

# Academic Writing by Using Latex: A Hands-on Workshop

(Oct 12, 1:30 to 2:50 PM)

<https://academicworkshops.github.io/Latex/>

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# Motivations



Dr. Yong Zheng

- Assistant Professor at Illinois Tech, USA
- Roles at ACM SIGITE 2022
  - Program Chair
  - Proceedings Chair
- Motivations for this workshop
  - Several authors at SIGITE used MS WORD
  - Authors were struggling in camera-ready submissions

# About This Workshop

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- Website: <https://academicworkshops.github.io/Latex/>
- Time: Oct 12, 1:30 PM – 2:50 PM
- Hands-on Workshop
  - We are not learning Latex coding from beginning (e.g., variables??)
  - We learn essential and easy-to-use Latex skills
  - We learn several useful tools to facilitate our Latex writing
  - We have hands-on practice
  - We have several useful materials (e.g., templates, tools, resources)

# Schedule

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- Latex vs. WORD
- Latex for Academic Writing (<https://academicworkshops.github.io/Latex/>)
  - Latex: an overview
  - Installation: Latex Environments
  - Document structure and compilation
  - Text Editing (sections, list, font, color, symbols, footnote, equations)
  - Charts and Tables
  - References
  - Useful Tools for Latex writing
- Practice: Converting a WORD doc to Latex document

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- MS Word is the most popular typesetting system

## Pressure Test: Finding Appropriate Data Size for Practice in Data Science Education

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Illinois Institute of Technology, USA  
szheng12@hawk.iit.edu

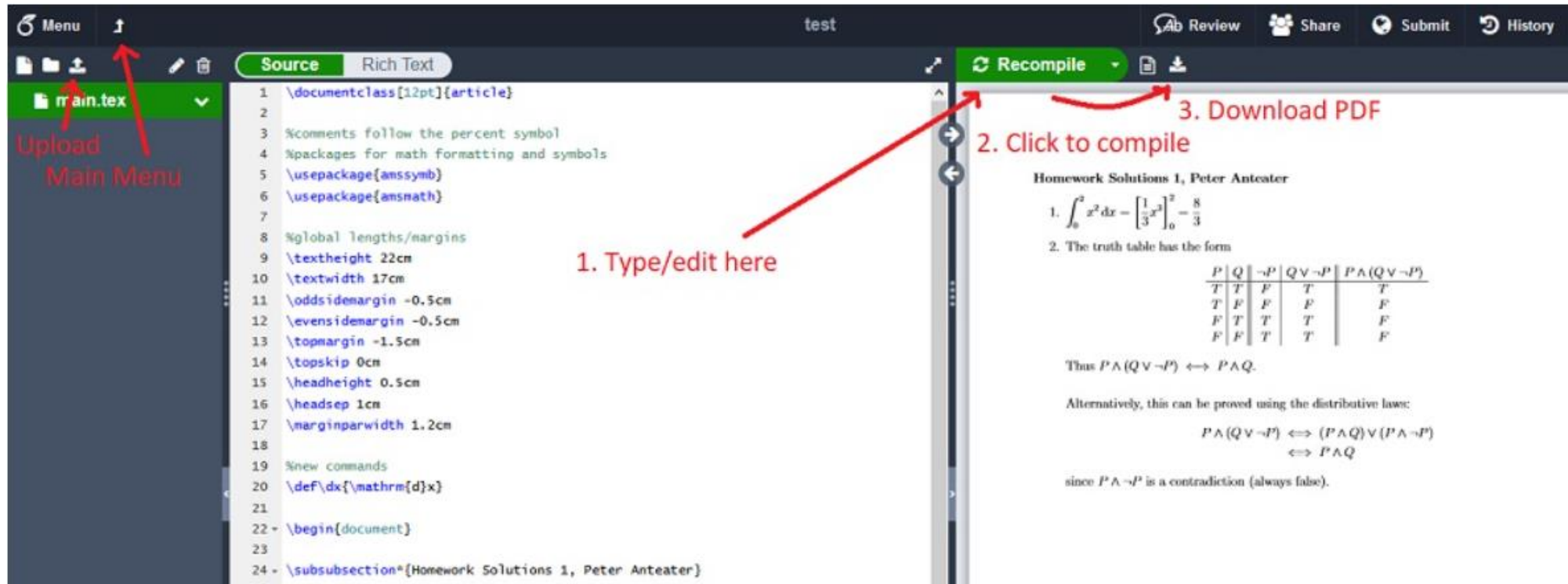
### ABSTRACT

Data science, such as data analytics, data mining, machine learning, became one popular curriculum in information technology educations. The lectures on these topics cannot stand alone without coding practice on real-world data sets. Some instructors prefer to utilize small data sets for practice in classroom or assignments, which limits experimental experiences and may even bring mislead-ing experiences to students. Others may try to assign large data sets to students, but students may not be able to bear with the running time due to the efficiency issue raised by several factors (e.g., data

to assist data-driven decision making [17]. With the demand for data scientist positions in industries, more and more academic institutions started to put programs together to provide data science curriculum [4, 9, 10, 22] in both computer science education and information technology education.

Traditional lectures on statistical analytics and data science usually deal with small or toy data sets for the purpose of in-class demos, practice in assignments and projects. Data mining and machine learning algorithms were usually trained on small-scale data sets at the early age. With the development of distributed com-

- Latex is another popular one, especially for academic writing



The screenshot shows a LaTeX editor interface with the following components and annotations:

- Left Panel:** A file explorer showing 'main.tex'. An arrow points to it with the text 'Upload Main Menu'.
- Source Editor:** A code editor showing LaTeX source code. An arrow points to the code with the text '1. Type/edit here'.
- Right Panel:** A preview window showing the rendered PDF. An arrow points to the 'Recompile' button with the text '2. Click to compile'. Another arrow points to the download icon with the text '3. Download PDF'.

The rendered PDF content includes:

Homework Solutions 1, Peter Antecater

- $\int_0^2 x^2 dx = \left[ \frac{1}{3}x^3 \right]_0^2 = \frac{8}{3}$
- The truth table has the form
 

| P | Q | $\neg P$ | $Q \vee \neg P$ | $P \wedge (Q \vee \neg P)$ |
|---|---|----------|-----------------|----------------------------|
| T | T | F        | T               | T                          |
| T | F | F        | F               | F                          |
| F | T | T        | T               | F                          |
| F | F | T        | T               | F                          |

Thus  $P \wedge (Q \vee \neg P) \iff P \wedge Q$ .

Alternatively, this can be proved using the distributive law:

$$P \wedge (Q \vee \neg P) \iff (P \wedge Q) \vee (P \wedge \neg P)$$

$$\iff P \wedge Q$$

since  $P \wedge \neg P$  is a contradiction (always false).



- Latex is another popular one, especially for academic writing

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### ABSTRACT

Data science, such as data analytics, data mining, machine learning, became one popular curriculum in information technology educations. The lectures on these topics cannot stand alone without coding practice on real-world data sets. Some instructors prefer to utilize small data sets for practice in classroom or assignments, which limits experimental experiences and may even bring misleading experiences to students. Others may try to assign large data sets to students, but students may not be able to bear with the running time due to the efficiency issue raised by several factors (e.g., data

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|                         | <b>Latex</b>                 | <b>MS Word</b>                   |
|-------------------------|------------------------------|----------------------------------|
| Cost                    | Free                         | Commercial software              |
| Stability               | Stable with low memory usage | More crashes                     |
| OS Dependence           | Independent                  | Dependent                        |
| Content and Formats     | Separated                    | Mixed together                   |
| Symbols                 | Supported                    | Not easy to find special symbols |
| Math Equations          | Easy and good-looking        | Need third-party supports        |
| Automatic Positioning   | Supported                    | Less supported                   |
| Bibliography Management | Superior                     | Not easy to change styles        |
| Spelling/Grammar Check  | Low                          | Good                             |
| Coding Requirements     | A little                     | None                             |
| Online Editors          | Yes                          | Yes                              |

# Why Latex

---

- Advantages

- Being independent of OS
- Formats/Styles and Contents are separated => just HTML with CSS!
- Easy to produce neat Math equations
- Enriched methods for automatic positioning
- Powerful in reference management

- Disadvantages

- Limited grammar check
- People need special training (however, we have several tools now!)

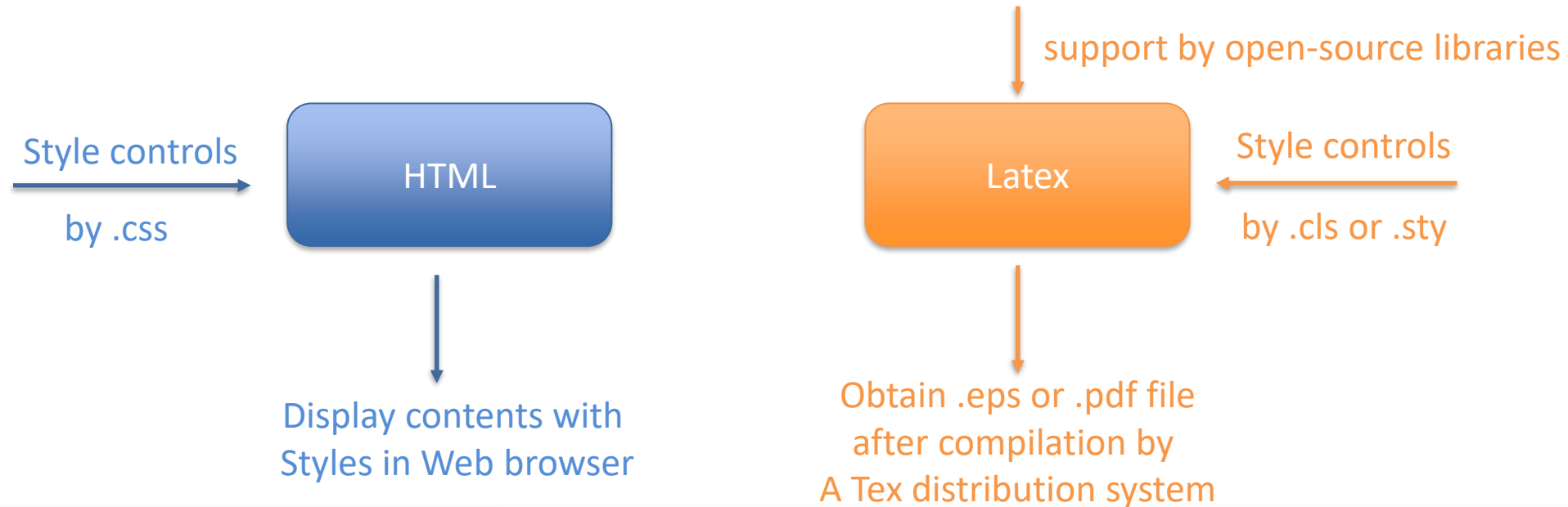
# Schedule

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# Latex: An Overview

- LATEX (pronounced “LAY-tek” or “LAH-tek”) is a tool for typesetting professional-looking documents.
- Contents and Formats are separated, just like HTML



# Latex: An Overview

- Latex is similar to HTML coding.
  - Example: Hello, world!

- LaTeX:

```
latex Copy code  
  
\documentclass{article}  
\begin{document}  
Hello, LaTeX!  
\end{document}
```

- HTML:

```
html Copy code  
  
<!DOCTYPE html>  
<html>  
<head>  
  <title>HTML Example</title>  
</head>  
<body>  
  <p>Hello, HTML!</p>  
</body>  
</html>
```

# Latex: An Overview

- Latex is similar to HTML coding.
  - Example: sections & headings →
  - Example: Hyperlinks



## • LaTeX:

```
latex Copy code  
  
\href{https://www.example.com}{Visit Example}
```

## • HTML:

```
html Copy code  
  
<a href="https://www.example.com">Visit Example</a>
```

## • LaTeX:

```
latex Copy code  
  
\section{Introduction}  
This is the introduction section.  
\subsection{Subsection}  
This is a subsection.
```

## • HTML:

```
html Copy code  
  
<h1>Introduction</h1>  
<p>This is the introduction section.</p>  
<h2>Subsection</h2>  
<p>This is a subsection.</p>
```

# Latex: An Overview

- Latex is similar to HTML coding.
  - Example: lists
  - Example: Images



• LaTeX:

```
latex
```

```
\includegraphics[width=0.5\textwidth]{image.png}
```

• HTML:

```
html
```

```

```

• LaTeX:

```
latex
```

```
\begin{itemize}
```

```
\item Item 1
```

```
\item Item 2
```

```
\end{itemize}
```

• HTML:

```
html
```

```
<ul>
```

```
<li>Item 1</li>
```

```
<li>Item 2</li>
```

```
</ul>
```

# Latex: An Overview

---

- Tex vs Latex
  - TeX is a low-level typesetting system created by Donald Knuth. LaTeX is built on top of TeX and provides a higher-level, user-friendly interface. It defines document structures and formatting conventions using macros and templates.
  - In TeX, users must define the entire document structure, including headers, footers, etc. LaTeX abstracts many of these formatting details into document classes and packages.
  - LaTeX comes with a vast collection of packages and macros that extend its functionality.



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# Installation: Latex Environments

---

- To set up the Latex environment, we need two components
  - **Tex Integrated Development Environment (IDE)**
    - Examples: TeXstudio, Texmaker, Overleaf (online), WinEdit, etc.
  - **Tex Distribution System**
    - Examples: Tex Live, MacTex, MikeTex, CTeX (for Chinese characters), etc.
    - A Tex distribution system must have following components
      - Tex Engine: for compilation and formatting purpose
      - Macros and Packages, as well package managers
      - Fonts, utilities, reference tools and management
      - Editor integration, so that they can work together with any IDE

# Installation: Latex Environments

---

We have two options for this workshop (<https://academicworkshops.github.io/Latex/>)

- Option 1: Local copy on your device
  - Tex distribution: MikTeX, <https://miktex.org/>
  - Latex IDE: Texmaker, <https://www.xm1math.net/texmaker/>
- Option 2: Overleaf – an online Latex environment
  - Website: register an account at <https://www.overleaf.com/>
  - ACM template, <https://www.overleaf.com/latex/templates/acm-conference-proceedings-primary-article-template/wbvngjhjbzwpc>

# Installation: Latex Environments

- Option 1: Local copy by MikTeX + Texmaker

The screenshot shows the Texmaker interface with the following components and annotations:

- Document sections:** A sidebar on the left lists the document structure, including sections like Introduction, Template Overview, and Authors and Affiliations.
- 1. Coding Editor:** The main window displays the LaTeX source code for `sample-sigconf.tex`.
- 2. Quick build:** A button in the top toolbar is highlighted with a red arrow.
- 3. Compilation logs:** A log window at the bottom shows error messages such as "Underfull \vbox (badness 1286) has occurred while ...".
- 4. PDF Viewer:** A window on the right displays the rendered PDF document.

The rendered PDF document features the following content:

### The Name of the Title Is Hope

Ben Trovato\*  
G.K.M. Tobin\*  
trovato@corporation.com  
webmaster@marysville-ohio.com  
Institute for Clarity in Documentation  
Dublin, Ohio, USA

Lars Thórvöld  
The Thórvöld Group  
Hekla, Iceland  
larst@affiliation.org

Valerie Béranger  
Inria Paris-Rocquencourt  
Rocquencourt, France

Aparna Patel  
Rajiv Gandhi University  
Doimukh, Arunachal Pradesh, India

Huifen Chan  
Tsinghua University  
Haidian Qu, Beijing Shi, China

Charles Palmer  
Palmer Research Laboratories  
San Antonio, Texas, USA  
cpalmer@prl.com

John Smith  
The Thórvöld Group  
Hekla, Iceland  
jsmith@affiliation.org

Julius P. Kumquat  
The Kumquat Consortium  
New York, USA  
jpkumquat@consortium.net

**Figure 1: Seattle Mariners at Spring Training, 2010.**

**ABSTRACT**  
A clear and well-documented L<sup>A</sup>T<sub>E</sub>X document is presented as an article formatted for publication by ACM in a conference proceedings or journal publication. Based on the "acmart" document class, this article presents and explains many of the common variations, as well as many of the formatting elements an author may use in the preparation of the documentation of the document.

**KEYWORDS**  
datasets, neural networks, gaze detection, text tagging

**ACM Reference Format:**  
Ben Trovato, G.K.M. Tobin, Lars Thórvöld, Valerie Béranger, Aparna Patel, Huifen Chan, Charles Palmer, John Smith, and Julius P. Kumquat. 2018. The Name of the Title Is Hope. In *Proceedings of Make sure to enter the correct*

# Installation: Latex Environments

- Option 2: Overleaf – an online Latex environment

1. Type/edit here

2. Click to compile

3. Download PDF

Upload Main Menu

```
1 \documentclass[12pt]{article}
2
3 %comments follow the percent symbol
4 %packages for math formatting and symbols
5 \usepackage{amssymb}
6 \usepackage{amsmath}
7
8 %global lengths/margins
9 \textheight 22cm
10 \textwidth 17cm
11 \oddsidemargin -0.5cm
12 \evensidemargin -0.5cm
13 \topmargin -1.5cm
14 \topskip 0cm
15 \headheight 0.5cm
16 \headsep 1cm
17 \marginparwidth 1.2cm
18
19 %new commands
20 \def\dx{\mathrm{d}x}
21
22 \begin{document}
23
24 \subsubsection*{Homework Solutions 1, Peter Anteater}
```

Homework Solutions 1, Peter Anteater

- $\int_0^2 x^2 dx = \left[\frac{1}{3}x^3\right]_0^2 = \frac{8}{3}$
- The truth table has the form

| P | Q | $\neg P$ | $Q \vee \neg P$ | $P \wedge (Q \vee \neg P)$ |
|---|---|----------|-----------------|----------------------------|
| T | T | F        | T               | T                          |
| T | F | F        | F               | F                          |
| F | T | T        | T               | F                          |
| F | F | T        | T               | F                          |

Thus  $P \wedge (Q \vee \neg P) \leftrightarrow P \wedge Q$ .

Alternatively, this can be proved using the distributive law:

$$P \wedge (Q \vee \neg P) \leftrightarrow (P \wedge Q) \vee (P \wedge \neg P)$$
$$\leftrightarrow P \wedge Q$$

since  $P \wedge \neg P$  is a contradiction (always false).

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# Latex: Document Structures

---

- Note: we are not learning how to create a Latex document or template from beginning. We focusing on how to complete our academic writing by using a specific Latex template, such as the ACM template for ACM proceedings
- ACM template is included
  - Practice.zip, <https://academicworkshops.github.io/Latex/>
  - Overleaf, <https://www.overleaf.com/latex/templates/acm-conference-proceedings-primary-article-template/wbvngbjbwpc>

# Latex: Document Structures

---

- ACM templates
  - .cls, .sty: define doc format, e.g., margins, single/double columns, etc.
  - .bib: raw list of references
  - .bbl: list of references after compiling
  - .bst: format of references, such as APA style, Chicago style, etc.
  - .tex: the main Tex file for us to put contents in
  - .pdf, .eps, .dvi, .ps: document after compiling
  - .jpg, .png, .eps: image files
  - Other files: not important files or intermediate files during compiling



# Latex: Document Structures

```
latex Copy code
\documentclass{article}

% Packages
\usepackage{graphicx} % For including graphics
\usepackage{algorithm} % For algorithms

% Document information
\title{My LaTeX Document with References}
\author{Your Name}
\date{\today}

\begin{document}

\maketitle

\section{Introduction}
This is the introduction section of my document.

\subsection{Subsection}
This is a subsection within the introduction.

\section{Another Section}
This is another section in the document.

% Insert citations where needed in your document
Smith's study-\cite{smith2010} provides valuable insights.

\bibliographystyle{ACM-Reference-Format} % Specify the bibliography style
\bibliography{sample-base} % Include your .bib file without the extension

\end{document}
```

## My LaTeX Document with References

Your Name

October 9, 2023

### 1 Introduction

This is the introduction section of my document.

#### 1.1 Subsection

This is a subsection within the introduction.

### 2 Another Section

This is another section in the document.

Smith's study [?] provides valuable insights.

```
latex Copy code
\documentclass{article}

% Packages
\usepackage{graphicx} % For including graphics
\usepackage{algorithm} % For algorithms

% Document information
\title{My LaTeX Document with References}
\author{Your Name}
\date{\today}

\begin{document}

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This is a subsection within the introduction.

\section{Another Section}
This is another section in the document.

% Insert citations where needed in your document
Smith's study-\cite{smith2010} provides valuable insights.

\bibliographystyle{ACM-Reference-Format} % Specify the bibliography style
\bibliography{sample-base} % Include your .bib file without the extension

\end{document}
```

Define document class

The options are pre-defined in .cls file.

The following options can be applied to ACM tex:  
opt: **sigconf,review,anonymous,manuscript,nonacm**

`\documentclass[sigconf]{acmart}`

- sigconf, double-column format
- manuscript, single-column format
- review, add line numbers to manuscript
- anonymous, remove author names
- nonacm, remove ACM reference format

```
latex Copy code
\documentclass{article}

% Packages
\usepackage{graphicx} % For including graphics
\usepackage{algorithm} % For algorithms

% Document information
\title{My LaTeX Document with References}
\author{Your Name}
\date{\today}

\begin{document}

\maketitle

\section{Introduction}
This is the introduction section of my document.

\subsection{Subsection}
This is a subsection within the introduction.

\section{Another Section}
This is another section in the document.

% Insert citations where needed in your document
Smith's study-\cite{smith2010} provides valuable insights.

\bibliographystyle{ACM-Reference-Format} % Specify the bibliography style
\bibliography{sample-base} % Include your .bib file without the extension

\end{document}
```

Define document class

## Hints

- You use the following for one-column submission  
`\documentclass[manuscript,review,anonymous]{acmart}`
- In camera-ready submission, you can use  
`\documentclass[manuscript]{acmart}` for 1-col submission  
or `\documentclass[sigconf]{acmart}` for 2-col submission
- You can also use `\documentclass[sigconf]{acmart}` to help  
adjust figures or tables

```
latex Copy code
\documentclass{article}

% Packages
\usepackage{graphicx} % For including graphics
\usepackage{algorithm} % For algorithms

% Document information
\title{My LaTeX Document with References}
\author{Your Name}
\date{\today}

\begin{document}

\maketitle

\section{Introduction}
This is the introduction section of my document.

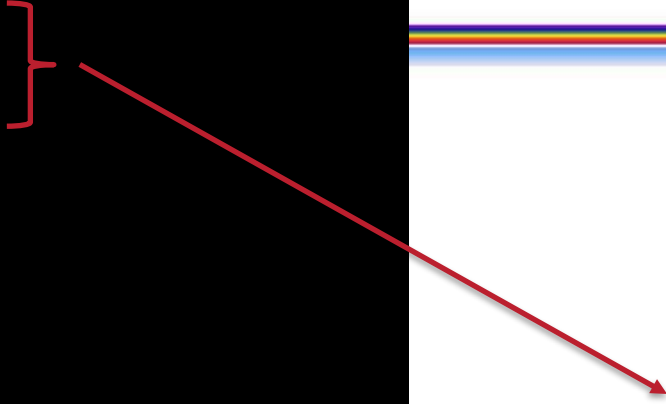
\subsection{Subsection}
This is a subsection within the introduction.

\section{Another Section}
This is another section in the document.

% Insert citations where needed in your document
Smith's study-\cite{smith2010} provides valuable insights.

\bibliographystyle{ACM-Reference-Format} % Specify the bibliography style
\bibliography{sample-base} % Include your .bib file without the extension

\end{document}
```



## Load open-sourced packages

We can add any packages if necessary  
e.g., graphics is used to add images/figures  
algorithm is used to insert pseudo coding

```
\documentclass{article}

% Packages
\usepackage{graphicx} % For including graphics
\usepackage{algorithm} % For algorithms

% Document information
\title{My LaTeX Document with References}
\author{Your Name}
\date{\today}

\begin{document}

\maketitle

\section{Introduction}
This is the introduction section of my document.

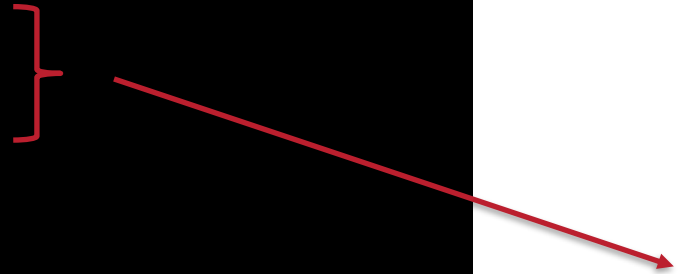
\subsection{Subsection}
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\section{Another Section}
This is another section in the document.

% Insert citations where needed in your document
Smith's study-\cite{smith2010} provides valuable insights.

\bibliographystyle{ACM-Reference-Format} % Specify the bibliography style
\bibliography{sample-base} % Include your .bib file without the extension

\end{document}
```



**Titles, authors, abstracts, keywords**  
Here, they are included before `\begin{document}`.  
Some templates may put them after `\begin{document}`, such as the ACM template.  
It depends on the definitions in .cls file.

```
\documentclass{article}

% Packages
\usepackage{graphicx} % For including graphics
\usepackage{algorithm} % For algorithms

% Document information
\title{My LaTeX Document with References}
\author{Your Name}
\date{\today}

\begin{document}

\maketitle

\section{Introduction}
This is the introduction section of my document.

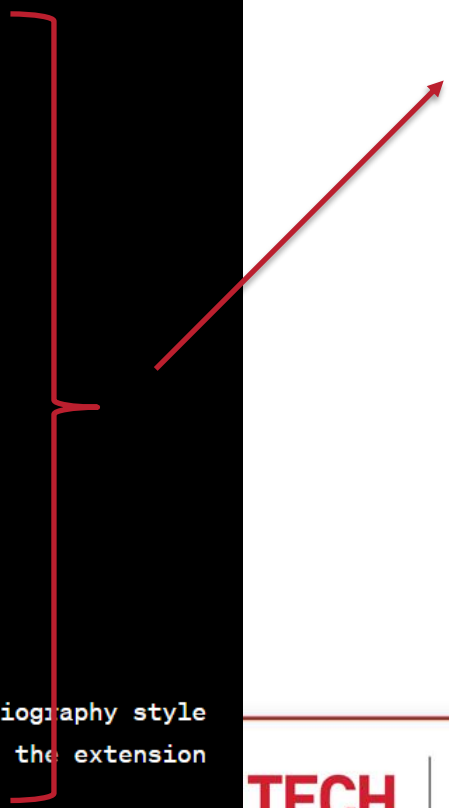
\subsection{Subsection}
This is a subsection within the introduction.

\section{Another Section}
This is another section in the document.

% Insert citations where needed in your document
Smith's study-\cite{smith2010} provides valuable insights.

\bibliographystyle{ACM-Reference-Format} % Specify the bibliography style
\bibliography{sample-base} % Include your .bib file without the extension

\end{document}
```



## Main contents

- Sections and subsections
- Texts, equations, tables, figures
- Algorithms
- References
- .....

```
\documentclass{article}

% Packages
\usepackage{graphicx} % For including graphics
\usepackage{algorithm} % For algorithms

% Document information
\title{My LaTeX Document with References}
\author{Your Name}
\date{\today}

\begin{document}

\maketitle

\section{Introduction}
This is the introduction section of my document.

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This is a subsection within the introduction.

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This is another section in the document.

% Insert citations where needed in your document
Smith's study-\cite{smith2010} provides valuable insights.

\bibliographystyle{ACM-Reference-Format} % Specify the bibliography style
\bibliography{sample-base} % Include your .bib file without the extension

\end{document}
```

## Reference Controls

- ACM-Reference-Format.bst, style file
- Sample-base.bib, raw list of references

# Latex: Compilation

- By Using Overleaf
  - It is an online editor, where you do not need local Text distribution systems

Code Editor Visual Editor Normal text B I Ω ↺ ↻ ↶ ↷ ↸ ↹ ↺ ↻ ↶ ↷ ↸ ↹

```
40 %%% Large single column format, used for IMWUT, JOCCH, PACMPL, POMACS, TAP, PACMHCI
41 % \documentclass[acmlarge,screen]{acmart}
42
43 %%% Large double column format, used for TOG
44 % \documentclass[acmtog, authorversion]{acmart}
45
46 %%% Generic manuscript mode, required for submission
47 %%% and peer review
48 \documentclass[manuscript,anonymous,nonacm]{acmart}
49 % Fonts used in the template cannot be substituted; margin
50 % adjustments are not allowed.
51 %
52 % \BibTeX command to typeset BibTeX logo in the docs
53 \AtBeginDocument{%
54   \providecommand\BibTeX{%
55     \normalfont B\kern-0.5em{\scshape i\kern-0.25em b}\kern-0.8em\TeX}}
56
57 % Rights management information. This information is sent to you
58 % when you complete the rights form. These commands have SAMPLE
59 % values in them; it is your responsibility as an author to replace
60 % the commands and values with those provided to you when you
61 % complete the rights form.
62 \setcopyright{acmcopyright}
63 \copyrightyear{2018}
64 \acmYear{2018}
65 \acmDOI{XXXXXXXX.XXXXXXX}
```

Compiling

Recompile

Auto Compile

On

Off

Compile Mode

Normal

Fast [draft]

Syntax Checks

Check syntax before compile

Don't check syntax

Compile Error Handling

Stop on first error

Try to compile despite errors

Stop compilation

Recompile from scratch

CCS Concepts: • Do Not Use This Code → Generate the Correct Terms for Your Paper; Paper, Generate the Correct Terms for Your Paper, Generate the Correct Terms for Your Paper.

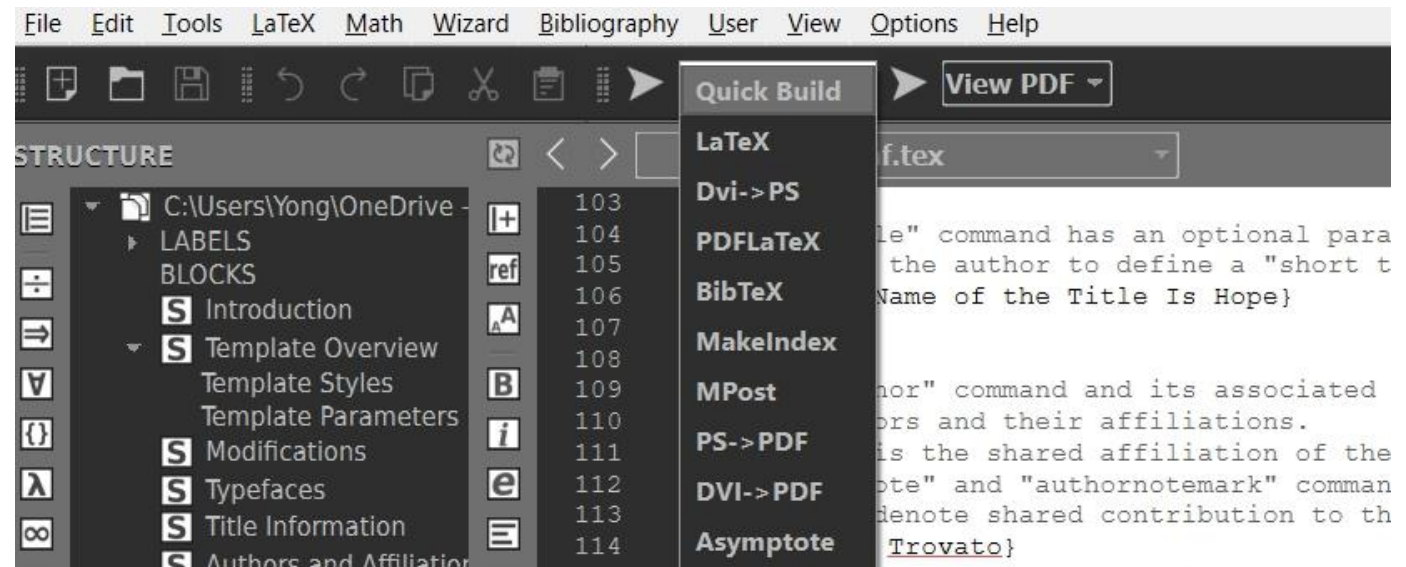


# Latex: Compilation

- By Using Local Environment: MikTeX + Texmaker

- There are several options

- Latex => compile tex, get dvi
- PDFLaTeX => get pdf
- BibTeX => compile bib to bbl
- QuickBuild =  
PDFLaTeX + View PDF



# Latex: Compilation

- By Using Local Environment: MikTeX + Texmaker

- Special notes for references

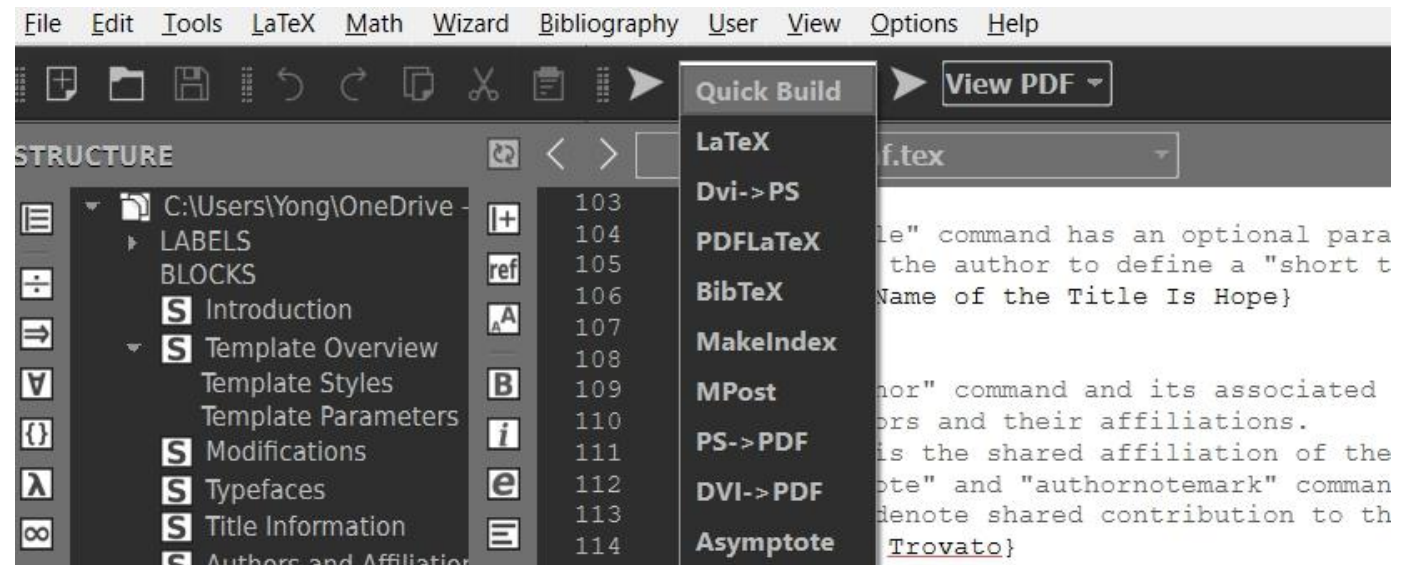
- Run BibTeX first

It will update .tex and .bib to produce new bbl file

- Run PDFLaTeX or QuickBuild

The actual changes will be updated on final PDF files

- You may need to run BibTeX + PDFLaTeX (or QuickBuild) for several rounds (especially run “QuickBuild” for several times) in order to have updates of references in final PDF file



# Schedule

---

- Latex vs. WORD
- Latex for Academic Writing (<https://academicworkshops.github.io/Latex/>)
  - Latex: an overview
  - Installation: Latex Environments
  - Document structure and compilation
  - Text Editing (sections, list, font, color, symbols, footnote, equations)
  - Charts and Tables
  - References
  - Useful Tools for Latex writing
- Practice: Converting a WORD doc to Latex document

# Text Editing in Latex: Sections

- You can create sections in multiple depth

```
\section{My Section}
```

```
\subsection{one sub section}
```

```
\subsection{another sub section}
```

```
\subsubsection{a sub sub section}
```

```
\subsubsubsection{a sub sub section}
```



12 MY SECTION

12.1 one sub section

12.2 another sub section

12.2.1 *a sub sub section.* a sub sub section

- By default, Tex system only supports up to 3 levels in depth  
The `\subsubsubsection{}` above is not working
- But you can add your own commands to support it  
Hint: ask ChatGPT about how to do this

# Text Editing in Latex: Texts

- Text formats
  - **Bold**: bold text in LaTeX is typeset using the `\textbf{...}` command.
  - *Italics*: italicised text is produced using the `\textit{...}` command.
  - Underline: to underline text use the `\underline{...}` command.

```
Some of the \textbf{greatest}
discoveries in \underline{science}
were made by \textbf{\textit{accident}}.
```



Some of the **greatest** discoveries in science were made by *accident*.

# Text Editing in Latex: Texts

- Text color

```
\documentclass{article}
\usepackage{xcolor} % add this package

\begin{document}

This is regular black text.

\textcolor{red}{This text is in red.}

More regular black text.

\end{document}
```

use `\textcolor{color}{texts}` command

This is regular black text.  
**This text is in red.**  
More regular black text.

# Text Editing in Latex: Texts

- Text size

- Change font size for the whole document

- ```
\documentclass[12pt]{article}
```

- Change font size for specific texts

- Use pre-defined size

- ```
This is \large{large} text.
```

- Use self-defined size

- ```
\fontsize{14}{16}\selectfont This is a custom font size.
```

- the 1<sup>st</sup> argument = font size in points

- the 2<sup>nd</sup> argument = line spacing

- `\tiny`: Tiny text.
- `\scriptsize`: Scriptsize text.
- `\footnotesize`: Footnotesize text.
- `\small`: Small text.
- `\normalsize`: Normal (default) text size.
- `\large`: Large text.
- `\Large`: Larger text.
- `\LARGE`: Even larger text.
- `\huge`: Huge text.
- `\Huge`: Largest text.

# Text Editing in Latex: List

- Unordered List

- Use `\itemize` and put entries in `\item`

```
\begin{itemize}
  \item The individual entries are indicated with a black dot, a so-called bullet.
  \item The text in the entries may be of any length.
\end{itemize}
```

- The individual entries are indicated with a black dot, a so-called bullet.
- The text in the entries may be of any length.

- Change bullet styles by loading the `enumitem` package

```
\usepackage{enumitem}
\begin{itemize} [label=$\ast$]
  \item Item 1
  \item Item 2
\end{itemize}
```

``-``: A hyphen or dash.  
`$$\ast$`: An asterisk.  
`$$\bullet$`: A filled bullet.  
`$$\cdot$`: A small centered dot.  
`$$\circ$`: A hollow circle.  
`$$\diamond$`: A diamond shape.  
`$$\triangleright$`: A right-pointing triangle.  
`$$\rightarrow$`: A right arrow symbol.  
`$$\rightarrowtail$`: A right arrow with a tail.  
`$$\Rrightarrow$`: A double right arrow.  
`$$\hookrightarrow$`: A hooked right arrow.



# Text Editing in Latex: List

- Ordered List

- Use `\enumerate` and put entries in `\item`

```
\begin{enumerate}
  \item This is the first entry in our list.
  \item The list numbers increase with each entry we add.
\end{enumerate}
```

1. This is the first entry in our list.
2. The list numbers increase with each entry we add.

- Change numbering styles by loading the `enumitem` package

```
\usepackage{enumitem}
\begin{enumerate} [label=\Roman*]
  \item Item I
  \item Item II
  \item Item III
\end{enumerate}
```



- I) Item I
- II) Item II
- III) Item III

# Text Editing in Latex: Others

- Subscript and Superscript

- Use `$x_2$` and `$x^{2}$`

- Hyperlinks

```
\usepackage{hyperref}
\href{https://www.example.com}{texts}
```

- Footnotes

```
Your texts\footnote{texts for footnote}
```

`$x_2$` is used to describe a variable, where `$x^{2}$` denotes the squared value of `$x$`. You can visit my website `\href{https://www.iit.edu}{https://www.iit.edu}` for more references `\footnote{https://www.iit.edu}`.



$x_2$  is used to describe a variable, where  $x^2$  denotes the squared value of  $x$ . You can visit my website <https://www.iit.edu> for more references<sup>1</sup>.

---

<sup>1</sup><https://www.iit.edu>

# Text Editing in Latex: Symbols & Equations

- We can use online tools to produce symbols and equations
- Online tool: HostMath, <https://www.hostmath.com/>

The screenshot shows the HostMath online LaTeX editor interface. On the left, there is a grid of mathematical symbols categorized into Math, GK&Fun, Logic, Arrow, Symbol, and Format. The main text area contains the LaTeX code  $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ . Below the text area, the rendered mathematical expression is shown: 
$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

# Text Editing in Latex: Symbols & Equations

- To put symbols or equations in main content/texts, you need to put them in  $\$your symbol or equation\$$

I use this formula,  $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$  for the calculations.  $\longrightarrow$  I use this formula,  $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$  for the calculations.

- Or, you can create an equation with index number

I use Equation  $\sim \backslash \text{ref}\{\text{eq:dev}\}$  for the calculations.

```
\begin{equation}
\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
\label{eq:dev}
\end{equation}
```

I use Equation 1 for the calculations.

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad (1)$$

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# Latex: Charts / Figures

- Load the package “graphic”, `\usepackage{graphicx}`
- Insert any images (jpg, png, pdf) into Latex

```
\begin{figure}
\centering
\includegraphics[scale=0.8]{sample-franklin.png}
\caption{This is an example image.}
\label{fig:example}
\end{figure}
```

Update image size

Full path of image



Figure 1: This is an example image.

- Refer to my image `\ref{fig:example}`

# Latex: Tables

- We can use online tools, “Tables Generator”, <https://www.tablesgenerator.com/>

|   | A    | B     | C     | D     | E     |
|---|------|-------|-------|-------|-------|
| 1 |      | C1    | C2    | C3    | C4    |
| 2 | mean | 80.25 | 77.56 | 73.17 | 75.00 |
| 3 | q2   | 80.25 | 77.25 | 73.50 | 75.00 |
| 4 | std  | 4.60  | 8.87  | 2.02  | 0.00  |

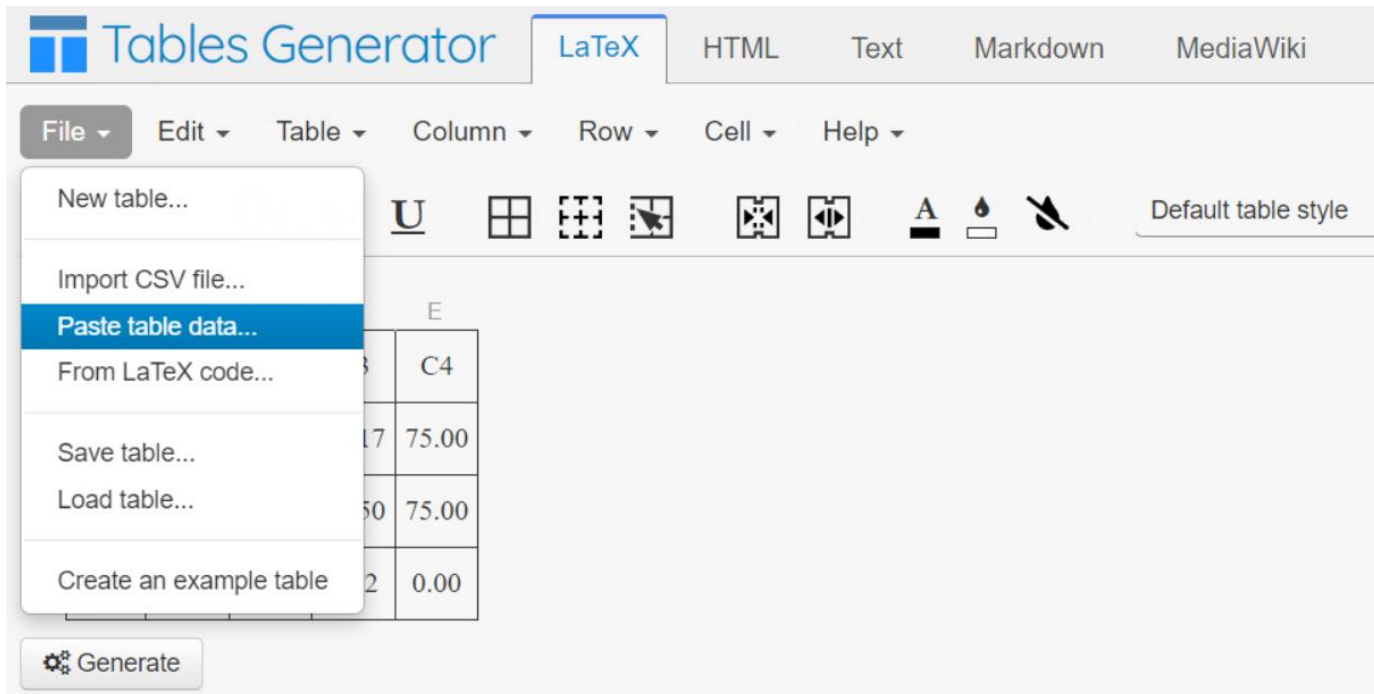
⚙️ Generate

Result (click "Generate" to refresh)

```
1 \begin{table}[]
2 \begin{tabular}{|c|c|c|c|c|}
3 \hline
4 & C1 & C2 & C3 & C4 & \\ \hline
5 mean & 80.25 & 77.56 & 73.17 & 75.00 & \\ \hline
6 q2 & 80.25 & 77.25 & 73.50 & 75.00 & \\ \hline
7 std & 4.60 & 8.87 & 2.02 & 0.00 & \\ \hline
8 \end{tabular}
9 \end{table}
```

# Latex: Tables

- You can prepare data table in Excel, and then load into the web UI
- Or, you can import a csv document



The screenshot shows the 'Tables Generator' web application. The 'File' menu is open, displaying several options. The 'Paste table data...' option is highlighted. In the background, a table is visible with the following data:

|  | E     | C4    |
|--|-------|-------|
|  | 75.00 |       |
|  | 50    | 75.00 |
|  | 2     | 0.00  |



# Latex: Tables

- You should have a basic understanding about Latex tables, if you would like more advanced design in future

```
\begin{table}[ht!]  
\centering  
\caption{table caption}\label{tab:mytable}  
\begin{tabular}{|c|c|c|c|c|}  
\hline  
  & C1 & C2 & C3 & C4 & \\ \hline  
mean & 80.25 & 77.56 & 73.17 & 75.00 & \\ \hline  
q2   & 80.25 & 77.25 & 73.50 & 75.00 & \\ \hline  
std  & 4.60 & 8.87 & 2.02 & 0.00 & \\ \hline  
\end{tabular}  
\end{table}
```

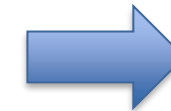
“ht!” is used for auto-positioning / table floating

```
\begin{table}  
\end{table}
```



Use one column width in two-column ACM template

```
\begin{table*}  
\end{table*}
```



Use the whole page width in two-column ACM template



Figure 1: Seattle Mariners at Spring Training, 2010.

#### ABSTRACT

A clear and well-documented  $\LaTeX$  document is presented as an article formatted for publication by ACM in a conference proceedings or journal publication. Based on the “acmart” document class, this article presents and explains many of the common variations, as well as many of the formatting elements an author may use in the preparation of the documentation of their work.

CCS CONCEPTS

#### KEYWORDS

datasets, neural networks, gaze detection, text tagging

#### ACM Reference Format:

Ben Trovato, G.K.M. Tobin, Lars Thorsvold, Valerie Béanger, Aparna Patel, Huifen Chan, Charles Palmer, John Smith, and Julius P. Kunquat. 2018. The Name of the Title Is Hope. In *Proceedings of Make sure to enter the correct conference title from your rights confirmation email (Conference acronym 'XX)*. ACM, New York, NY, USA, 6 pages. <https://doi.org/XXXXXXXXXXXXXX>

# Latex: Tables

- You should have a basic understanding about Latex tables, if you would like more advanced design in future

```
\begin{table}[ht!]  
\centering  
\caption{table caption}\label{tab:mytable}  
\begin{tabular}{|c|c|c|c|c|}  
\hline  
  & C1 & C2 & C3 & C4 & \\ \hline  
mean & 80.25 & 77.56 & 73.17 & 75.00 & \\ \hline  
q2 & 80.25 & 77.25 & 73.50 & 75.00 & \\ \hline  
std & 4.60 & 8.87 & 2.02 & 0.00 & \\ \hline  
\end{tabular}  
\end{table}
```

Table alignment

Table caption and label

Table column alignment and formats

1<sup>st</sup> row, table header

Regular rows with data

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---

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# Latex: Reference Management

```
\documentclass{article}

% Packages
\usepackage{graphicx} % For including graphics
\usepackage{algorithm} % For algorithms

% Document information
\title{My LaTeX Document with References}
\author{Your Name}
\date{\today}

\begin{document}

\maketitle

\section{Introduction}
This is the introduction section of my document.

\subsection{Subsection}
This is a subsection within the introduction.

\section{Another Section}
This is another section in the document.

% Insert citations where needed in your document
Smith's study-\cite{smith2010} provides valuable insights.

\bibliographystyle{ACM-Reference-Format} % Specify the bibliography style
\bibliography{sample-base} % Include your .bib file without the extension

\end{document}
```

## Reference Controls

- ACM-Reference-Format.bst, style file
- Sample-base.bib, raw list of references

# Latex: Reference Management

- .bib file
  - You need to put raw entries in .bib file
  - You can easily find the bib entries from Google Scholar

The screenshot shows the Google Scholar interface. At the top, the search bar contains the text "Multi-Objective Portfolio Optimization Towards Sustainable Investments". Below the search bar, the "Articles" section is visible. On the left, there are filters for "Any time" (with options: Since 2023, Since 2022, Since 2019, Custom range...), "Sort by relevance" (with options: Sort by date), and "Any type" (with options: Review articles). At the bottom left, there are checkboxes for "include patents" and "include citations". The main article entry is titled "Multi-Objective Portfolio Optimization Towards Sustainable Investments" by "Y Zheng, KN Shukla, J Xu, DX Wang, M O'Leary". The abstract text is: "The process of financial portfolio optimization involves choosing the most suitable mix of assets to meet a particular investment goal. Conventional portfolio optimization primarily focuses on maximizing returns and minimizing risks while overlooking the importance of social responsibility or sustainability in financial investments. In this paper, we present a Python-based multi-objective portfolio optimization library for sustainable investments (MOPO-LSI). MOPO-LSI is able to take Environmental, Social and Governance (ESG) ...". Below the abstract, there are buttons for "Save", "Cite", and "Import into BibTeX". A red arrow points from the "Import into BibTeX" button to the BibTeX entry on the right.

```
@inproceedings{zheng2023multi,  
  title={Multi-Objective Portfolio Optimization  
  author={Zheng, Yong and Shukla, Kumar Neelotpa  
  booktitle={Proceedings of the 6th ACM SIGCAS/S  
  pages={124--128},  
  year={2023}  
}
```

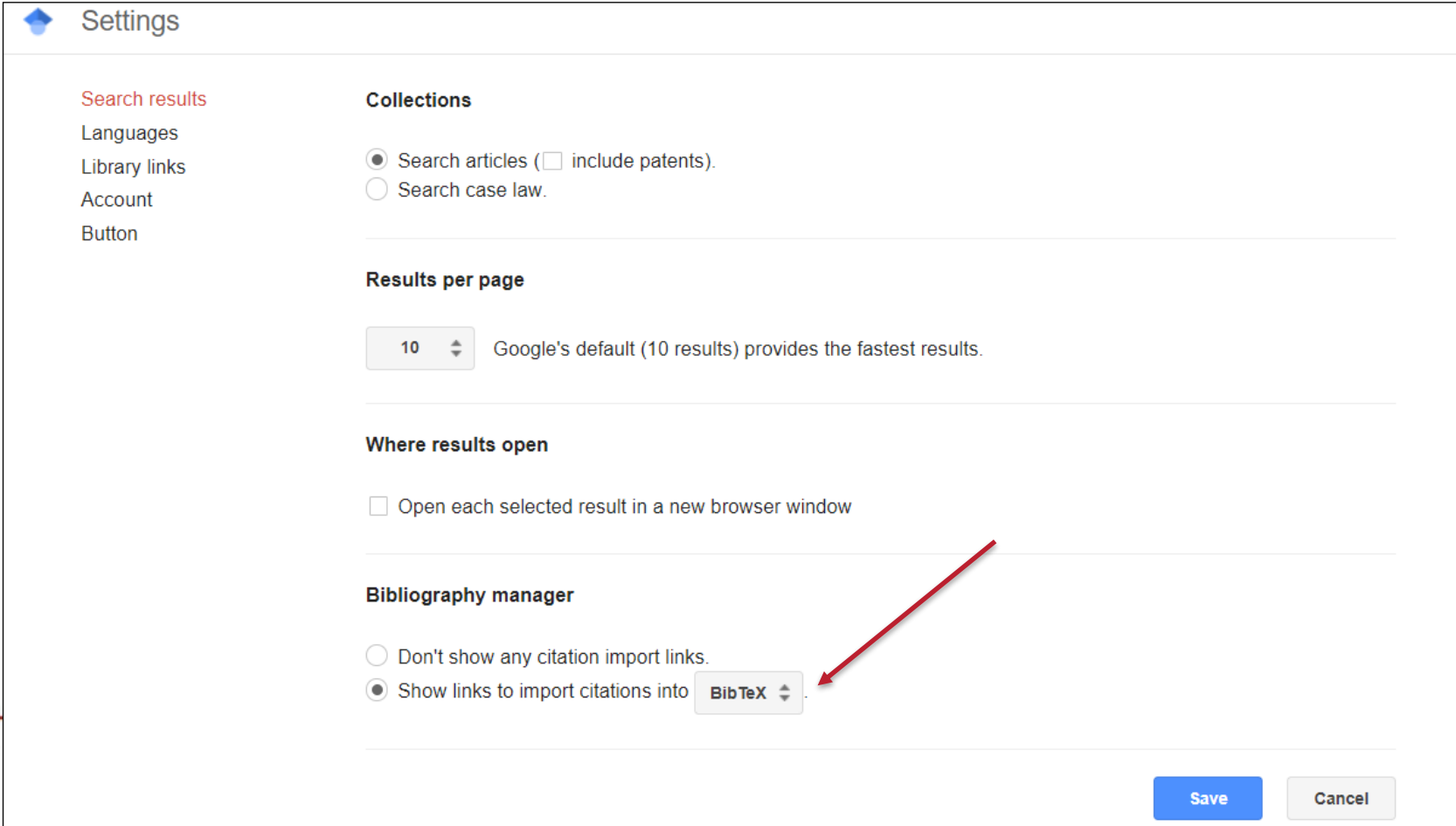
1. Click it

2. Get the entry

3. Put it in .bib file

# Latex: Reference Management

- Make sure that you turn on it in Google Scholar Settings



The screenshot shows the Google Scholar Settings interface. On the left, there is a sidebar with navigation links: Settings (with a blue diamond icon), Search results, Languages, Library links, Account, and Button. The main content area is divided into several sections: Collections, Results per page, Where results open, and Bibliography manager. In the Bibliography manager section, the option 'Show links to import citations into' is selected with a radio button, and the dropdown menu is set to 'BibTeX'. A red arrow points to the 'BibTeX' dropdown. At the bottom right, there are 'Save' and 'Cancel' buttons.

Settings

**Search results**

Languages  
Library links  
Account  
Button

**Collections**

Search articles ( include patents).  
 Search case law.

**Results per page**

10 Google's default (10 results) provides the fastest results.

**Where results open**

Open each selected result in a new browser window

**Bibliography manager**

Don't show any citation import links.  
 Show links to import citations into **BibTeX**

Save Cancel

# Latex: Reference Management

- How to cite a paper in paper content

- Find the key of the reference

- Use `\cite{key}` or `\citep{key}` in your texts

- Example: Dr. Zheng et al. `\cite{zheng2023multi}` proposed and built an open-source library for multi-objective portfolio optimization

```
@inproceedings{zheng2023multi,  
  title={Multi-Objective Portfolio Optimization  
  author={Zheng, Yong and Shukla, Kumar Neelotpa  
  booktitle={Proceedings of the 6th ACM SIGCAS/S  
  pages={124--128},  
  year={2023}  
}
```

- `\cite{}` Dr. Zheng et al. [39] proposed and built an open-source library for multi-objective portfolio optimization

- `\citep{}` Dr. Zheng et al. (Zheng et al., 2023) proposed and built an open-source library for multi-objective portfolio optimization

By using “article” as document class, and the “apelite” in bib style

# Latex: Reference Management

- By Using Overleaf
  - It is an online editor, where you do not need local Text distribution systems

The screenshot displays the Overleaf online LaTeX editor interface. On the left, a code editor shows LaTeX source code with line numbers 40 through 65. The code includes document class declarations, font settings, and copyright information. On the right, a settings menu is open, showing options for 'Auto Compile' (set to 'Off'), 'Compile Mode' (set to 'Normal'), and 'Syntax Checks' (with 'Check syntax before compile' checked). A red arrow points to the 'Recompile' button in the top toolbar, and the word 'Compiling' is written in red text next to it.



# Latex: Reference Management

- By Using Local Environment: MikTeX + Texmaker

- Special notes for references

- Run BibTeX first

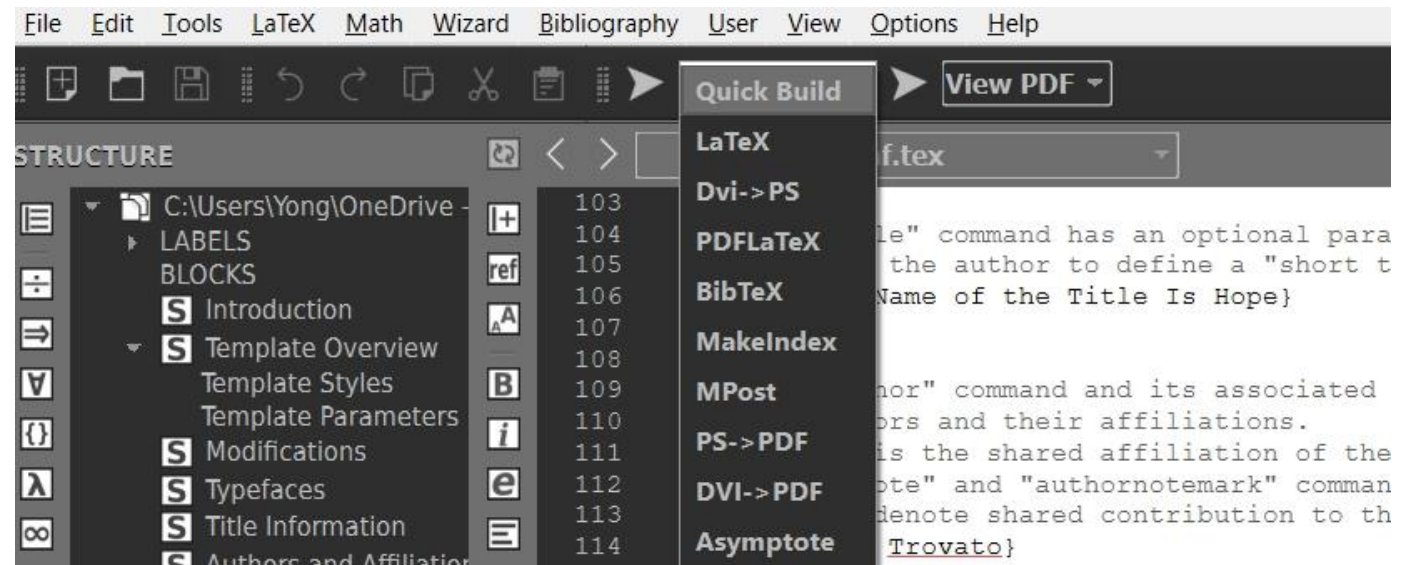
It will update .tex and .bib to produce new bbl file

- Run PDFLaTeX or QuickBuild

The actual changes will be updated on final PDF files

- You may need to run BibTeX + PDFLaTeX (or QuickBuild)

for several rounds in order to have updates of references in final PDF file



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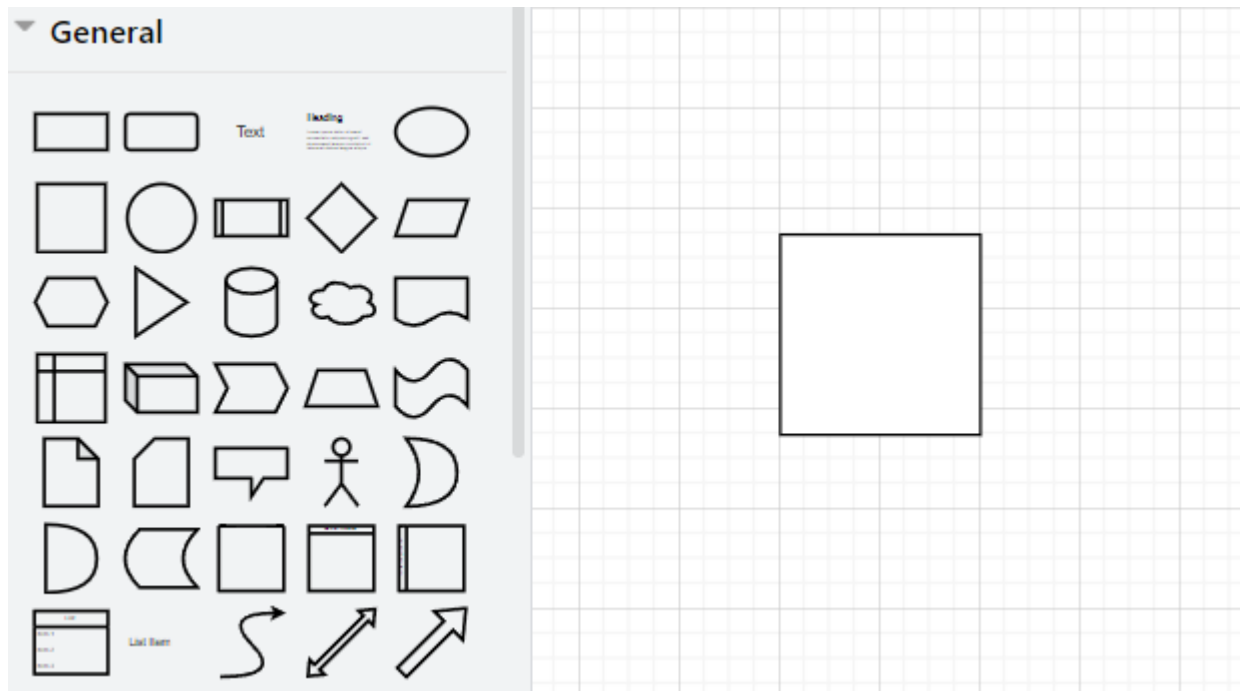
# Latex: Useful Tools

---

- Latex Tables, <https://www.tablesgenerator.com/>
- Latex Equations and Symbols, <http://www.hostmath.com/>
- Online Latex Editor, <https://www.overleaf.com/>
- Online Diagrams for free, <https://app.diagrams.net/>
- ChatGPT for advanced Latex coding, <https://chat.openai.com/>

# Latex: Useful Tools

Online Diagrams for free, <https://app.diagrams.net/>



# Latex: Useful Tools

ChatGPT for advanced Latex coding, <https://chat.openai.com/>

- Query: how to put three tables side by side in a same row?
- ChatGPT: example of coding..... (not shown here)
- Outputs by using sample coding from ChatGPT

Table 1: Table 1

|   |   |
|---|---|
| A | B |
| 1 | 2 |

Table 2: Table 2

|   |   |
|---|---|
| X | Y |
| 3 | 4 |

Table 3: Table 3

|   |    |
|---|----|
| I | II |
| 5 | 6  |

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida nauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus

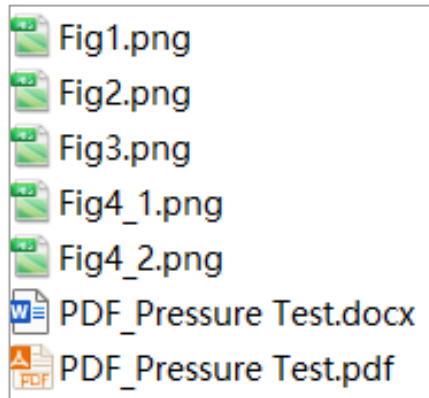
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# Hands-on Practice

- Website: <https://academicworkshops.github.io/Latex/>
- Hands-on Practice
  - Download the practice.zip file
  - Unzip it



- Convert the WORD file to Latex coding by using ACM two-column template

# Conclusions

---

- Latex writing is not difficult, especially we have several smart tools to help us. Using Latex actually can save time in formatting & revisions.
- Hopefully you have learned something useful from this workshop. Remember, ChatGPT is your best friend/instructor in future. I will still show around at the SIGITE conference.
- Now, I will move to my paper presentation, “[ChatGPT for Teaching and Learning: An Experience from Data Science Education](#)” at 3 PM. Welcome to join my talks.



# Academic Writing by Using Latex: A Hands-on Workshop

(Oct 12, 1:30 to 2:50 PM)

<https://academicworkshops.github.io/Latex/>

**Yong Zheng**

Center for Decision Making and Optimization  
Department of Information Technology and Management  
Illinois Institute of Technology, USA

