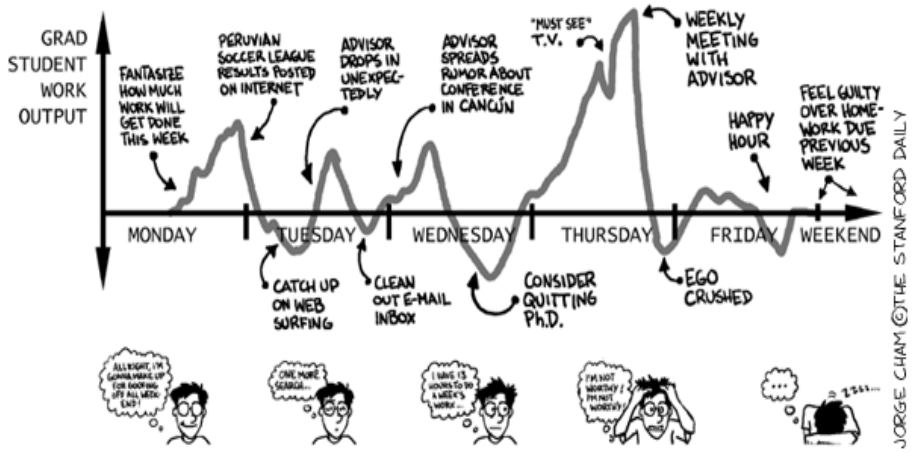
INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA

Área Departamental de Engenharia de Electrónica e Telecomunicações e de Computadores



[Título da dissertação, do Projecto ou do Relatório de Estágio]

[NOME COMPLETO DO AUTOR]

(Grau do candidato)

[Dissertação | Projecto Final] para obtenção do Grau de Mestre em Engenharia Informática e de Computadores

Orientadores : [Grau] [Nome do orientador]
[Grau] [Nome do orientador]

Júri:

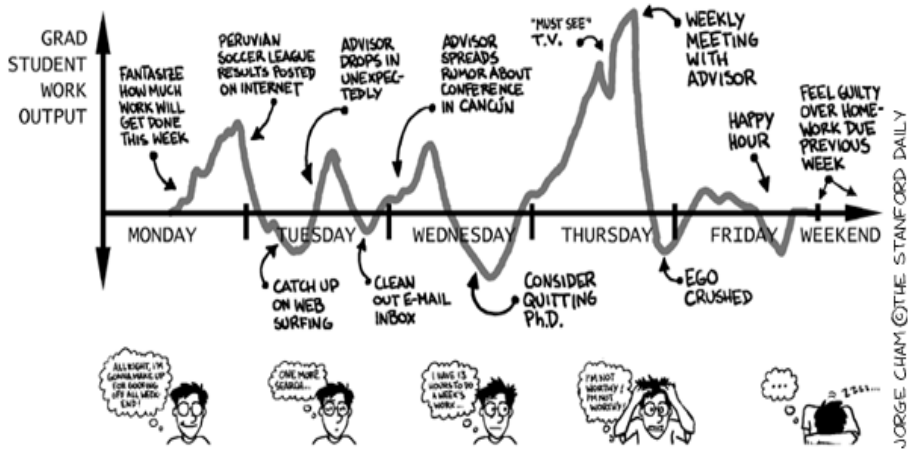
Presidente: [Grau e Nome do presidente do júri]

Vogais: [Grau e Nome do primeiro vogal]
[Grau e Nome do segundo vogal]
[Grau e Nome do terceiro vogal]
[Grau e Nome do quarto vogal]

MÊS, ANO

INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA

Área Departamental de Engenharia de Electrónica e Telecomunicações e de Computadores



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[Grau e Nome do terceiro vogal]
[Grau e Nome do quarto vogal]

MÊS, ANO

Aos meus ...

Agradecimentos

Os agradecimentos. Apesar de haver total liberdade no conteúdo e forma desta secção, normalmente inicia-se com os agradecimentos institucionais (orientador, instituição, bolsas, colegas de trabalho, ...) e só depois os pessoais (amigos, família, ...)

Resumo

Independentemente da língua em que está escrita a dissertação, é necessário um resumo na língua do texto principal e um resumo noutra língua. Assume-se que as duas línguas em questão serão sempre o Português e o Inglês.

O *template* colocará automaticamente em primeiro lugar o resumo na língua do texto principal e depois o resumo na outra língua. Por exemplo, se a dissertação está escrita em Português, primeiro aparecerá o resumo em Português, depois em Inglês, seguido do texto principal em Português.

Resumo é a versão precisa, sintética e selectiva do texto do documento, destacando os elementos de maior importância. O resumo possibilita a maior divulgação da tese e sua indexação em bases de dados.

A redação deve ser feita com frases curtas e objectivas, organizadas de acordo com a estrutura do trabalho, dando destaque a cada uma das partes abordadas, assim apresentadas: Introdução - Informar, em poucas palavras, o contexto em que o trabalho se insere, sintetizando a problemática estudada. Objectivo - Deve ser explicitado claramente. Métodos - Destacar os procedimentos metodológicos adoptados. Resultados - Destacar os mais relevantes para os objectivos pretendidos. Os trabalhos de natureza quantitativa devem apresentar resultados numéricos, assim como seu significado estatístico. Conclusões - Destacar as conclusões mais relevantes, os estudos adicionais recomendados e os pontos positivos e negativos que poderão influir no conhecimento.

O resumo não deve conter citações bibliográficas, tabelas, quadros, esquemas. Dar preferência ao uso dos verbos na 3ª pessoa do singular. Tempo e verbo não devem dissociar-se dentro do resumo. Deve evitar o uso de abreviaturas e siglas - quando absolutamente necessário, citá-las entre parênteses e precedidas da explicação de seu significado, na primeira vez em que aparecem.

E, deve-se evitar o uso de expressões como "O presente trabalho trata ...", "Nesta tese são discutidos....", "O documento conclui que....", "aparentemente é...."etc.

Existe um limite de palavras, 300 palavras é o limite.

Para indexação da tese nas bases de dados e catálogos de bibliotecas devem ser apontados pelo autor as palavras-chave que identifiquem os assuntos nela tratados. Estes permitirão a recuperação da tese quando da busca da literatura publicada.

Palavras-chave: Palavras-chave (em português) . . .

Abstract

The dissertation must contain two versions of the abstract, one in the same language as the main text, another in a different language. The package assumes the two languages under consideration are always Portuguese and English.

The package will sort the abstracts in the proper order. This means the first abstract will be in the same language as the main text, followed by the abstract in the other language, and then followed by the main text.

The abstract is critical because many researchers will read only that part. Your abstract should provide an accurate and sufficiently detailed summary of your work so that readers will understand what you did, why you did it, what your findings are, and why your findings are useful and important. The abstract must be able to stand alone as an overview of your study that can be understood without reading the entire text. However, your abstract should not be overly detailed. For example, it does not need to include a detailed methods section.

Even though the abstract is one of the first parts of the document, it should be written last. You should write it soon after finishing the other chapters, while the rest of the manuscript is fresh in your mind.

The abstract should not contain bibliography citations, tables, charts or diagrams. Give preference to the use of the verbs in the third person singular. Time and word must not dissociate yourself within the abstract. Abbreviations should be limited. Abbreviations that are defined in the abstract will need to be defined again at first use in the main text.

Finally, you must avoid the use of expressions such as "The present work deals with ... ", "In this thesis are discussed .... ", "The document concludes that .... ", "apparently and .... " etc.

The word limit should be observed, 300 words is the limit.

Abstracts are usually followed by a list of keywords selected by the author. Choosing appropriate keywords is important, because these are used for indexing purposes. Well-chosen keywords enable your manuscript to be more easily identified and cited.

Keywords: Keywords (in English) . . .

Índice

Lista de Figuras

Lista de Tabelas

Lista de Listagens

Glossário

matrix a rectangular table of elements. 12

universal set the set of all things. 12

Introduction

This package is distributed under GPLv3 License. If you have questions or doubts concerning the guarantees, rights and duties of those who use packages under GPLv3 License, please read http://www.gnu.org/licenses/gpl.html.

A marginpar note!

A a note in a line by itself.

Please note that

this package and template are not official for ISEL/IPL.

2

ThesisISEL User's Manual

2.1 Introduction

This chapter describes how to use the LaTeX style thesis. This style file is a major rewrite from the most of Universities, which was in turn adapted from a style file from the FCT-UNL (not official version). We aimed at providing an improved visual layout and, simultaneously, a *very easy to use* template (aka, a LaTeX template for dummies).

The first main rule you must know is that **you must** specify the encoding of your text files. A simple *rule of thumb* is: if you are using Windows add 'latin1' to the list of package options; if you are using other systems, such as Linux or Mac OSx, add 'utf8' to the list of package options.

2.2 Folder Structure

The template file for writing dissertations in LaTeX is organized into a main directory, a set of files and sub-directories:

ThesisISEL This is the main directory and includes:

Logo Directory with Faculty logos;

r-files Directory with useful bash scripts, e.g., for cleaning all temporary files;

Chapters Directory where to put user files (text and figures);

alpha-pt.bst A file with bibliography names in portuguese, e.g., 'Relatório Técnico' e 'Tese de Mestrado' instead of 'Technical Report' and 'Master Thesis'. This file is used automatically if Portuguese is selected as the main language (see below);

defaults.tex A file with the main default values for the package (institution name, faculty's logo, degree name and similars);

personaldataofthesis.tex A file with the main default values for the package (identification of report as well as the author and juries);

template.tex The main file. You should run `LaTeX` in this one. Please refrain from changing the file content outside of the well defined area;

bibliography.bib The bib file. An easy way to find to import citation into `bibtex` is select option `Show links to import citation into BibTex` in `Scholar google settings`.

thesisisel.cls The `LaTeX` class file for the thesis style. Currently, some of the defaults are stored here instead of `defaults.tex`. This file should not be changed, unless you're ready to play with fire! :)

Again, we would like to recall that all the user `LaTeX` files should be stored in the `ThesisISEL` directory, and all the images in `ThesisISEL/Chapters/img` directory.

Yet another note!

2.3 Package Options

The thesis style includes the following options, that must be included in the options list in the `\documentclass[options]{thesisisel}` line at the top of the `template.tex` file.

The list below aggregates related options in a single item. For each list, the default value is prefixed with a *.

2.3.1 Language Related Options

You must choose the main language for the document. The available options are:

1. ***pt** — The text is written in Portuguese (with a small abstract in English).
2. **en** — The text is written in English (with a small abstract in Portuguese).

The language option affects:

- **The order of the summaries.** At first the abstract in the main language and then in the foreign language. This means that if your main language for the document in english, you will see first the abstract (in english) and then the 'resumo' (in portuguese). If you switch the main language for the document, it will also automatically switch the order of the summaries.
- **The names for document sectioning.** E.g., 'Chapter' vs. 'Capítulo', 'Table of Contents' vs. 'Índice', 'Figure' vs. 'Figura', etc.
- **The type of documents in the bibliography.** E.g., 'Technical Report' vs. 'Relatório Técnico', 'MSc Thesis' vs. 'Tese de Mestrado', etc.

No mater which language you chose, you will always have the appropriate hyphenation rules according to the language at that point. You always get portuguese hyphenation rules in the 'Resumo', english hyphenation rules in the 'Abstract', and then the main language hyphenation rules for the rest of the document. If you need to force hyphenation write inside of `\hyphenation{}` the hyphenated word, e.g. `\hyphenation{op-ti-cal net-works}`.

2.3.2 Class of Text

You must choose the class of text for the document. The available options are:

1. **bsc** — BSc graduation report.
2. **prepmsc** — Preparation of MSc dissertation. This is a preliminary report graduate students at ISEL/IPL must prepare to conclude the first semester of the two-semesters MSc work. The files specified by `\dedicatoryfile` and `\acknowledgmentsfile` are ignored, even if present, for this class of document.
3. **msc** — MSc dissertation.

2.3.3 Printing

You must choose how your document will be printed. The available options are:

(i) **oneside** — Single side page printing, and (ii) ***twoside** — Double sided page printing.

2.3.4 Font Size

You must select the encoding for your text. The available options are:

1. **11pt** — Eleven (11) points font size.
2. ***12pt** — Twelve (12) points font size. You should really stick to 12pt...

2.3.5 Text Encoding

You must choose the font size for your document. The available options are:

1. **latin1** — Use Latin-1 (ISO 8859-1) encoding. Most probably you should use this option if you use Windows;
2. **utf8** — Use UTF8 encoding. Most probably you should use this option if you are not using Windows.

2.3.6 Examples

Let's have a look at a couple of examples:

- BSc graduation report, in portuguese, with 12pt size and to be printed one sided (I wonder why one would do this!)
  `\documentclass[bsc,pt,12pt,oneside,latin1]{thesisisel}`
- Preparation of MSc thesis, in portuguese, with 12pt size and to be printed one sided (I wonder why one would do this!)
  `\documentclass[prepmsc,pt,12pt,oneside,latin1]{thesisisel}`
- MSc dissertation, in english, with 12pt size and to be printed double sided
  `\documentclass[msc,en,12pt,twoside,utf8]{thesisisel}`

2.4 How to Write Using LaTeX

Please have a look at Chapter 3, where you may find many examples of LaTeX constructs, such as Sectioning, inserting Figures and Tables, writing Equations, Theorems and algorithms, exhibit code listings, etc.

3

A Short LaTeX Tutorial with Examples

This Chapter aims at exemplifying how to do common stuff with LaTeX. We also show some stuff which is not that common! ;)

Please, use these examples as a starting point, but you should always consider using the *Big Oracle* (aka, Google, your best friend) to search for additional information or alternative ways for achieving similar results.

3.1 Document Structure

In engineering and science, a thesis or dissertation is the culmination of a master's or Ph.D. degree. A thesis or dissertation presents the research that the student performed for that degree. From the student's perspective, the primary purpose of a thesis or dissertation is to persuade the student's committee that he or she has performed and communicated research worthy of the degree. In other words, the main purpose of the thesis or dissertation is to help the student secure the degree. From the perspective of the engineering and scientific community, the primary purpose is to document the student's research. Although much research from theses and dissertations is also communicated in journal articles, theses and dissertations stand as detailed documents that allow others to see what the work was and how it was performed. For that reason, theses and dissertations are often

read by other graduate students, especially those working in the research group of the authoring student.

With a thesis or dissertation, the format also encompasses the names of the sections that are expected: **Abstract, Acknowledgments, Nomenclature, List of Figures, List of Tables, Introduction, Literature Review, Theoretical Analysis of Secondary Flows, Computational Methods, Experimental Design, Experimental and Computational Results, Conclusions and Future Work, References, Glossary and Appendix.**

3.2 Dealing with Bibliography

3.3 Inserting Tables

3.4 Nomenclature/List of Symbols

The Nomenclature includes abbreviations and terms found in the thesis that the writer uses frequently and does not define at each usage. The List of Symbols includes all special symbols used in the thesis that the writer does not define at each usage.

Add abbreviations together with their description or long form to your document. Ideally, this is done immediately after an abbreviation is mentioned for the first time. Consider the following example:

I want β to be listed after α.

The example above was introduced with:

```
I want \nom{$\beta$}{The second letter of the Greek alphabet} to be
   listed after \nom{$\alpha$}{The first letter of the Greek alphabet
   }.
```

Listagem 3.1: Nomenclature example

Similar to a glossary or bibliography, the document is typesetted once (latex). Next, the nomenclature is generated using makeindex. Finally, the document is typesetted again, adding the nomenclature to it.

```
$ pdflatex template
$ makeindex template.nlo -s nomencl.ist -o template.nls
$ pdflatex template (twice)
```

or, if you use texmaker, the idea is change

Makeindex Commands in Texmaker/Preferences/makeindex.

By default it states: "/usr/texbin/makeindex"%.idx, and you change to "/usr/-texbin/makeindex"%.nlo -s nomencl.ist -o %.nls.

The makeindex command takes the nomenclature file (.nlo), the style file (nomencl.ist) and the name of the output file (.nls) as input arguments.

After the Nomenclature and/or List of Symbols (if applicable) follow(s) the List of Figures.

3.5 Glossary

A glossary is a nice thing to have in a report and usually very helpful. As you probably can imaging, it is very easy to create in Latex. Nevertheless, there are a few things to be done, especially generating the glossary-files.

First you have to tell Latex to use the glossary package and to create the glo-file containing all the glossar-entries in your document:

```
\usepackage{glossaries}
\makeglossaries
```

Next you need to define the terms you want to appear in the glossary. Again, this must be done in the preamble. This is done using the command

```
\newglossaryentry{<label>}{<key-val list>}
```

The first argument `<label>` is a unique label to allow you to refer to this entry in your document text. The entry will only appear in the glossary if you have referred to it in the document using one of the commands listed later. The second argument is a comma separated `<key>=<value>` list.

Inside the text you just need to use the command `\gls{name}` or `\glspl{name}` (plural name) to call it. For example, the following defines the term 'set' and assigns a brief description. The term is given the label set. This is the minimum amount of information you must give:

```
\newglossaryentry{set} % the label
{name=set,             % the term
 description={a collection of objects} %a brief description
}
```

Other example, now the glossary associated with a symbol, universal set:

```
\newglossaryentry{U}   % the label
{name={universal set}, % the term
 description={the set of all things} % a brief description
 symbol={\ensuremath{\mathcal{U}}}  % the associated symbol
}
```

The plural of the word “matrix” is “matrices” not “matrixs”, so the term needs the plural form set explicitly:

```
\newglossaryentry{matrix}% the label
{name=matrix, % the term
 description={a rectangular table of elements},
 plural=matrices % the plural
}
```

What you do first is generate your PDF once. An ist-file as well as a glossary file (*.glo) are generated. The glossary-file contains all the glossary entries found in the document in plain text. Next you type the following command in the command-line:

```
$makeindex template.glo -s template.ist -t template.glg -o
template.gls
```

The two files with the extensions *.gls and *.glg are generated. If entries are ignored or rejected, which can be seen either in the glg-file or directly in the output of the makeindex-command (see 3.4), you have to check your glossary entries. The important of the two files is the *.gls-file, as it is used by Latex for the actual glossary. You now need to re-generate the PDF and if everything works fine, your glossary should appear where you wanted it.

3.6 Importing Images

3.7 Floats, Figures and Captions

3.7.1 Inserting Figures Wrapped with text

You should only use this feature is *really* necessary. This means, you have a very small image, that will look lonely just with text above and below.

In this case, you must use the `wrapfigure` package. To use `wrapfig`, you must first add this to the preamble:

`\usepackage{wrapfig}`

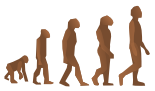


Figura 3.1: Vectorial image

This then gives you access to:

`\begin{wrapfigure}[lineheight]{alignment}{width}`

Alignment can normally be either 'l' for left, or 'r' for right. Lowercase 'l' or 'r' forces the figure to start precisely where specified (and may cause it to run over page breaks), while capital 'L' or 'R' allows the figure to float. If you defined your document as twosided, the alignment can also be 'i' for inside or 'o' for outside, as well as 'I' or 'O'. The width is obviously the width of the figure.

The example above was introduced with:

```
\begin{wrapfigure}{l}{2.5cm}
  \centering
    \includegraphics[width=2cm]{evolution_steps-vectorial}
  \caption{Vectorial image}
\end{wrapfigure}
```

Listagem 3.2: Wrapfig example

3.8 Text Formatting

3.9 Generating PDFs from LaTeX

3.9.1 Generating PDFs with pdflatex

You may create PDF files either by using `latex` to generate a DVI file, and then use one of the many DVI-2-PDF converters, such as `dvipdfm`.

Alternatively, you may use `pdflatex`, which will immediately generate a PDF with no intermediate DVI or PS files. In some systems, such as Apple, PDF is already the default format for LaTeX. I strongly recommend you to use this approach, unless you have a very good argument to go for `latex` + `dvipdfm`.

A typical pass for a document with figures, cross-references and a bibliography would be:

```
$ pdflatex template
$ bibtex template
$ pdflatex template (twice)
```

You will notice that there is a new PDF file in the working directory called `template.pdf`. Simple :)

Please note that, to be sure all table of contents, cross-references and bibliography citations are up-to-date, you must run `latex` once, then `bibtex`, and then `latex` twice.

3.9.2 Dealing with Images

You may process the same source files with both `latex` or `pdflatex`. But, if your text include images, you must be careful. `latex` and `pdflatex` accept images in different (exclusive) formats. For `latex` you may use EPS ou PS figures. For `pdflatex` you may use JPG, PNG or PDF figures. I strongly recommend you to use PDF figures in vectorial format (do not use bitmap images unless you have no other choice).

3.9.3 Creating Source Files Compatible with both latex and pdflatex

Do not include the extension of the file in the `\includegraphics` command. E.g., use
`\includegraphics{evolution_steps}`
and not
`\includegraphics{evolution_steps.png}`.
If you use the first form, `latex` or `pdflatex` will add an appropriate file extension.

This means that, if you plan to use only `pdflatex`, you need only to keep (preferably) a PDF version of all the images. If you plan to use also `latex`, then you also need an EPS version of each image.

To be included in the sections above

If you are writing only one or two documents and aren't planning on writing more on the same subject for a long time, maybe you don't want to waste time creating a database of references you are never going to use. In this case you should consider using the basic and simple bibliography support that is embedded within LaTeX.

LaTeX provides an environment called **thebibliography** that you have to use where you want the bibliography; that usually means at the very end of your document, just before the `\end{document}` command. Here is a practical example:

```
\begin{thebibliography}{9}

\bibitem{lamport94}
  Leslie Lamport,
  \emph{\LaTeX: A Document Preparation System}.
  Addison Wesley, Massachusetts,
  2nd Edition,
  1994.

\end{thebibliography}
```

In this document, the bibliography is in a separate document: `bibliography.bib` where information is entered from https://scholar.google.pt/, as the show in Figure 3.2.

To actually cite a given document is *very* easy. Go to the point where you want the citation to appear, and use the following: `\cite{citekey}`, where the citekey is that of the bibitem you wish to cite, e.g `~\cite{lamport94}`. When LaTeX processes the document, the citation will be cross-referenced with the bibitems and replaced with the appropriate number citation. The advantage here, once again, is that LaTeX looks after the numbering for you.

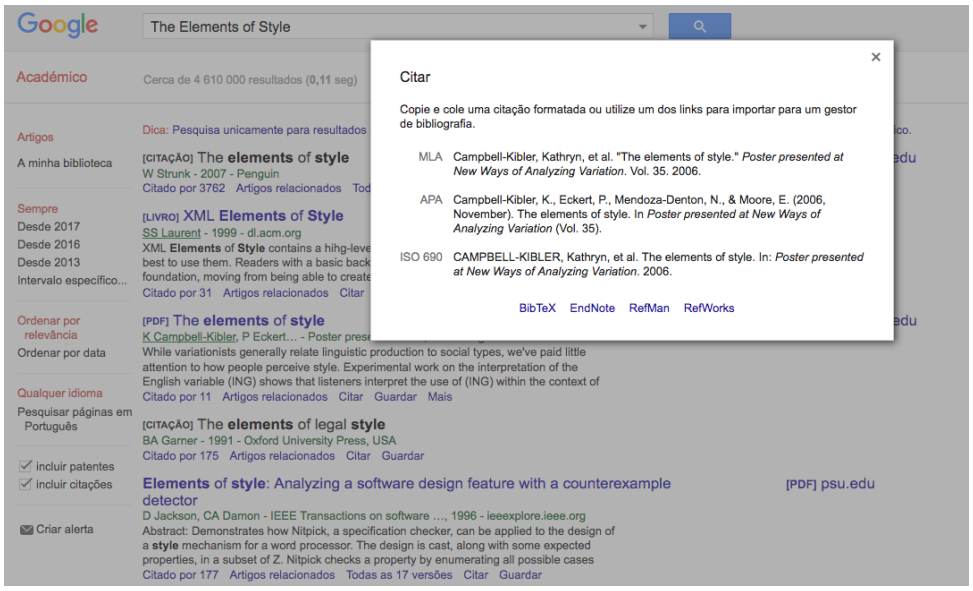


Figura 3.2: Screenshot from Scholar Google

When a sequence of multiple citations are needed, you should use a single `\cite{}` command. The citations are then separated by commas. Note that you must not use spaces between the citations. Here's an result example [2–4].

Footnotes are a very useful way of providing extra information to the reader. Usually, it is non-essential information which can be placed at the bottom of the page. This keeps the main body of text concise.

The footnote facility is easy to use: `\footnote{Simple footnote}`[1].

The tabular environment can be used to typeset tables with optional horizontal and vertical lines. LaTeX determines the width of the columns automatically. The first line of the environment has the form: `\begin{tabular}[pos]{table spec}`

table spec tells LaTeX the alignment to be used in each column and the vertical lines to insert.

pos can be used to specify the vertical position of the table relative to the baseline of the surrounding text.

The number of columns does not need to be specified as it is inferred by looking at the number of arguments provided. It is also possible to add vertical lines between the columns here.

Some notes are important to followed, such as present in Table 3.1:

[1] Simple footnote

i) Not defined vertical lines;

ii) The legend must be on top;

iii) Use `\toprule`, `\midrule` and `\bottomrule` to draw horizontal lines.

Tabela 3.1: Table's rules.

Item		
Animal	Description	Price ($)
Gnat	per gram	13.65
	each	0.01
Gnu	stuffed	92.50
Emu	stuffed	33.33
Armadillo	frozen	8.99

There are two ways to incorporate images into your LaTeX document, and both use the graphicx package by means of putting the command `\usepackage{graphicx}` near the top of the LaTeX file, just after the documentclass command.

The two methods are

- include only PostScript images (esp. 'Encapsulated PostScript') if your goal is a PostScript document using dvips;
- include only PDF, PNG, JPEG and GIF images if your goal is a PDF document using pdflatex, TeXShop, or other PDF-oriented compiler.

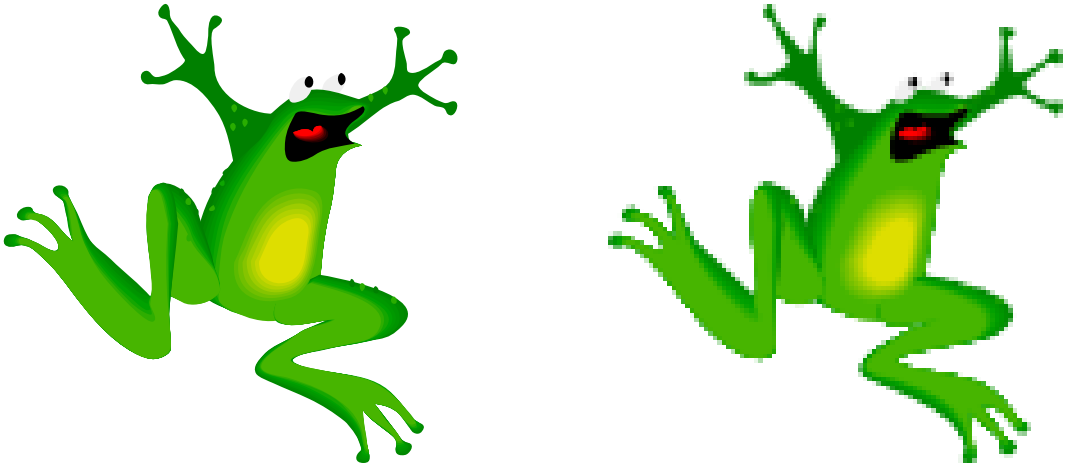
Some PNG images within my LaTeX document. The quality of the image files is sufficient and the result using LaTeX and viewing the resulting DVI file is quite looks good.

To get the best quality of the images in PDF files I'd recommend using vector-based graphics for images. The best format to save images in is .pdf, see Figure 3.3(a). With programs like Inkscape, you can draw as you would in MS Paint (and do much more), and because the images are vector-based instead of pixel-based, their quality should be preserved when converting to PDF in any way.

In all cases, each image must be in an individual 1-image file; no animation files or multipage documents.

There are two different ways to place two figures/tables side-by-side. The subfigure package provides functionality to arrange figures and tables next to each

other, within the usual figure-floating-environment. Subfigure will alphabetically number your subfigures and you have access to the complete reference as usual through `\ref{fig:subfig1}`, Figure 3.3, or to the letter only through `\subref{fig:subfig1}`, (a), or either `\ref{fig:ra-raster}`, Figure 3.3(b).



(a) Vectorial (b) Raster

Figura 3.3: Subfigure example with vectorial and no-vectorial images

Using the package listings you can add non-formatted text as you would do with `\begin{verbatim}` but its main aim is to include the source code of any programming language within your document. If you wish to include pseudocode or algorithms see LaTeX/Algorithms_ and_Pseudocode, as Listing 3.3.

```
private static void printSet(Set set) {
   int[] elements = set.getElements();
   System.out.print('{');
   for (int i = 0; i < elements.length; i++) {
      System.out.print(elements[i] + (i == elements.length-1 ? "" :
         ","));
   }
```

Listagem 3.3: Static method - SetApp

```
# comentário
square <- function(x) {
   x^2
   % |$x^{2}$|
}

# nerv
x <- c(1:100)
y <- square(x)
```

Listagem 3.4: R-Code (Test).

3.10 Equations

Typesetting mathematics is one of LaTeX's greatest strengths. It is also a large topic due to the existence of so much mathematical notation. It is recommend to read the following document available in Short Math Guide for LaTeX - AMS - American Mathematical Society.

3.11 Page orientation

The default page layout is "portrait", but sometimes it is still useful/necessary to have the whole document or only single pages changed to "landscape". The latter might be due to a large table or figure. If you want to make appear the left side up, better readable on screen, the pdflscape-package will do it: `\usepackage{pdflscape}`

and again:

```
\begin{landscape}
...
\end{landscape}
```

or, `\includepdf[landscape=true,pages={1}]{example.pdf}`

to put the page in "landscape", while the rest will remain in "portrait" orientation. Nevertheless, the header/footer will also be changed in orientation.

Written by Matilde Pós-de-Mina Pato with collaboration of Nuno Datia, 2012 October (1st version)

Written by Matilde Pós-de-Mina Pato,
2017 December – versão 2.4 (last version)

Referências

[1] J. Bruin. Newtest: command to compute new test @ONLINE, February 2011. URL http://www.ats.ucla.edu/stat/stata/ado/analysis/. (not cited)

[2] Chicago. *The Chicago Manual of Style*, pages 400–401. University of Chicago Press, thirteenth edition, 1982. (not cited)

[3] Donald E. Knuth. *The TeXbook*. Addison-Wesley, 1984. (not cited)

[4] William Strunk, Jr. and E. B. White. *The Elements of Style*. Macmillan, third edition, 1979. (not cited)

Applied Survival Analysis by Hosmer and Lemeshow

Stata Textbook Examples Applied Survival Analysis by Hosmer and Lemeshow [1]

The data files used for the examples in this text can be downloaded in a zip file from the Wiley FTP website or the Stata Web site.

```
# The R package(s) needed for this chapter is the survival package.
# We currently use R 2.0.1 patched version. You may want to make sure
# that packages on your local machine are up to date. You can perform
# updating in R using update.packages() function.

# url: http://www.ats.ucla.edu/stat/r/examples/
# data set is hmohiv.csv.
hmohiv<-read.table("http://www.ats.ucla.edu/stat/r/examples/asa/hmohiv.
    csv", sep=",", header = TRUE)
attach(hmohiv)
hmohiv

# using the hmohiv data set. To control the type of symbol, a variable
    called psymbol is created.
# It takes value 1 and 2, so the symbol type will be 1 and 2.
psymbol<-censor+1
table(psymbol)

```

```
17 plot(age, time, pch=(psymbol))
18 legend(40, 60, c("Censor=1", "Censor=0"), pch=(psymbol))
19
20 age1<-1000/age
21 plot(age1, time, pch=(psymbol))
22 legend(40, 30, c("Censor=1", "Censor=0"), pch=(psymbol))
23
24 # Package "survival" is needed for this analysis and for most of the
       analyses in the book.
25 library(survival)
26 test <- survreg( Surv(time, censor) ~ age, dist="exponential")
27 summary(test)
28
29 pred <- predict(test, type="response")
30 ord<-order(age)
31 age_ord<-age[ord]
32 pred_ord<-pred[ord]
33 plot(age, time, pch=(psymbol))
34 lines(age_ord, pred_ord)
35 legend(40, 60, c("Censor=1", "Censor=0"), pch=(psymbol))
```