldsymbol{\Sigma} &= \begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{21} & \sigma_{22} \end{bmatrix} \end{aligned} \tag{1}$$

- special symbols

```
\begin{eqnarray*}  % asterisk suppresses numbering
   y & = & \sqrt{ \frac{q}{r} } \\
   i = 1, \ldots, n
\end{eqnarray*}
```

$$\begin{aligned} y &= \sqrt{\frac{q}{r}} \\ i &= 1, \ldots, n \end{aligned}$$

References

Cowles, M. K. (1996). Accelerating Markov chain Monte Carlo convergence for cumulative-link generalized linear models. *Statistics and Computing*, 6:101–111.