A Simple Guide to LaTex

Contents

0 - Installation

Windows

1. Download and install MikTex from the official website: http://miktex.org/download.
2. Choose a graphical editor, such as 'TeXstudio' (suggestion) and 'Winedt'
   TeXstudio: http://www.texstudio.org/.
   Winedt: http://www.winedt.com/.

Mac OS

1. Download and install MacTeX from official website: https://tug.org/mactex/.
2. Choose a graphical editor, such as 'TeXstudio' (suggestion) and 'TeXmaker'.

Linux

1. Install 'texlive' package.   `$ sudo apt-get install texlive-full`
2. Afterwards, you can use any text editor to follow along and compile the .tex files
   with the command line tool pdflatex.
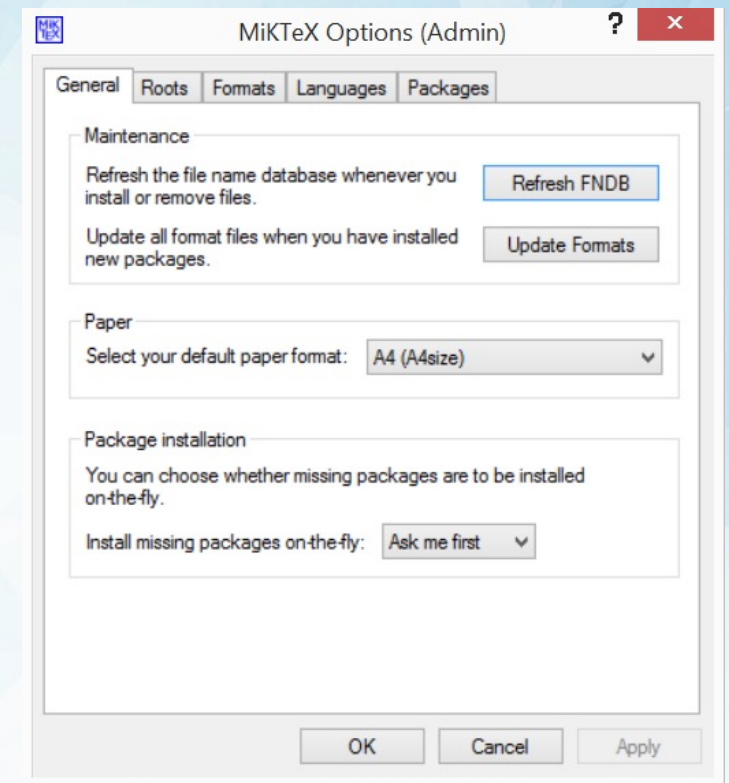Or use a graphical editor, such as 'TeXmaker' and 'TeXstudio'.

1 – Useful Packages

LaTex offers a lot of functions by default, but in some situations it can become in handy to use to called packages. Most of packages can be automatically installed by graphical editor when first is compiled. Otherwise, you can download from 'https://www.ctan.org/pkg?lang=en' and install manually.

Installation:

(1)   download packagename.tds.zip.

(2)   unpack the whole content directly into MikTex folder.

(3)   Find setting option from the start/program/MikTex/setting(Admin).

(4)   Execute Refresh FNDB and Update Formats.

Some commonly used packages are listed below:

(1)   Manipulation of figure: graphics, subfigure, float.

(2)   Manipulation of mathematics: mathtools, amsmath, times.

(3)   Manipulation of text: textcomp, lipsum.

(4)   Manipulation of algorithm: algorithm, algorithmic.

2 – Basics for Academic Papers

Load class file '**.cls' which goes into structuring your document.

Import exta packages

```
\documentclass{IEEEtran}

% add packages here
\usepackage{graphics}
\graphicspath{{Figures/} }
\usepackage[pdftex]{hyperref}
\usepackage{mathtools}

\begin{document}

\title{Title of Your Academic Paper}

\author{Author 1, Author 2, Author 3}% <-this % stops a space
\IEEEcompsocitemizethanks{\IEEEcompsocthanksitem
    Author 1 is with the Department
    of Electrical Engineering and Computer Science, Case Western Reserve University, Cleveland, OH 44106.
    \protect\\
    E-mail: ****@case.edu}% <-this % stops an unwanted space
\IEEEcompsocitemizethanks{\IEEEcompsocthanksitem
    Author 2 is with the Department
    of Electrical Engineering and Computer Science, Case Western Reserve University, Cleveland, OH 44106.
    \protect\\
    E-mail: ****@case.edu}% <-this % stops an unwanted space
}

\maketitle

\begin{abstract}
\input Abstract.tex
\end{abstract}

\begin{IEEEkeywords}
Key word 1; Key word 2; Key word 3
\end{IEEEkeywords}

\input Introduction.tex
\input RelatedWork.tex
\input Algorithm.tex
\input Experiment.tex
\input Discussion.tex
\input Conclusion.tex

\balance

\bibliographystyle{abbrv}
\bibliography{Reference}
\end{document}
```

Title
Authors
Abstract
Key words
Paper body
Author information
Reference

Title of Your Academic Paper

Author 1, Author 2, Author 3

Abstract—

*Index Terms—*Key word 1; Key word 2; Key word 3

I. INTRODUCTION

LaTeX is widely used in academia[2][3] for the communication and publication of scientific documents in many fields, including mathematics, physics, computer science, statistics, economics and political science. It also has a prominent role in the preparation and publication of books and articles that contain complex multilingual materials, such as Tamil, Sanskrit and Arabic[citation needed]. LaTeX uses the TeX typesetting program for formatting its output, and is itself written in the TeX macro language.

LaTeX can be used as a standalone document preparation system or as an intermediate format. In the latter role, for example, it is sometimes used as part of a pipeline for translating DocBook and other XML-based formats to PDF. The typesetting system offers programmable desktop publishing features and extensive facilities for automating most aspects of typesetting and desktop publishing, including numbering and cross-referencing of tables and figures, chapter and section headings, the inclusion of graphics, page layout, indexing and bibliographies.
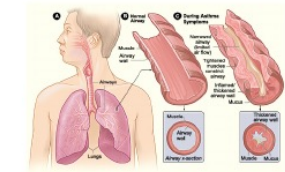
Fig. 1. Concept diagram of asthma formation [?]

Number	Spatial Resolution	Sample rate (fps)	Center frequency (MHz)	Data size (GB)
V01	640×480	25	2.22	1.92
V02	712×480	16	2.00	1.79
V03	712×480	17	1.82	1.87
V04	720×540	15	2.22	1.91
V05	720×540	15	2.22	1.87
V06	720×540	17	1.82	1.80
V07	500×480	14	2.22	1.10
V08	700×480	17	1.82	1.87
V09	700×480	16	1.82	1.64

TABLE I
INFORMATION OF THE PUBLIC DATASET

II. RELATED WORK

Cite a paper[1].

III. SYSTEM OVERVIEW

A. Subsection 1

Insert a figure 1 The energy function $F(c_1, c_2, C)$ is defined by

$$F(c_1, c_2, C) = \mu \int_{\Omega} \delta(\phi(x,y)) |\nabla \phi(x,y)| dxdy$$
$$+ \nu \int_{\Omega} H(\phi(x,y)) dxdy$$
$$+ \lambda_1 \int_{\Omega} |u_0(x,y) - c_1|^2 H(\phi(x,y)) dxdy$$
$$+ \lambda_2 \int_{\Omega} |u_0(x,y) - c_2|^2$$
$$(1 - H(\phi(x,y))) dxdy$$

B. Subsection 2

Primary steps of the algorithm are shown in Algorithm 1.

Algorithm 1 Chan-Vese active contour algorithm
/* Initialization */
Step 1: $\phi^0 \leftarrow \phi_0, n \leftarrow 0$.
/* Iteration */
Step 2: Compute $c_1(\phi^n)$ and $c_2(\phi^n)$.
Step 3: Solve the PDE in ϕ to obtain $\phi^n + 1$.
Step 4: Reinitialize ϕ locally to the signed distance function to the curve (this step is optional).
Step 5: If the solution is stationary, stop, otherwise go to Step 2.

IV. EXPERIMENT

More details about the dataset are in Table I. 'V01', 'V02', ..., 'V09' are the numbers of volunteers.

V. DISCUSSION

VI. CONCLUSION AND FUTURE WORK

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REFERENCES

[1] V. B. Patil, S. K. Patil, S. S. Patil, N. U. Patel, S. T. Patil, and S. P. Pawar. A brief introduction on asthma. *Pharma Science Monitor*, 5(2), 2014.

3 - Typesetting math

There are two major modes of typesetting math in LaTex. One is embedding the math directly into text by encapsulating your formula in dollar sings, and the other is using predefined math environment.

(1) Embedded in text with dollar signs:

```
This formula $f(x)=x^2$ is an example.
```

(2) The equation environment:

```
Formula~\ref{formula 1} is an example of citing formula.
\begin{equation}\label{formula 1}
f(x)=x^2
\end{equation}
```

(1)

Output →

Formula $\boxed{1}$ is an example of citing formula.

$$f(x) = x^2 \tag{1}$$

```
The energy function $F(c_1, c_2, C)$ is defined by\\
\begin{align*}
F(c_1, c_2, C) =&\mu \int_{\Omega}\delta(\phi (x,
y))|\bigtriangledown\phi(x, y)|{d}x{d}y\\
        &+\nu \int_{\Omega}H(\phi (x, y)){d}x{d}y\\
        &+\lambda _1\int_{\Omega}|u_0(x, y)-c_1|^2H(\phi
(x, y)){d}x {d}y\\
        &+\lambda _2\int_{\Omega}\mid u_0(x, y)-c_2\mid ^2\\
        &(1-H(\phi (x, y))){d}x{d}y\\
\end{align*}
```

Output →

The energy function $F(c_1, c_2, C)$ is defined by

$$
F(c_1, c_2, C) = \mu \int_{\Omega} \delta(\phi(x,y))| \triangledown \phi(x,y)|dxdy \\
+ \nu \int_{\Omega} H(\phi(x,y))dxdy \\
+ \lambda_1 \int_{\Omega} |u_0(x,y) - c_1|^2 H(\phi(x,y))dxdy \\
+ \lambda_2 \int_{\Omega} | u_0(x,y) - c_2 |^2 \\
(1 - H(\phi(x,y)))dxdy
$$

4 - Picture

Using LaTeX all pictures will be indexed automatically and tagged with successive numbers when using the figure environment and the graphicx package.

refer

```
Insert a figure~\ref{fig.Asthma}
\begin{figure}[h!]
    \centering
    \includegraphics[width=0.36\textwidth]{Aasthma.pdf}
    \caption{Concept diagram of asthma formation~\cite{NH}}
    \label{fig.Asthma}
\end{figure}
```

Set the exact position of figure in one page

Set the width

Label for referring

Caption under figure

Setting the float by adding [h!] behind the figure environment \begin tag will force the figure to be shown at the location in the document.

Possible values are:
- h(here)-same location
- t(top) - top of page
- b(bottom) - bottom of page
- p(page) - on an extra page
- !(override) - will force the specified location
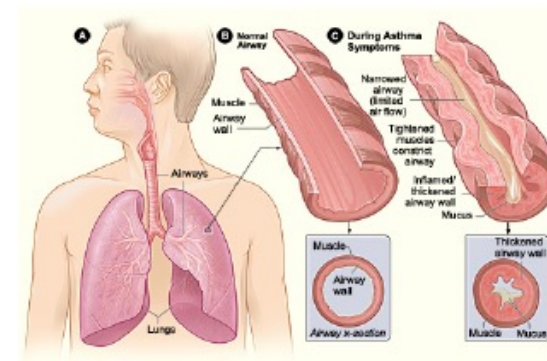- H - stricter than [h!]

Insert a figure [1]

Fig. 1. Concept diagram of asthma formation

5 – Table

The *table environment* merely holds our other environments and allows to add a caption to our table. The actual data is contained in the *tabular environment* and we center the table on the page using the center environment. You can program by yourself or generate LaTex code on this website:http://www.tablesgenerator.com/.

```latex
\begin{table}[H]
    \newcommand{\tabincell}[2]{\begin{tabular}{@{}#1@{}}#2\end{tabular}}
    \centering
    \caption{Technical specifications of Interson ultrasound imaging
    probe}
    \label{tab.Spec}
    \begin{tabular}{|c|c|}\hline
        Depth Range & \tabincell{c}{2-15 cm } \\\hline
        Pulse Frequency & \tabincell{c}{3.5-5MHz} \\\hline
        Frame Rate & \tabincell{c}{12 fps } \\\hline
        Scan Angle & \tabincell{c}{60 degrees } \\\hline
        Image Format & \tabincell{c}{Jpeg } \\\hline
        Image Size & \tabincell{c}{$1024\times600$} \\\hline
        Gray Scale & \tabincell{c}{256 shades } \\\hline
        Scanning Mode & \tabincell{c}{B-mode } \\\hline
    \end{tabular}
    \vspace{0.3 cm}
\end{table}
```

Center the table on the page →

Output →

TABLE I
TECHNICAL SPECIFICATIONS OF INTERSON ULTRASOUND IMAGING PROBE

Depth Range	2-15 cm
Pulse Frequency	3.5-5MHz
Frame Rate	12 fps
Scan Angle	60 degrees
Image Format	Jpeg
Image Size	1024×600
Gray Scale	256 shades
Scanning Mode	B-mode

6 - Algorithm

An example for algorithm:

```
Primary steps of the algorithm are shown in Algorithm 1.
\begin{algorithm}
\caption{Chan-Vese active contour algorithm}
\begin{algorithmic}
%\STATE
\STATE /* Initialization */
\STATE Step 1: $\phi^0\leftarrow\phi _0, n\leftarrow0$.
%\STATE
\STATE /* Iteration */
\STATE Step 2: Compute $c_1(\phi^n)$ and $c_2(\phi^n)$.
\STATE Step 3: Solve the PDE in $\phi$ to obtain $\phi^n+1$.
\STATE Step 4: Reinitialize $\phi$ locally to the signed distance
function to the curve (this step is optional).
\STATE Step 5: If the solution is stationary, stop,
\STATE \qquad \qquad otherwise go to Step 2.
\end{algorithmic}
\end{algorithm}
```

Output →

Primary steps of the algorithm are shown in Algorithm 1.

Algorithm 1 Chan-Vese active contour algorithm

/* Initialization */
Step 1: $\phi^0 \leftarrow \phi_0, n \leftarrow 0$.
/* Iteration */
Step 2: Compute $c_1(\phi^n)$ and $c_2(\phi^n)$.
Step 3: Solve the PDE in ϕ to obtain $\phi^n + 1$.
Step 4: Reinitialize ϕ locally to the signed distance function to the curve (this step is optional).
Step 5: If the solution is stationary, stop,
　　　　otherwise go to Step 2.

---

7 - Bibliography and Footnotes

All the bibliographic information needs to be contained in .bib files. After creating the bibtex file, we have to tell LaTeX where to find our bibliographic database. For BibTeX this is not much different from printing the table of contents. We just need the commands \bibliography which tells LaTeX the location of our .bib file and \bibliographystyle which selects one of various bibliographic styles.

For example:
```
\bibliographystyle{abbrv}
\bibliography{Reference}
```

In the Reference.bib, the referred paper should be in the following format and cited by '\cite{Varsha:2014}':

```
@article{Varsha:2014,
    title={A BRIEF INTRODUCTION ON ASTHMA.},
    author={Patil, Varsha B and Patil, Shweta K and Patil, Sanjivani
    S and Patel, Nilam U and Patil, Sunila T and Pawar, Sunil P},
    journal={Pharma Science Monitor},
    volume={5},
    number={2},
    year={2014}
}
```

Hint: your can search the paper you want to cite in your paper on Google Scholar. It provide citation in LaTex format.


```
@article{patil2014brief,
    title={A brief introduction on asthma},
    author={Patil, Varsha B and Patil, Shweta K and Patil,
    journal={Pharma Science Monitor},
    volume={5},
    number={2},
    year={2014}
}
```

8 – Great tools

1. Online LaTex Equation Editor: https://www.codecogs.com/latex/eqneditor.php

2. Google Scholar Button Extension: This extension adds a browser button for easy access to Google Scholar from any webpage.
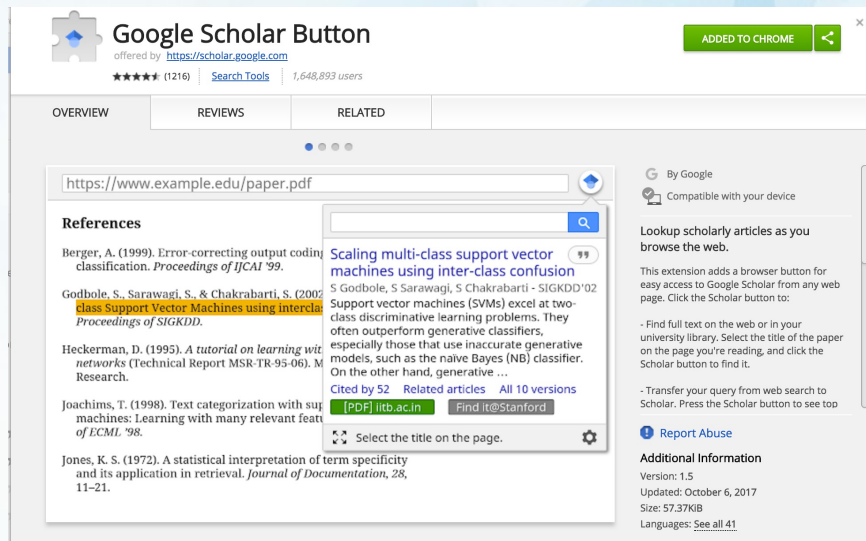
By installing this extension, you agree to the Google Terms of Service and Privacy Policy at https://www.google.com/intl/en/policies/.