

Introduction to \LaTeX

Hyunsung Kim

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Department of Statistics
Chung-Ang University

- Tables
- Figures
- Beamer Template
- Useful Tips

Tables

How to make table?

```
1 \begin{table}[ht]
2   \centering
3   \begin{tabular}{ccc}           % alignment(c: center, l: left, r: right)
4     \hline                     % horizontal line
5     Var1 & Var2 & Var3 \\\       % table elements(variable name + value)
6     \hline
7     1 & 2 & 3 \\\
8     4 & 5 & 6 \\\
9     7 & 8 & 9 \\\
10    \hline
11    \end{tabular}
12    \caption{Table example}      % caption
13  \end{table}
```

Listing 1: Table example code

How to make table?

Var1	Var2	Var3
1	2	3
4	5	6
7	8	9

Table 1: Table example

Multiple columns and rows

▷ Multiple rows

```
1 \usepackage{multirow}
2
3 \begin{table}[ht]
4   \centering
5   \begin{tabular}{ccc}
6     \hline
7     Var1 & Var2 & Var3 \\
8     \hline
9     \multirow{2}{4em}{multi row} & 3
10    & 5 & 6 \\
11    7 & 8 & 9 \\
12    \hline
13  \end{tabular}
14 \end{table}
```

▷ Multiple columns

```
1 \begin{table}[ht]
2   \centering
3   \begin{tabular}{ccc}
4     \hline
5     Var1 & Var2 & Var3 \\
6     \hline
7     1 & \multicolumn{2}{c}{\textcolor{red}{multi col}} \\
8     4 & 5 & 6 \\
9     7 & 8 & 9 \\
10    \hline
11  \end{tabular}
12 \end{table}
```

Multiple columns and rows

▷ Multiple rows

Var1	Var2	Var3
multi row	2	3
	5	6
7	8	9

▷ Multiple columns

Var1	Var2	Var3
1	multi col	
4	5	6
7	8	9

- GUI 형태로 값을 입력하는 방식
- 입력된 테이블을 $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ 코드로 변환해줌
- Table Generator

Tables Generator

The screenshot shows the LaTeX Tables Generator web application. At the top, there's a navigation bar with tabs for LaTeX Tables (selected), HTML Tables, Text Tables, Markdown Tables, and MediaWiki Tables. Below this is the title "LaTeX Tables Generator" and a Facebook link. A menu bar includes File, Edit, Table, Column, Row, Cell, and Help. A toolbar contains icons for table structure, text formatting (bold, italic, underline), and a "Default table style" dropdown. The main area displays a table with 3 columns (A, B, C) and 5 rows. The cells contain "Var1", "Var2", "Var3", "1", "2", "3", "4", "5", "6", "7", "8", and "9". The cell containing "9" is highlighted in yellow. Below the table is a "Generate" button. To the right is a link "Show an example table". Below the table, the "Result" section shows the generated LaTeX code:

```
1 \begin{table}[]
2 \begin{tabular}{lll}
3 Var1 & Var2 & Var3 \\
4 1 & 2 & 3 \\
5 4 & 5 & 6 \\
6 7 & 8 & 9 \\
7 \end{tabular}
8 \end{table}
```

 There are checkboxes for "Escape special TeX symbols (% & _ # \$)", "Compress whitespace", and "Smart output formatting". An "Extra options..." dropdown is at the bottom left. A "Copy to clipboard" button is on the right.

Tables Generator

LaTeX Tables HTML Tables Text Tables Markdown Tables MediaWiki Tables

LaTeX Tables Generator [Facebook](#)

File Edit Table Column Row Cell Help [Show an example table](#)

Table structure icons:

Default table style

	A	B	C
1	Var1	Var2	Var3
2	1	2	3
3	4	5	6
4	7	8	9

Generate

Result (click "Generate" to refresh) [Copy to clipboard](#)

```
1 \begin{table}[]
2 \begin{tabular}{lll}
3 Var1 & Var2 & Var3 \\
4 1 & 2 & 3 \\
5 4 & 5 & 6 \\
6 7 & 8 & 9 \\
7 \end{tabular}
8 \end{table}
```

☒ Escape special TeX symbols (% & _ # \$)
☐ Compress whitespace ☐ Smart output formatting
Extra options...

Figure 1: Example table using Table Generator

- R의 dataframe or matrix type을 L^AT_EX 코드로 변환시켜주는 package
- "xtable(df)" 형식으로 사용
- L^AT_EX 코드가 반환

```
> head(iris)
  Sepal.Length Sepal.width Petal.Length Petal.width Species
1          5.1          3.5          1.4          0.2  setosa
2          4.9          3.0          1.4          0.2  setosa
3          4.7          3.2          1.3          0.2  setosa
4          4.6          3.1          1.5          0.2  setosa
5          5.0          3.6          1.4          0.2  setosa
6          5.4          3.9          1.7          0.4  setosa
```

Figure 2: The sample dataframe object

```
> library(xtable)
> xtable( head(iris) )
% latex table generated in R 3.6.1 by xtable 1.8-4 package
% Fri Jan 31 18:20:12 2020
\begin{table}[ht]
\centering
\begin{tabular}{rrrrr}
\hline
& Sepal.Length & Sepal.width & Petal.Length & Petal.width & Species \\
\hline
1 & 5.10 & 3.50 & 1.40 & 0.20 & setosa \\
2 & 4.90 & 3.00 & 1.40 & 0.20 & setosa \\
3 & 4.70 & 3.20 & 1.30 & 0.20 & setosa \\
4 & 4.60 & 3.10 & 1.50 & 0.20 & setosa \\
5 & 5.00 & 3.60 & 1.40 & 0.20 & setosa \\
6 & 5.40 & 3.90 & 1.70 & 0.40 & setosa \\
\hline
\end{tabular}
\end{table}
```

Figure 3: Output of xtable function

	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
1	5.10	3.50	1.40	0.20	setosa
2	4.90	3.00	1.40	0.20	setosa
3	4.70	3.20	1.30	0.20	setosa
4	4.60	3.10	1.50	0.20	setosa
5	5.00	3.60	1.40	0.20	setosa
6	5.40	3.90	1.70	0.40	setosa

Table 2: The table using output of xtable function

Figures

How to input figures?

```
1 \begin{figure}[h] % t: top, b: bottom, h: here
2   \begin{center}
3     \includegraphics[width=0.7\linewidth]{img/figure.png}
4   \end{center}
5   \caption{Figure example} % caption
6   \label{fig:long}
7   \label{fig:onecol}
8 \end{figure}
```

Listing 2: Figure example code

How to input figures?

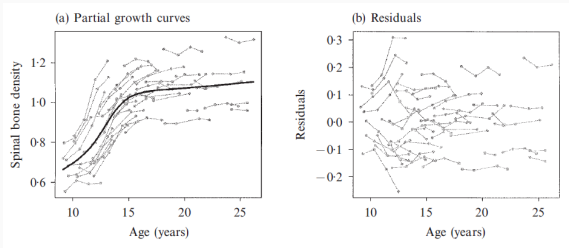


Figure 4: Figure example

Beamer Template

What is Beamer?

- 발표자료 형태의 L^AT_EX 문서
- 각 슬라이드에 내용을 넣는 방식으로 구성됨
- theme, color에 따라 다양한 양식 존재
- Beamer theme matrix

What is Beamer?

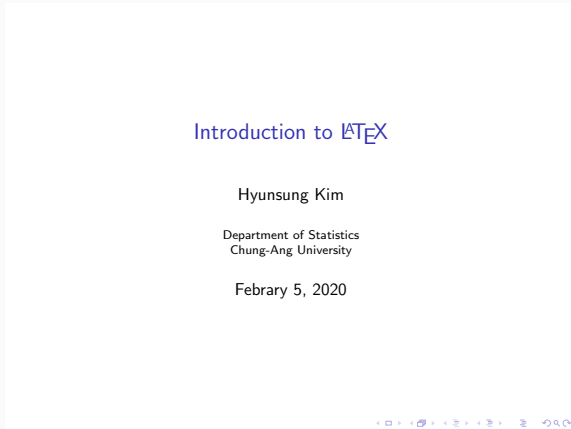


Figure 5: Beamer example

What is Beamer?

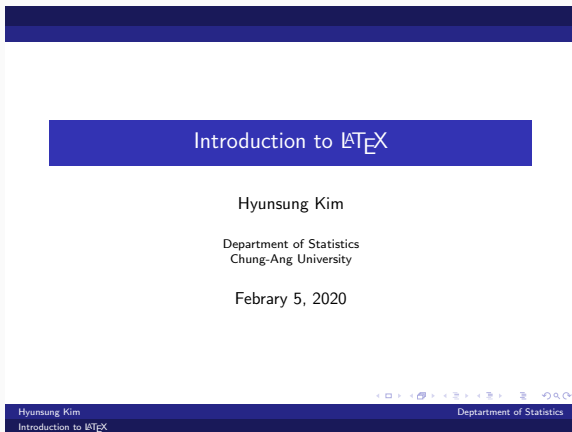


Figure 6: Berlin theme

What is Beamer?

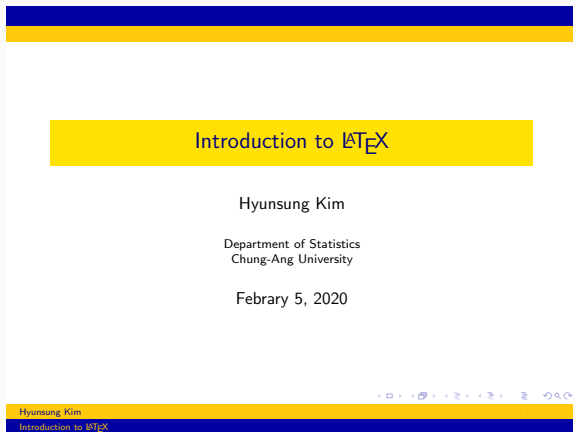


Figure 7: Berlin theme + wolverine colortheme

Example Code - Title

```
1 \documentclass{beamer}      % document type
2
3 \usetheme{Berlin}          % theme
4 \usecolortheme{wolverine}  % color theme
5
6 \title{Introduction to \LaTeX}
7 \date[Short Occasion]{February 5, 2020}
8 \author{Hyunsung Kim}
9 \institute[Department of Statistics]
10 {Department of Statistics\\ Chung-Ang University}
11 \subject{Introduction to \LaTeX}
12
13 % create slides here
14 \begin{document}
15
16   % main title
17   \begin{frame}
18     \titlepage
19   \end{frame}
20
21 \end{document}
```

Listing 3: Title code

Example Code - Slides

```
1 \begin{document}
2
3 \section{Section 1}
4
5 \subsection{Subsection 1}
6
7 % slide 1
8 \begin{frame}{Frame 1}
9 \begin{itemize}
10 \item {
11     item 1
12 }
13 \item {
14     item 2
15 }
16 \end{itemize}
17 \end{frame}
18
19 \end{document}
```

Listing 4: Slides code

Frame 1

- item 1
- item 2

1

Figure 8: Slides example

Useful Tips

- 수식 작성시 반복해서 사용하게 되는 코드가 생김(bold체 등)
- L^AT_EX 파일 상단에 축약해놓은 명령어를 지정해 놓고 사용하면 매우 편리!

Difference of codes

$$\mathbf{B}_i \mathbf{\Theta} \mathbf{D} \mathbf{\Theta}^T \mathbf{B}_i^T$$

▷ Original code

```
1  $$
2  \mathbf{B}_i \ \boldsymbol{\Theta} \ \mathbf{D} \ \boldsymbol{\Theta}^T \ \mathbf{B}_i^T
3  $$
```

▷ User defined code

```
1  $$
2  \bB_i \ \bTheta \ \bD \ \bTheta^T \ \bB_i^T
3  $$
```

User defined command

▷ 다음과 같이 정의하여 사용하면 됨

```
1 \def \bY { \mathbf{Y} }
2 \def \bB { \mathbf{B} }
3 \def \bI { \mathbf{I} }
4 \def \bD { \mathbf{D} }
5 \def \bbeta { \boldsymbol{\beta} }
6 \def \btheta { \boldsymbol{\theta} }
7 \def \bTheta { \boldsymbol{\Theta} }
8 \def \balpha { \boldsymbol{\alpha} }
```

- 코드를 같이 제출하는 과제가 있는 강의를 들을 때 유용 (통계계산론, 데이터마이닝 등)
- 단순 코드 복붙보다 깔끔하게 정리 가능
- 코드를 L^AT_EX 파일에 직접 넣지 않고 코드 파일을 첨부하여 사용 가능
- Reference

- L^AT_EX 파일 compile시, pdf 뿐만 아니라 다른 파일들이 같이 생김
- 임시 파일들이 따로 폴더에 들어가도록 설정할 수 있음
- TeXstudio + Miktex 기준의 설정 방법
- PdfLaTeX의 명령어를 다음과 같이 수정하여 설정 가능
`pdflatex.exe -synctex=0 -interaction=nonstopmode
--aux-directory=build %.tex`

How to config Build directory?

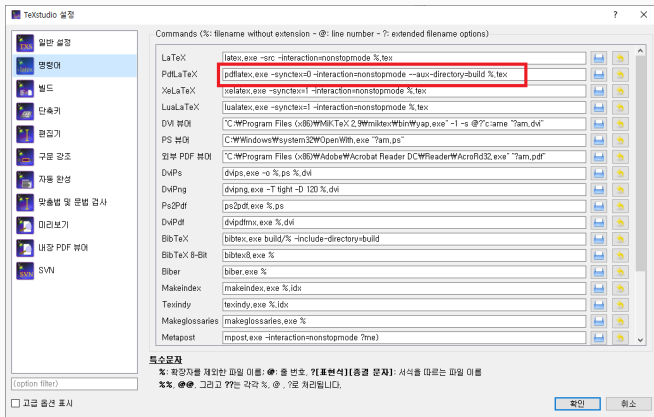


Figure 9: Settings in textstudio

Before configuration

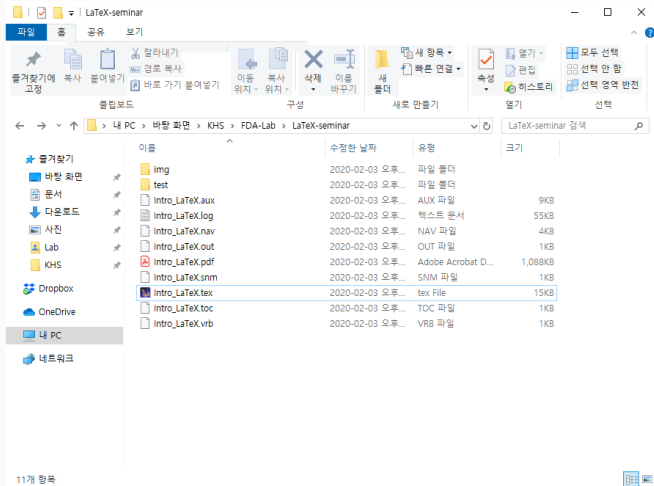


Figure 10: Before configuration

After configuration

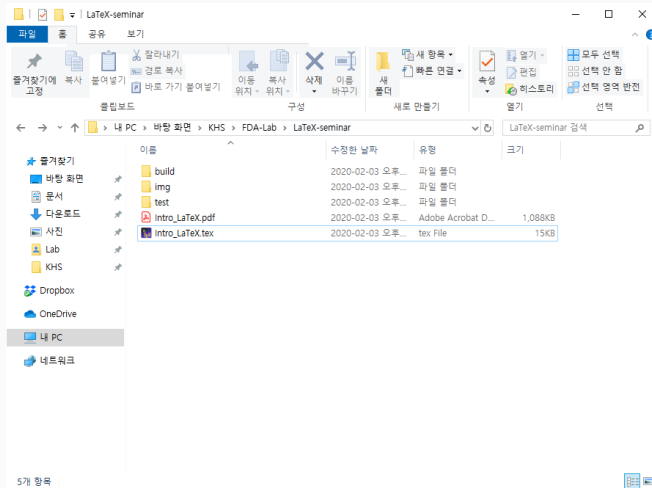


Figure 11: After configuration

- Rmarkdown으로 L^AT_EX 문서 작성 가능
(단, L^AT_EX 설치되어 있는 경우만 가능)
- Markdown 문법 + L^AT_EX 혼용 가능
- Reference

감사합니다!