UT-Thesis Class File Example

by

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A thesis submitted in conformity with the requirements
for the degree of Master of Science
Graduate Department of Biology
University of Toronto

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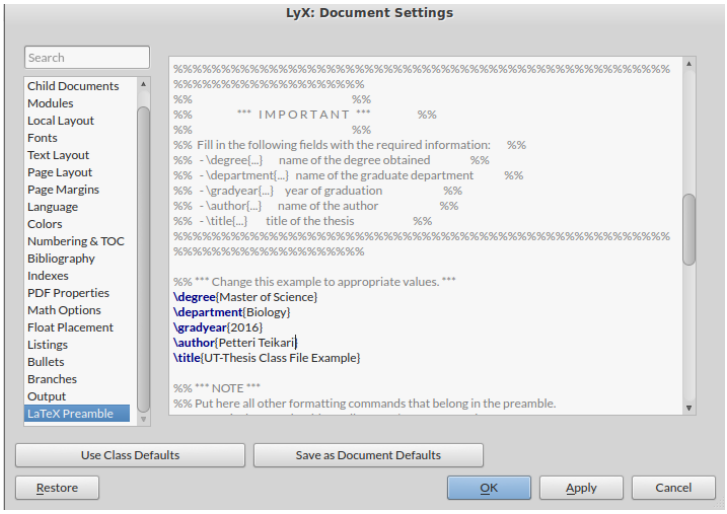

Figure 1: Preamble defining name, department, graduation year, etc. (Document -> Settings)

Abstract

Title: LyX basic functionality

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Master in LaTeX/LyX
Graduate Department of Computer Software Tutorials
University of Toronto
2015

*** Put your Abstract here. *** (At most 150 words for M.Sc. or 350 words for Ph.D.)

Note! The fields for the very first page are defined in the preamble of UT-THESIS.LYX

*** Put your Dedication here. ***

Acknowledgements

Additional software recommended by Petteri:

- Zotero, https://www.zotero.org/
- LyZ Firefox plugin for Zotero, https://addons.mozilla.org/en-US/firefox/addon/lyz/

Contents

List of Figures

List of Tables

Chapter 1

Software setup

1. Install LyX with the MikTeX bundle (especially if you don't know what that means, as the MikTeX install TeX and LaTeX macro extensions)

2. If you are using Zotero, install LyZ to your Firefox as well

3. Configure the LyX pipes for both LyX and LyZ, see Figure 1.1 on page 2 for Ubuntu/Mac. If you are using windows use \\.\pipe\lyxpipe

1.1 Some tutorials and resources

1.1.1 The LyX Tutorial - by Amir Karger and the LyX Team

http://www.fnal.gov/docs/products/lyx/Tutorial.tex.html

This file is designed for all of you who have *never heard of LaTeX*, or don't know it very well. Now, don't panic - you won't need to learn LaTeX to use LyX. That is, after all, *the whole point of LyX*: to provide an almost-WYSIWYG interface to LaTeX. There are some things you will need to learn, however, in order to use LyX effectively.

1.1.2 Essentials of LyX by Stephen Wolff and Liviu Andronic

http://wiki.lyx.org/uploads/LyX/tutorials/essentials/LyX_Essentials.pdf

This document is intended to provide an overview of the essential features and functions of LyX, to give you a basic working knowledge of the software, and to enable you to begin typesetting beautiful documents with the powerful LaTeX system. It also discusses some of the more advanced topics and potential issues that you will invariably encounter when creating LyX documents

1.1.3 LaTeX Style and BiBTeX Bibliography Formats for Biologists: TeX and LaTeX Resources

http://www-lmmb.ncifcrf.gov/%7Etoms/latex.html

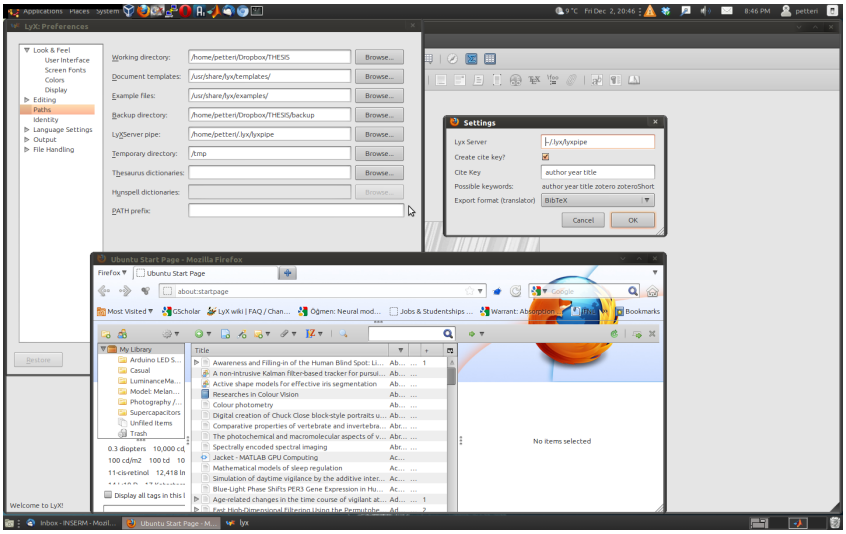

Figure 1.1: Setting the LyX pipes to LyXServer. **(top-left)** LyX : Tools - Preferences - Paths, and after change do Tools - Reconfigure. **(top-right)** LyZ configuration from **(bottom)** clicking LyZ icon and clicking Settings there. Replace both paths with "\\.\pipe\lyxpipe" if you are using Windows use (for details see: https://addons.mozilla.org/en-US/firefox/addon/lyz/ and http://wiki.lyx.org/LyX/LyXServer).

1.1.4 LaTeX: More Than Just Academic Papers and Theses

http://liantze.penguinattack.org/latextypesetting.html

Lim Lian Tze: "I prepared these slides for a talk at MOSC2011. It isn't a tutorial, rather I wanted to give *teasers* of what LaTeX is capable of beyond the usual journal or conference articles."

1.1.5 Misc

Thesis styles

http://wiki.lyx.org/Examples/Thesis, although UoT has decided this for you (http://www.sgs.utoronto.ca/currentstudent

Midnight Radio: How to import a new citation style in LyX

http://onthemidnightradio.blogspot.com/2011/02/how-to-import-new-citation-style-in-lyx.html

Converting Excel tables into LaTeX tables

CTAN http://www.ctan.org/tex-archive/support/excel2latex

Multiple and sectioned bibliographies

http://wiki.lyx.org/BibTeX/Tips#secbib

Chapter 2

First chapter

2.1 First section

That was done by sample citation from [4]

Theorem 1. *You might need to introduce custom hyphenations for some scientific terms that the system do not know how to hyphenate properly, from* `ut-thesis-extra.module` *:*

```
% custom hyphenation patterns
\hyphenation{cen-tro-sym-me-tric gra-phe-ne photo-ex-ci-ted pseu-do-ten-sor
    wave-vec-tor}
```

You probably need to add a lot of custom words as well to your Spellchecker.

If you have mixed languages, e.g. your default language is English (USA), and then you copy+paste from somewhere text that has English (UK) you get this blue underlining in Figure 2.1 on page 4.

Standard figure cross-referenced (see Figure 2.3 on page 4). For everything (sections [e.g. Section 2.1], subsections, paragraphs, tables, figures, etc.) you have to create **labels manually** so that they can be cross-referenced whereas in Word you could cross-reference directly headings, tables, etc. This is done by Insert - Label, and then you can do Insert - Cross-Reference.

Petteri: I typically use Formatted Cross-Reference for all cross-referencing so if you don't like how the formatting is now, you can tweak the Preamble (or in the case of UoT document, there are some definitions in `ut-thesis-extra.module` and probably UoT wants to have certain way how you cross-reference from text and you can't tweak that for your thesis). Note also that there are **ugly bounding boxes** now around the cross-references and hyperlinks, not sure how UoT wants them to be, but you could tweak the `hyperref` settings in `ut-thesis-extra.module` to remove them, see http://tex.stackexchange.com/questions/823/remove-ugly-borders-around-clickable-cross-references-and-hyperlinks.

At the moment the ugly bounding boxes are removed with the `hypersetup` in preamble, otherwise the paragraph above would look like in Figure 2.2 on page 4.

Some text from where you wanna cite Nimmerjahn again maybe [5]. And if you have multiple citations you can cram them to the same citation "box" like [4, 5] (from Zotero you just keep inserting new citations and they be merged to same field if you don't move your cursor meanwhile)

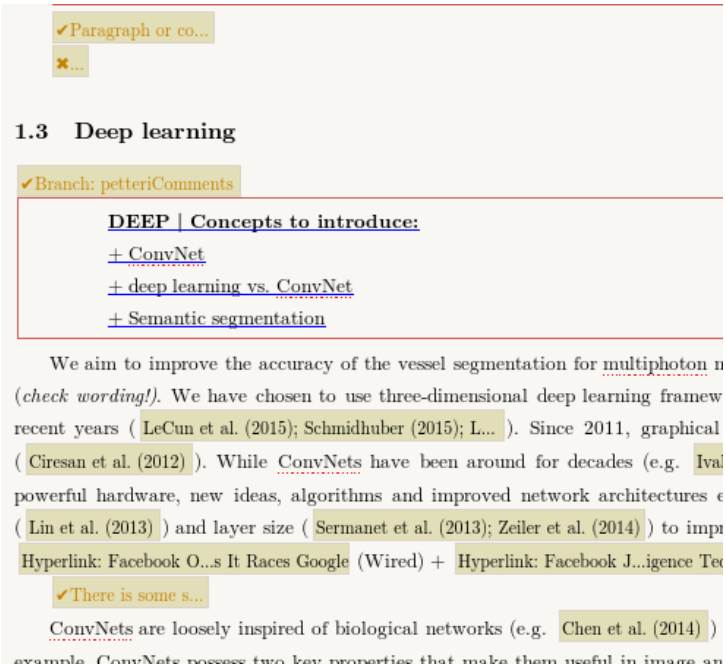

Figure 2.1: Language conflict (see the blue underline)

Standard figure cross-referenced (see Figure 1.1 on page 1). Petteri: I typically use Formatted Cross-Reference for all cross-referencing so if you don't like how the formatting is now, you can tweak the Preamble (or in the case of UoT document, there are some definitions in `ut-thesis-extra.module` and probably UoT wants to have certain way how you cross-reference from text and you can't tweak that for your thesis). Note also that there are **ugly bounding boxes** now around the cross-references and hyperlinks, not sure how UoT wants them to be, but you could tweak the `hyperref` settings in `ut-thesis-extra.module` to remove them, see http://tex.stackexchange.com/questions/823/remove-ugly-borders-around-clickable-cross-references-and-hyperlinks

Some text from where you wanna cite Nimmerjahn again maybe [2]

Figure 2.2: Ugly bounding boxes for cross-references and hyperlinks. Not sure what UoT wants to be used for your thesis (size 70% of column width with no `centerline` tag (centers the figure horizontally)

A text in a box. A text in a box. A text in a box.
A text in a box. A text in a box. A text in a box.
A text in a box. A text in a box. A text in a box.

Figure 2.3: A standard figure. **NOTE!** This **Figure Float** contains the field **"Short Title**" and its entry to the **"Table of Figures"** does not look as **awful** as it does for some other longer caption Floats**!**

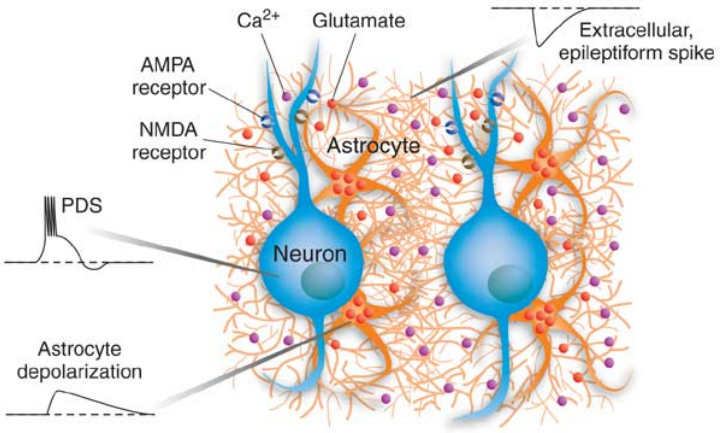

Figure 2.4: Another standard figure.

2.1.1 Subsection

Subsubsection

Some equation if you want to cite from text, see 2.1. When talking about parameters such as A you should use the Math mode (Ctrl+M) in text as well to comply with the Math symbols in italics.

$$A = b_i \times c^2 \tag{2.1}$$

Paragraph I like to personally use "Branches" that can contain your "literature skeleton" for example for each section / paragraph or however you wanna split them. For example:

Paragraph of previous methods for imaging tumor vasculature .. .continues .. and continues... or it does not continue, but you want to start putting references to your thesis already way before you actually start writing to make the task a lot easier in the end as you slowly pile up references and themes to talk about?

> Citation that you really liked [1], something that contains some parameter estimates that you want to save for further reference, and so that you find it easy again when it is time to write [6]. Now inside of this branch, we are using "Quote" style for example. And you can just deactivate this branch when you are compiling the final PDF to be submitted to UoT or to your supervisor. See e.g. Figure 2.5 on page 6.
>
> Other branch with "Quotation" style that could contain comments about paragraphs that are shorter than literature quotes, that you might want to pass for supervisor but not to UoT.

Subparagraph More text here with a reference to a table maybe (see Table 2.1 on page 6)

To see the Outline (View - Outline Pane) of all different levels of TOC, drag the slider to the right (see Figure 2.6 on page 7)

If you want to see the LaTeX source while writing, toggle on the Source Pane (View - Source Pane, Figure 2.7 on page 7)

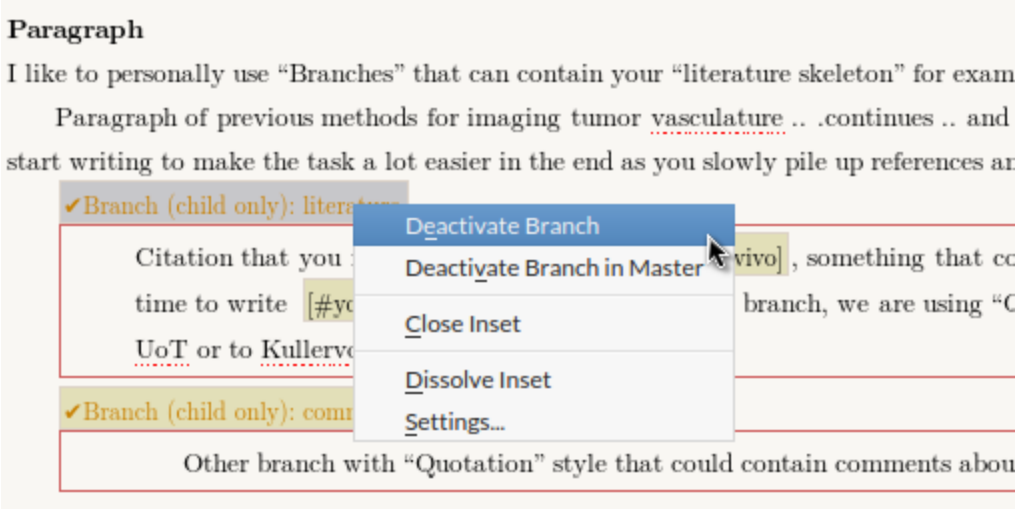

Figure 2.5: Deactivating branches (meaning that they won't be included in the PDF, now the Master is ut-thesis that has the Include of this chapter.

Table 2.1: Standard table.

1	2	3
1a	2a	3a
1b	2b	3b

If you wanna include some Matlab (or whatever language) code to your document, you can "Include" it (linking to the file, Insert - File - External Material) rather than copy+paste (which you can do as well, but then you have to do it every time again and again if you change the code). See example:

```
function sampleMatlabFile()

    % Time specifications:
    Fs = 20000;                    % samples per second
    dt = 1/Fs;                     % seconds per sample
    StopTime = 2;                % seconds
    t = (0:dt:StopTime-dt)';       % seconds

    % Sine wave:
    Fc = 25;                       % hertz
    y = sin(2*pi*Fc*t);

    % AM
    Fc2 = 1;
    y2 = sin(2*pi*Fc2*t);

    % rectify
    y = y - min(y(:)); y = y / max(y);
    y2 = y2 - min(y2(:)); y2 = y2/max(y2);

    close all
    figure('Color', 'w')

     hold on
     p = plot(t, y2, t, y.*y2);
         set(p(1), 'LineWidth', 4, 'Color', 'k')
         set(p(2), 'Color',[0.043 0.51 0.78]);

```

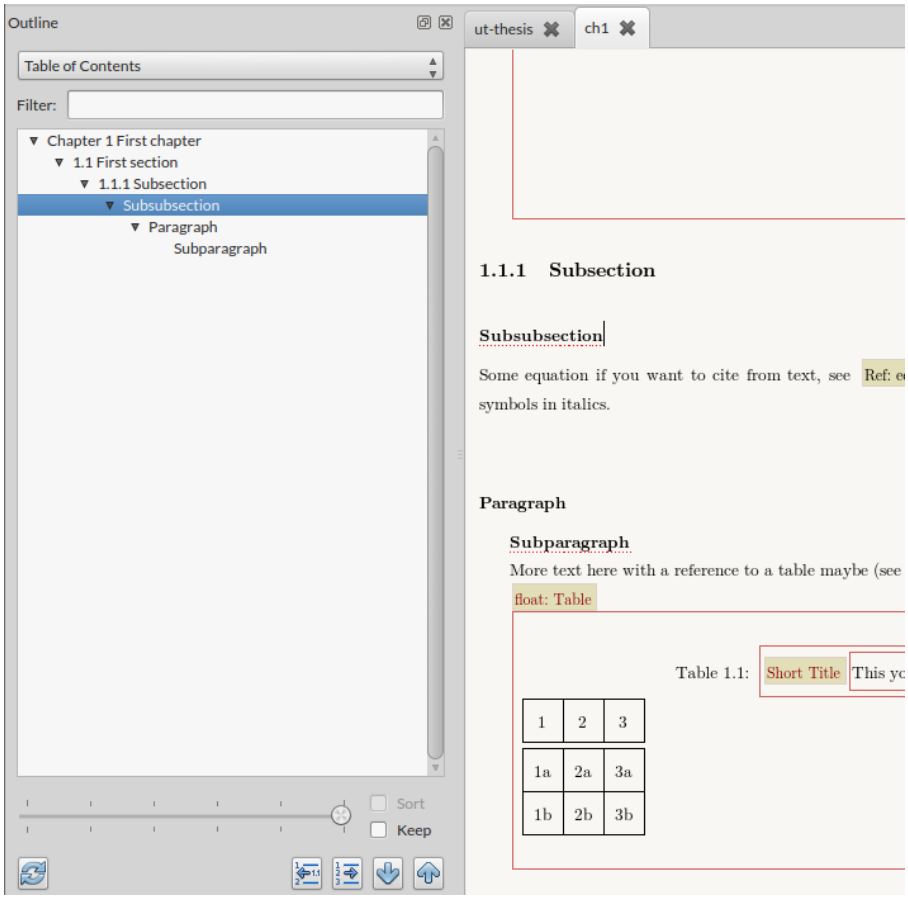

Figure 2.6: Control the outline depth

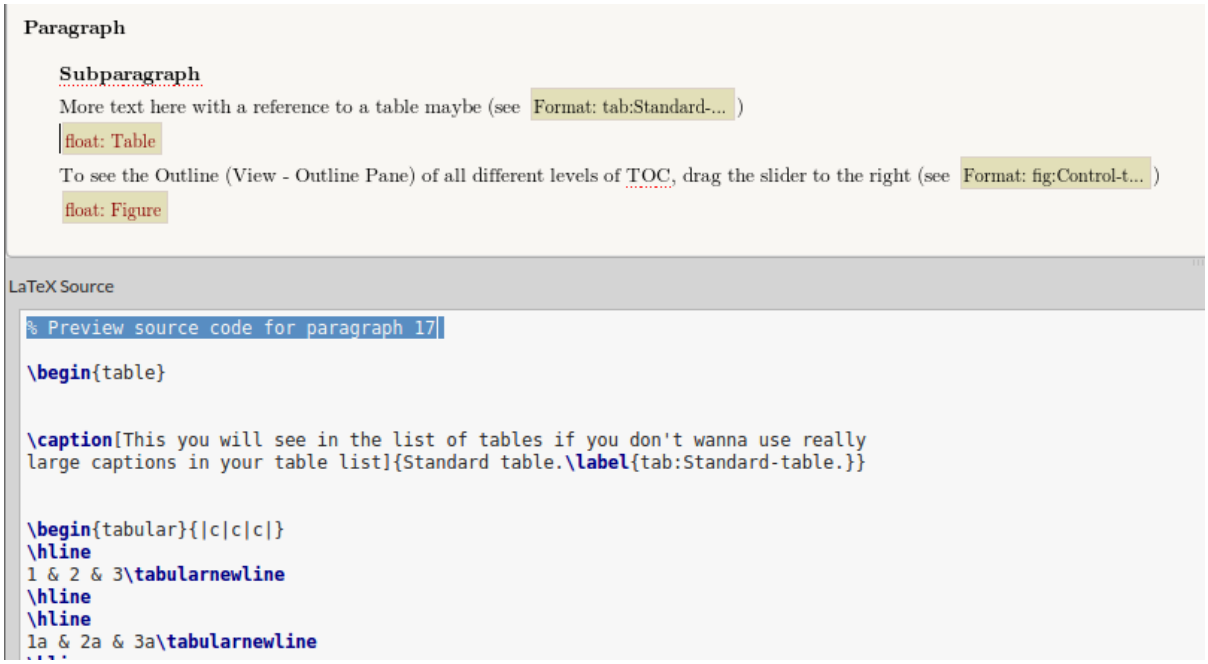

Figure 2.7: LaTeX source while writing

Algorithm 2.1 This is inside an Algorithm Float now, the TEX preamble part for styling your Matlab code (listings). There is also mcode package specifically for Matlab code. And then if you start adding R code or something else, you can add definitions of that code to your main preamble (UT-THESIS.LYX in our case that Includes all the chapters etc.). At the moment this was just copy+pasted to preamble, but you could add it to `ut-thesis-extra.module` instead of the preamble of UT-THESIS.LYX. Now also the TEX code styling is manually defined by Right Click - Settings -> for this listing which is kinda cumbersome if you have a lot of listing and you want to have global styling.

(2 × forced linechange here, Ctrl+Enter) Likewise you could include **LATEX tables** in the text that were generated for example by your analysis scripts. That way you could start including your results right away, and if you update your code, get new data, or something that results table would be automagically updated rather than you having to copy+paste it every time as an Excel table or something equally cumbersome. See for example Contingency tables in R, or use `stargazer` for beautiful tables, http://www.r-statistics.com/2013/01/stargazer-package-for-beautiful-latex-tables-from-r-statistical-models-output/. For Matlab see for example latexTable (https://github.com/eliduenisch/latexTable).

```
\usepackage{listings}
\usepackage{color} %red, green, blue, yellow, cyan, magenta, black, white
\definecolor{mygreen}{RGB}{28,172,0} % color values Red, Green, Blue
\definecolor{mylilas}{RGB}{170,55,241}

\lstset{language=Matlab,%
    basicstyle=\scriptsize\ttfamily,%
    breaklines=true,%
    morekeywords={matlab2tikz},
    keywordstyle=\color{blue},%
    morekeywords=[2]{1}, keywordstyle=[2]{\color{black}},
    identifierstyle=\color{black},%
    stringstyle=\color{mylilas},
    commentstyle=\color{mygreen},%
    showstringspaces=false,%without this there will be a symbol in the places where there is a space
    numbers=left,%
    numberstyle={\tiny \color{black}},% size of the numbers
    numbersep=9pt, % this defines how far the numbers are from the text
    emph=[1]{for,end,break},emphstyle=[1]\color{red}, %some words to emphasise
    %emph=[2]{word1,word2}, emphstyle=[2]{style},
}
```

```
        tit = title('AM Ultrasound');
        lab(1) = xlabel('Time'); lab(2) = ylabel('Amplitude');
        set(gca, 'YLim', [0 1.02])

    set(gca, 'FontSize', 9)
    set(tit, 'FontSize', 10, 'FontWeight', 'bold')
    set(lab, 'FontSize', 9)
```

And then you want to add the following definition to your Preamble (you can for sure edit it as you wish). **Note!** When pasting TEX definition (e.g. Matlab styling for preamble, 2.1) or any other multi-line "non-text" documents, you should paste it as Plain Text (`Ctrl+Shift+V` (typewriter/monospaced text with \TEXTTT{}), Paste Special - Plain Text) so that the line changes are not gone)

2.2 Packages

Using packages in LATEX is a bit similar for example to Python. You first need to have those packages installed on your machine that might not be included in your standard MiKTEX installation. And then you need to explicitly define at the start of your document, which packages you will be using.

The normal syntax is:

```
\usepackage{listings}
```

And you can pass input arguments inside `[]` for example:

```
\usepackage[hidelinks]{hyperref}
```

And after the import you can normally set the parameters still, like with this template the `hyperref` (that package styles how all the cross-references and citations from the text look) is tweaked with the following line in the preamble of the master:

```
\hypersetup{hidelinks,backref=true,pagebackref=true,hyperindex=true,colorlinks=
    false,breaklinks=true,urlcolor= blue,bookmarks=true,bookmarksopen=false,
    pdftitle={book title},pdfauthor={book author}}
```

2.3 Tips

Compiling often

Try to compile to PDF rather frequently to make sure that you don't add anything weird. If you just write the whole day and compile once-a-day it is harder to figure out what you did wrong to cause some PDF compilation error (e.g. Figure 2.8 on page 10) instead of compiling many times a day. Especially important if you are a beginner with the software.

Advanced replace

You can also do "Replace" with styling, or replace all "textual" greek letters to LaTeX notations, etc with Edit - Find & Replace (Advanced) for changing all non-italic et al. instances to italic et al. for example (Figure 2.9 on page 11).

Version control with git

If you like, you can do version control with Git () that some people found useful when writing their theses, e.g. Using Git for writing thesis [StackOverflow] and How do I use Git in LyX 2.1 (Quora)?. Might be useful practice to use Git with your thesis as well if you are developing code as well and you have been thinking of being more organized and starting to push your code to GitHub for example ([2, 3])

2.4 Troubleshooting

You can do "headings" with no numbering using the unnumbered section in styles (Figure 2.11 on page 12) marked with *.

Missing bibliographic entry

If you get problems with bibliography, and some entry is not found, you will get a **?** in the text (Figure 2.12 on page 12) as LyX cannot found that bibliographic entry from the `.bib` file. In practice this is probably due to same change in database and you need to run "Update BibTeX" in LyZ if you try

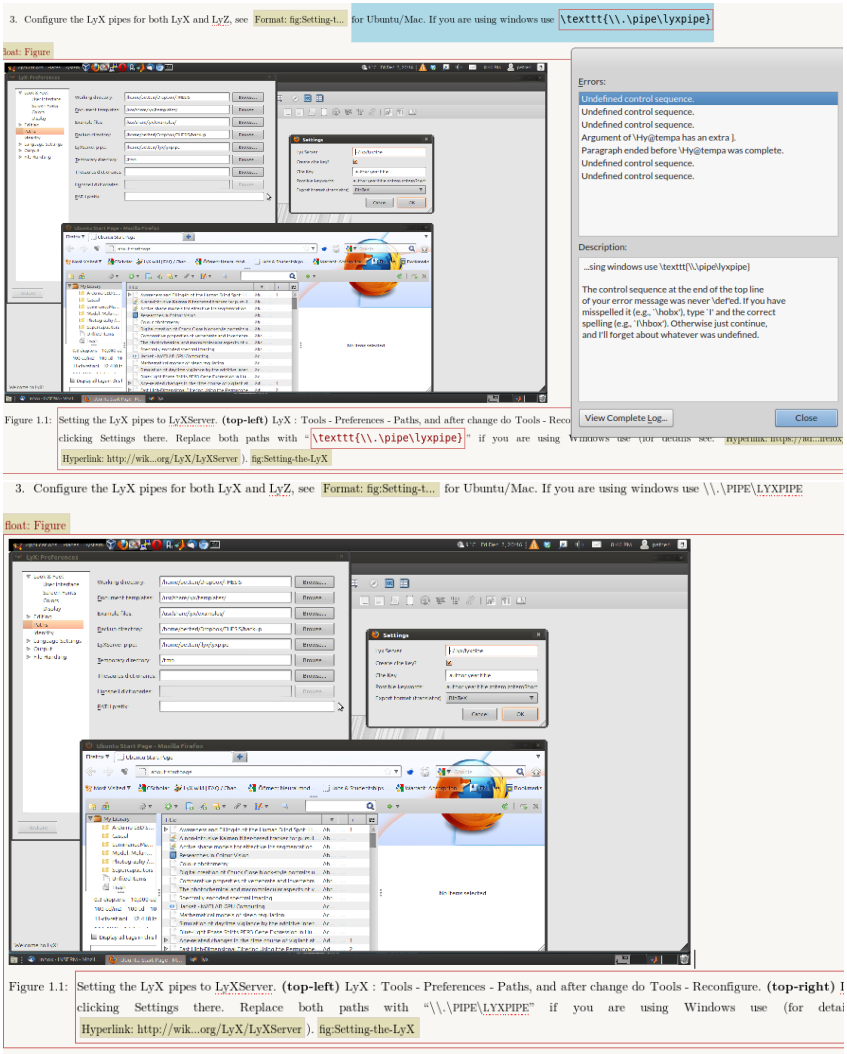

Figure 2.8: **(top)** Compilation error. **(bottom)** Error fixed as the "\\" in LaTeX means line change, and "\" is used as a TeX tag.

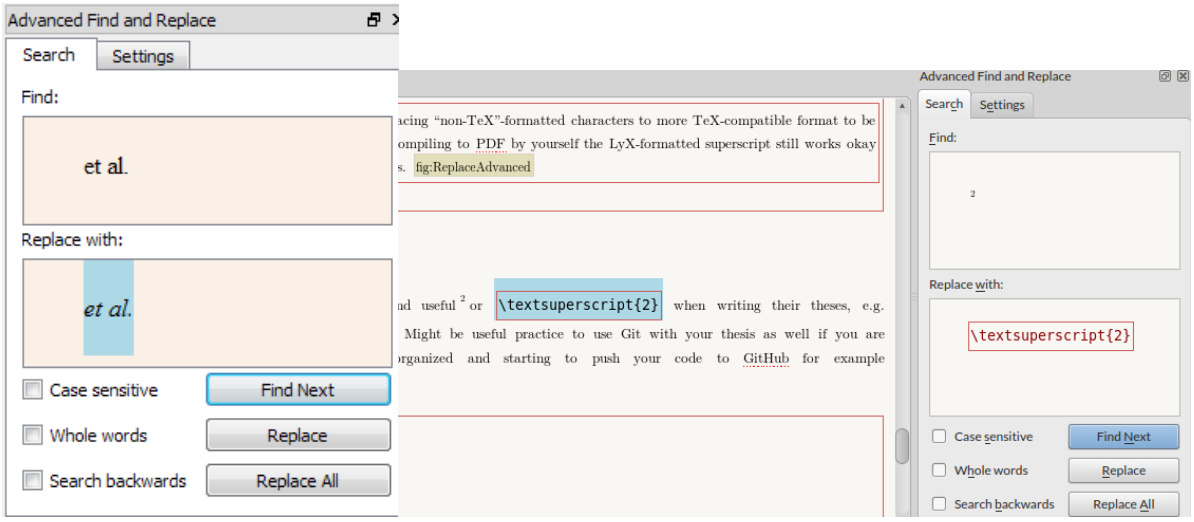

Figure 2.9: **(left)** Replacing so that only the styling is changed, **(right)** Replacing "non-TEX"-formatted characters to more TEX-compatible format to be compatible with journal submissions for example. If you are only compiling to PDF by yourself the LYX-formatted superscript still works okay but not might be supported by TEX->PDF engines used by publishers.

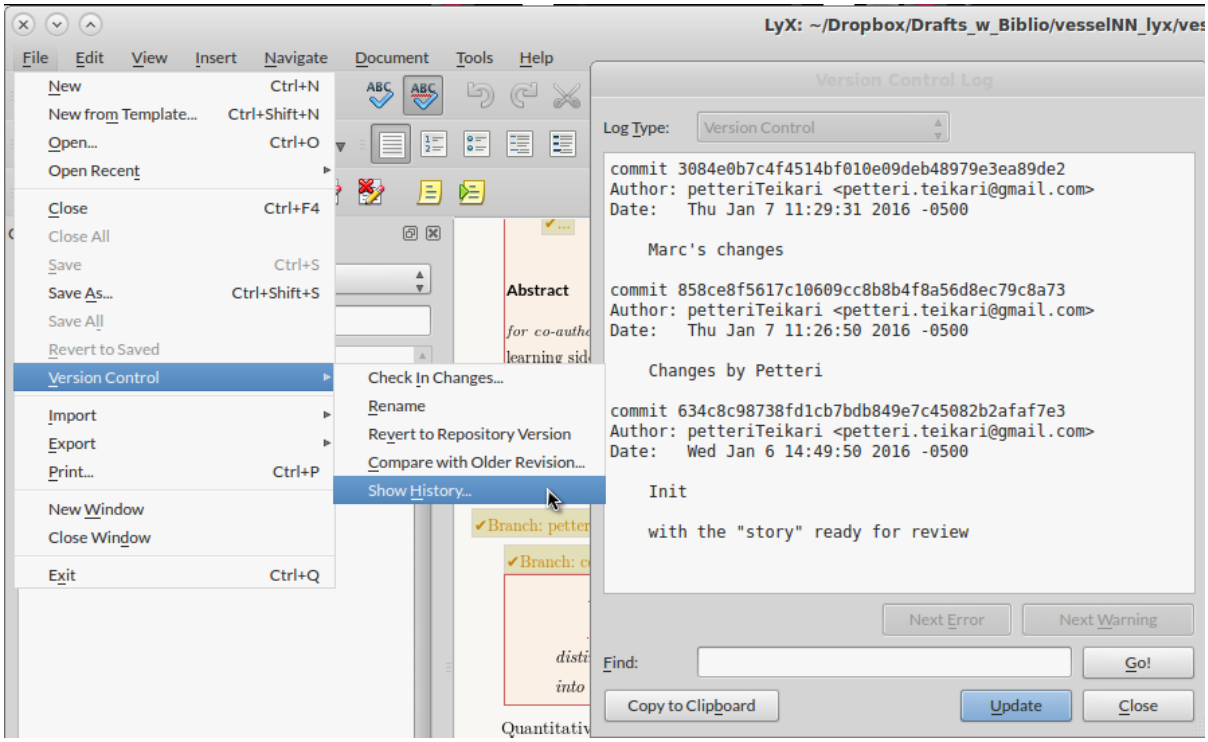

Figure 2.10: Version control with Git integrated to LYX so you do not need necessarily an external program such as Git Cola, or plain terminal calls.

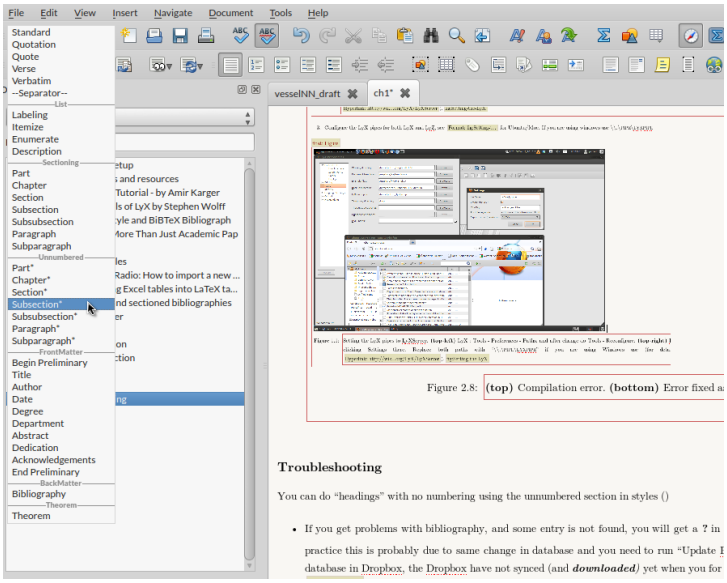

Figure 2.11: Using unnumbered headings.

Our work can be seen also as a pre-processing step for morphological reconstruction of vessel networks in mesh domain. The output from our pipeline could be for example used as an input for the mesh reconstruction pipeline of Python-based open source Vessel Modeling Toolkit (VMTK) or its inexpensive graphical front-end VMTKLab. This would be more robust segmentation pre-processing step than VMTK that is using one of the four vesselness enhancing filters: 1) Frangi's method ([134]), 2) Sato's method ([405]), 3) Vessel Enhancing Diffusion Filter ([?]), and 4) Vessel enhancing diffusion ([316]), with the Frangi's method being the default option. Vessel enhancing filter works as a pre-processing step for the level set based vessel segmentation of VMTK before running the Marching Cubes algorithm derivative ([300]) for mesh reconstruction.

Figure 2.12: Bibliography entry missing.

to insert the same citation again. Other possible scenario is that if you keep your Zotero database in Dropbox, the Dropbox have not synced (and ***downloaded***) yet when you for example open the Zotero at home to continue writing.

Can't write to file

Might happen if you are running out of RAM (Figure 2.13 on page 12), http://tex.stackexchange.com/questions/16801/xel i-cant-write-on-file-test-pdf

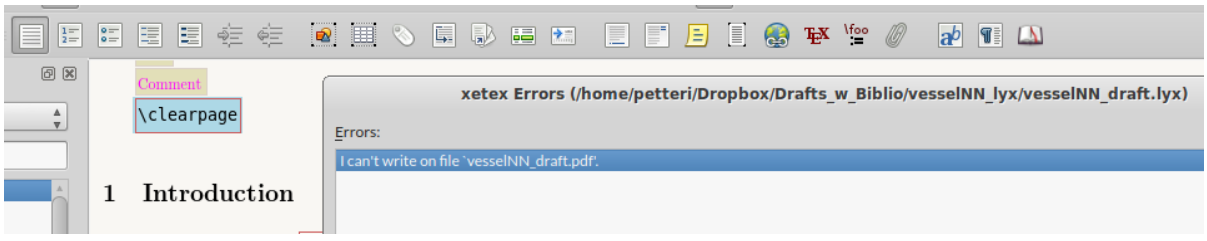

Figure 2.13: I can't write on file -problem. Probably due to insufficient RAM. Closing and re-opening LyX allowed PDF to be generated.

Now the reference style is "plain" (probably UoT's default then?). Also now the biblio is defined by the `.bib` file (Bibtex, see e.g. http://www.latex-tutorial.com/tutorials/beginners/latex-bibtex/) rather than by the inflexible static key-style entry of the original template. You can also convert the `.bib` file eventually to the static "key"-format as most of the journals do not accept the `.bib` way to do it (see e.g. Converting bibtext to bibitem, `.bbl` file). In practice now you could define easily the formatting of your references by the `.bst` file (see e.g. LaTeX Style and BiBTeX Bibliography Formats for Biologists: TeX and LaTeX Resources) rather than having to manually change all your references to match the different requirements of different journals. And if you are using Zotero, you should fix possibly erroneous entries there, and then run "Update BibTeX" from your LyZ plugin.

Bibliography

[1] Jordan L. Carbary-Ganz, Weston A. Welge, Jennifer K. Barton, and Urs Utzinger. In vivo molecular imaging of colorectal cancer using quantum dots targeted to vascular endothelial growth factor receptor 2 and optical coherence tomography/laser-induced fluorescence dual-modality imaging. *Journal of Biomedical Optics*, 20(9):096015–096015, 2015.

[2] Laura Dabbish, Colleen Stuart, Jason Tsay, and Jim Herbsleb. Social Coding in GitHub: Transparency and Collaboration in an Open Software Repository. In *Proceedings of the ACM 2012 Conference on Computer Supported Cooperative Work*, CSCW '12, pages 1277–1286, New York, NY, USA, 2012. ACM.

[3] Antonio Lima, Luca Rossi, and Mirco Musolesi. Coding Together at Scale: GitHub as a Collaborative Social Network. *arXiv:1407.2535 [physics]*, July 2014. arXiv: 1407.2535.

[4] Axel Nimmerjahn and Dwight E Bergles. Large-scale recording of astrocyte activity. *Current Opinion in Neurobiology*, 32:95–106, June 2015.

[5] Axel Nimmerjahn and Fritjof Helmchen. In vivo labeling of cortical astrocytes with sulforhodamine 101 (SR101). *Cold Spring Harbor Protocols*, 2012(3):326–334, March 2012.

[6] Hwan-Jun Yoon, Eek-Sung Lee, Minseok Kang, Yong Jeong, and Ji-Ho Park. In vivo multi-photon luminescence imaging of cerebral vasculature and blood–brain barrier integrity using gold nanoparticles. *Journal of Materials Chemistry B*, 3(15):2935–2938, April 2015.