Latex Technical Guide By Me

H.W. Jordaan

July 6, 2020

What does this guide contain?

LaTeX is a powerful tool to generate beautifully styled documents. It can be very intimidating and confusing when constructing your first document. The first time you apply it, it will feel as if the basic things will take forever. A common concern is: "How will I ever remember all these commands?" This is normal, and I can tell you that there is light in that very dark tunnel.

The aim of this guide is to not cover the basics - that is what the internet and YouTube is for. Rather, this document will give you hints how to do certain common parts, and also share best practices, when you are constructing a formal academic document such as a research report, research paper or thesis.

The majority of this document should not be read from the start to the end, but should rather serve be referred to while writing and want advice in how to do a certain thing. Each section of this guide will try and cover a single question or component.

When should I use LaTeX?

Some converts will say: "It the best thing ever. For everything of course." Some others which are intimidated or have not have a good start relationship will respond: "It is too complex! Just use Word."

Well the fact is that LaTeX is not commonly used in industry and is mainly reserved for the small community of researchers and academics of the world. I believe LaTeX shines when your document fulfils in the following characteristics:

1. Will be very large - 100 plus pages
2. Will have a large number of mathematical equations
3. Will contain a large number of references and citations

If your are new to LaTeX or are looking for information for doing something simple please refer to the YouTube videos within the following channels:

- https://www.youtube.com/user/mrskrummel
- https://www.youtube.com/playlist?list=PLNnwglGGYoTtW7o4PHFOSWGevcdFa3v3D
- https://www.youtube.com/user/ShareLaTeX
- https://www.youtube.com/channel/UC3gO3p5rBvmTpPHp0xHMluQ

Which editor should I use?

This is simple. It does not matter. There are many IDEs for writing LaTeX: TexStudio (suggested), TexLive, TeXnicCenter, Kile or just a standard text editor. These tools have variable difficulty to setup, but when installed everything runs on your local machine and compiling is as fast as your system can do it.

Another option is to make use of an online platform such as Overleaf (suggested) or ShareLatex. These tools are great if you are new to LaTeX, want to share and work together on a document with someone and want a cloud-based solution. The drawbacks are that this method is less useful for when document gets larger (compile time increases), you always need internet connectivity and it is more awkward to upload pictures.

Final opinion: If this is your first time using LaTeX or want to write something small such as an article with or without collaborators use an online platform. Larger documents such as a thesis (Masters or PhD) you should start looking at a local installation.

Is there a right way to write the source?

Well simply if it compiles then it is probably okay. There are a number of suggestions for when the document get really big or when you are collaborating with other people. Here follows a list of the highlight real:

-

How to handle figures

This is probably the thing I have spent the most of my LaTeX writing time, and have tried a number of different methods. Yes, you can simply just generate a plot in Matlab, export a .png and import it. If you want to exploit the power of LaTeX there is a little bit more to it to really get that next level picture or graph. If you want to do it right you will need to

be prepared to put in the time in, but the result will be beautiful and the readers will fall to the floor when they turn that page. The basic concerns when creating a figure is:

1. Resolution - in this regards vector based is always better and provide a balance between quality of rendering and size of image.
2. Size - figures with font normally scale with the rest of the figure thus relative size of fonts in figure and rest of text changes
3. Repeatability - consistently create multiple graphs and diagrams which have the same size and style
4. Effort - process must not be over time consuming and too clicky-clicky (queue mouse button sound)

In most documents you will be faced with three possible figures which will be discussed separately:

1. Pictures
2. Diagrams
3. Graphs

How to handle pictures

`https://youtu.be/GaI1RdFNtA8`

- Vector-based drawing in Inkscape
- Inkscape is cross-platform
- Copy in image from Google and trace over with line in Inkscape to get good realistic pictures
- Labels and text use Latex notation
- Save image as Pdf but with the Text output options *Omit text in PDF and create LaTeX file*
- Include the generate .tex file in the document source.

How to handle diagrams

- Use Inkscape to create diagram, similar to process described to create a picture
- Use Tikz to generate your block diagram

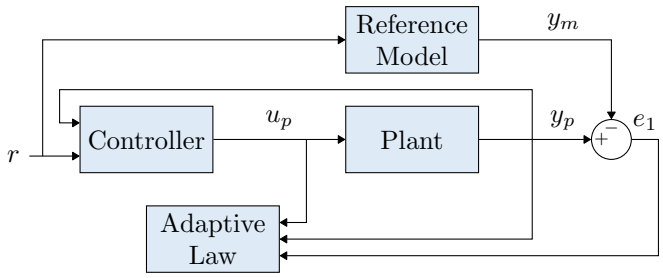

Figure 1: This is an example of a good diagram.

How to handle graphs

`https://youtu.be/JgXukrKZ9X8?list=PL5fGdFBgOr6N9w2YLk-T623YQAcnqtcYt`

- Generate the figure in Tikz
- Have the graph data in .csv files

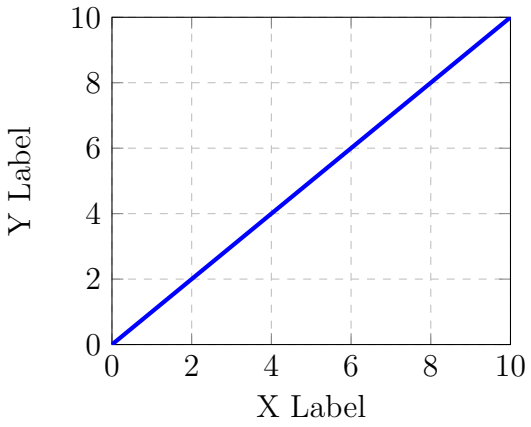

Figure 2: This is an example of a good graph.

Fixing the compile time of these figures