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Bachelor

Sentiment Analysis on Product-Service Systems

Dissertation submitted in partial fulfillment
of the requirements for the degree of

Master of Science in
Electrical and Computer Engineering

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Chairperson:	Name of the committee chairperson
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	Name of another raporteur
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Sentiment Analysis on Product-Service Systems

This document was created using the (pdf)LaTeX processor, based in the "novathesis" template[1], developed at the Dep. Informática of FCT-NOVA [2].
[1] https://github.com/joaomlourenco/novathesis [2] http://www.di.fct.unl.pt

Lorem ipsum.

Acknowledgements

The acknowledgements. You are free to write this section at your own will. However, usually it starts with the institutional acknowledgements (adviser, institution, grants, workmates, ...) and then comes the personal acknowledgements (friends, family, ...).

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 that the two languages under consideration are always Portuguese and English.

The package will sort the abstracts in the appropriate order. This means that 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. For example, if the dissertation is written in Portuguese, first will come the summary in Portuguese and then in English, followed by the main text in Portuguese. If the dissertation is written in English, first will come the summary in English and then in Portuguese, followed by the main text in English.

The abstract shoul not exceed one page and should answer the following questions:

- What's the problem?
- Why is it interesting?
- What's the solution?
- What follows from the solution?

Keywords: Keywords (in English) ...

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. Se a dissertação está escrita em Inglês, primeiro aparecerá o resumo em Inglês, depois em Português, seguido do texto principal em Inglês.

O resumo não deve exceder uma página e deve responder às seguintes questões:

- Qual é o problema?
- Porque é que ele é interessante?
- Qual é a solução?
- O que resulta (implicações) da solução?

E agora vamos fazer um teste com uma quebra de linha no hífen a ver se a LaTeX duplica o hífen na linha seguinte...

zzzz zzz zzzz zzz zzzz zzz zzzz zzz zzzz zzz zzzz zzz zzzz zzz zzzz zzz zzzz comentar--lhe zzz zzzz zzz zzzz

Sim! Funciona! :)

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

Contents

List of Figures

List of Tables

Listings

Glossary

aliquam	tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris..
computer	An electronic device which is capable of receiving information (data) in a particular form and of performing a sequence of operations in accordance with a predetermined but variable set of procedural instructions (program) to produce a result in the form of information or signals..
cras viverra	metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat..
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Acronyms

aaa	acornym aaa.
aab	acornym aab.
aba	acornym aba.
abbrev	abbreviation of a longer text.
AEU	adipiscing elit ut.
AFM	aenean faucibus morbi.
AMD	a magna donec.
ANP	ac nunc praesent.
ATG	amet tortor gravida.
AVF	adipiscing vitae felis.
bbb	acornym bbb.
CAS	curabitur auctor semper.
CDG	curabitur dictum gravida.
CEA	congue eu accumsan.
CIV	consectetuer id vulputate.
DIA	duis eget orci.
DNM	dolor nulla malesuada.
DNMC	duis nibh mi congue.
DRN	dignissim rutrum nam.

EII	est iaculis in.
ENE	et netus et.
EPA	eu pulvinar at.
ESQ	eleifend sagittis quis.
ESV	eget sem vel.
ETS	eu tellus sit.
FUP	fringilla ultrices phasellus.
LID	lorem ipsum dolor.
LNE	libero nonummy eget.
LUB	leo ultrices bibendum.
LVU	lectus vestibulum urna.
MAC	mollis ac nulla.
MFA	malesuada fames ac.
MNA	mauris nam arcu.
MTS	morbi tristique senectus.
NDV	nulla donec varius.
NPH	neque pellentesque habitant.
OER	orci eget risus.
PEV	purus elit vestibulum.

PIS placerat integer sapien.

PQV pretium quis viverra.

SAO sit amet orci.

SNE sem nulla et.

STC sit amet consectetuer.

TEM turpis egestas mauris.

ULC ut leo cras.

UPA ut placerat ac.

VAE vehicula augue eu.

VMR viverra metus rhoncus.

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Chapter 1

State of the Art

1.1 Social Networks

Social Network Theory and Analysis, these are the area that study the currently emerging networks.
Network communication can be found all around us human bodies have them (Neves et al, 2008), physics, politics, computer science, etc. Socially, in later years, networks have been developed used many important websites like facebook, twitter, Instagram. This has created a new importunity for marketing and analysis. Since this work is mainly focused on feedback I'll focus more on that particular area.

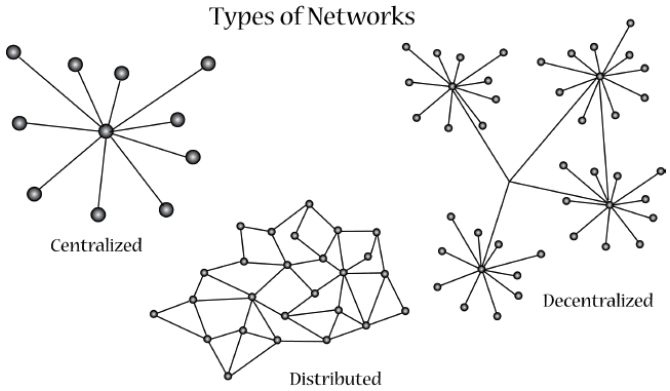

Figure 1.1: Network Types

Figure 1.1 shows some examples of network diagrams. Centralized networks are highly advantageous connection wise, everyone can give information to each other within 2 step, but fail when the centralized node is offline for some reason, this stops the entire network.

Before internet, companies had to rely on Decentralized networks to gather feedback,

some still do. By decentralizing, the amount of nodes that fail when the upper node disappear is lower, although it still happens. The big advantage of this layout is that it can easily become a Distributed network. Outer and lower connection nodes can easily connect to each other and create redundancy.

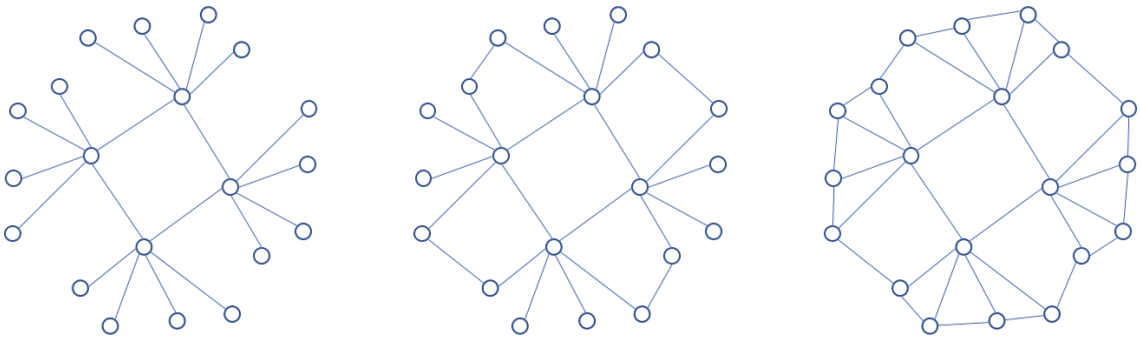

Figure 1.2: Decentralized to Distributed

Distributed networks, occur when all nodes are connected to the same amount of nodes Figure 1.2. This means that everyone has the same importance in the network. a layout like this is extremely utopic when thinking about feedback analysis.

While everyone has their own, valid, opinion on a product, people like celebrities can spread their opinion faster than a kinder gardener. Realistically, decentralized networks are the most common occurrence.

Chapter 2

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.

2.1 Document Structure

2.2 Dealing with Bibliogrpahy

2.3 Inserting Tables

2.4 Importing Images

2.5 Floats, Figures and Captions

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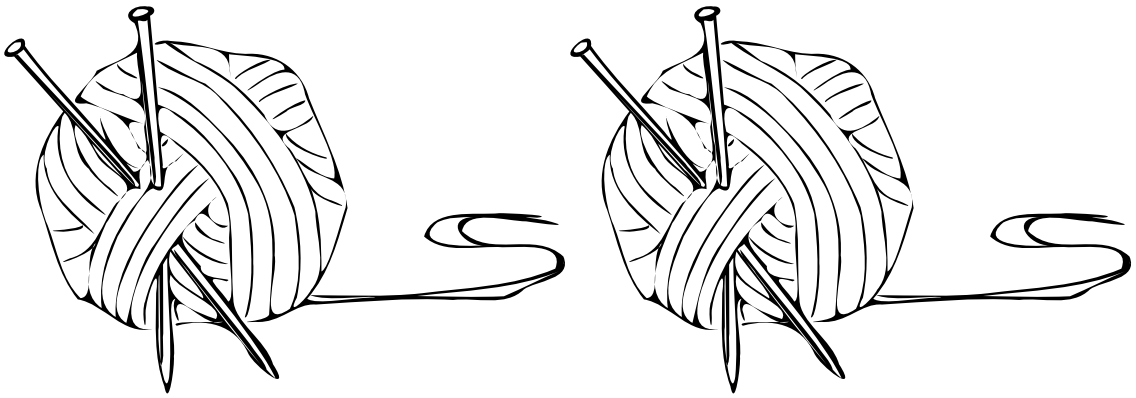

(a) One sub-figure (b) Another sub-figure

Figure 2.1: A figure with two sub-figures!

And this is a small text that references the Figure 2.1 and its Subfigures 2.1a and 2.1b.

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2.6 Text Formatting

2.7 Generating PDFs from LaTeX

2.7.1 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
$ pdflatex template
```

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 bibliographic citations are up-to-date, you must run `latex` once, then `bibtex`, and then `latex` twice.

2.7.2 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).

2.7.3 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{sonwman}`
and not
`\includegraphics{sonwman.eps}`.
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

Para fazer citações, deverá usar-se a chave da referência no ficheiro BibTeX. Se for uma única referência [**Artho04**], usar um "~" para ligar o `\cite{...}` à palavra que o precede (`...referência~\cite{Artho04}`). Caso queira fazer múltiplas citações [**Shavit95**, **Silberschatz06**, **Moss85**], deverá agrupá-las dentro de um úinico `\cite{...}`.

Note que o ficheiro de bibliografia pode ter tantas entradas quantas quiser. Apenas aquelas cuja chave seja referenciada no texto é que serão incluidas na listagem de bibliografia.

Footnotes[1] will be numbered and shown in the bottom of the page.

A Tabela 2.1 ilustra alguns conceitos importantes associados à contrução de tabelas:

i) Não usar linhas verticais;

ii) A legenda deve ficar por cima da tabela;

iii) Usar as macros `\toprule`, `\midrule` e `\bottomrule` para fazer a linha horizontal superior, interiores e inferior, respectivamente.

Table 2.1: Test results summary.

Test	Anomalies	Warnings	Correct	Categories	Missed
[**Beckman08**] Connection	2	2	1	*C*	1
[**Artho03**] Coordinates'03	1	4	1	*2B*, *1C*	0
[**Artho03**] Local Variable	1	2	1	*A*	0
[**Artho03**] NASA	1	1	1	—	0
[**Artho04**] Coordinates'04	1	4	1	*3C*	0
[**Artho04**] Buffer	0	7	0	*2A*, *1B*, *2C*, *2D*	0
[**Artho04**] Double-Check	0	2	0	*1A*, *1B*	0
[**Flanagan04**] StringBuffer	1	0	0	—	1
[**Praun03**] Account	1	1	1	—	0
[**Praun03**] Jigsaw	1	2	1	*C*	0
[**Praun03**] Over-reporting	0	2	0	*1A*, *1C*	0
[**Praun03**] Under-reporting	1	1	1	—	0
[**IBM-Rep**] Allocate Vector	1	2	1	*C*	0
Knight Moves	1	3	1	*2B*	0
Total	**12**	**33**	**10**	**5A, 6B, 10C, 2D**	**2**

As figuras a inserir no documento deverão ser de qualidade, preferencialmente em formato vectorial (PDF vectorial) e não em *bitmap* (PNG, JPG, etc). As imagens *bitmap* (Figura 2.2) não escalam bem e têm reflexos negativos na qualidade do seu docuemnto. Pelo contrário, as imagens *vectoriais* Figura 2.3 escalam muito tanto quanto o necessário sem degradar a qualidade da imagem.

Só deve usar *screenshots* se não tive mesmo nenhuma alternativa. Em vez e gerar um *screenshot*, tente usar uma impressora virtual PDF e imprimir para um ficheiro PDF.

[1] This is a simple footnote.

Regra geral obterá um PDF vetorial. Mesmo que o seu PDF contenha imagens, elas terão sempre qualidade maior ou igual à que obteria com um *screenshot*.

Para agregar várias figuras numa única... Poderá assim referenciar o conjunto 2.4, a priemira delas 2.4a ou a segunda 2.4b.

Para incluir listagens de código no seu documento, deverá incluir o pacote *listings* e depois usar o ambiente *lstlisting*, como exemplificado na Listagem 2.1.

Listing 2.1: Hello World

```
/**
 * The HelloWorldApp class implements an application that
 * simply prints "Hello World!" to standard output.
 */
class HelloWorldApp {%
    public static void main(String[] args) {%
        System.out.println("Hello World!"); // Display the string.
    }
}
```

2.8 Equações

O LaTeX é uma ferramenta poderosa para escrever em estilo matemático. Permite inserir fórmulas no meio do texto como por exemplo esta: $ax^2 + bx + c = 0$. Também permite que as fórmulas sejam destacadas numa linha separada e centradas na página

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

ou numeradas

$$aaa \tag{2.1}$$

que depois pode ser referida no texto como sendo a equação 2.1

$$aa$$

$$a \tag{2.2}$$

$$b \tag{2.3}$$

$$c \tag{2.4}$$

$$\tag{2.5}$$

Figure 2.2: Imagem em formato *bitmap* (JPG)

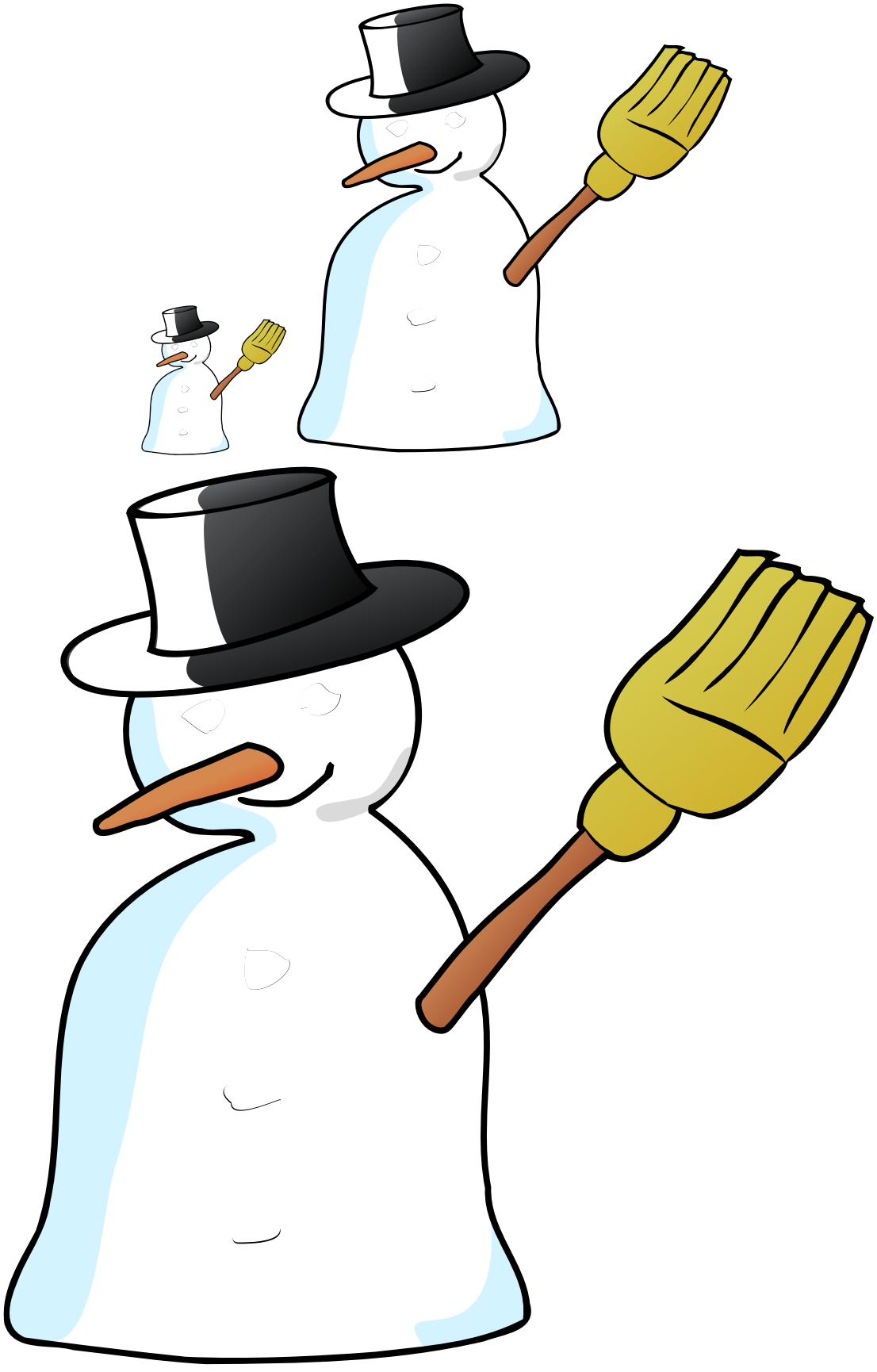
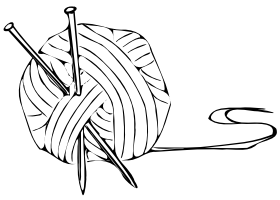


Figure 2.3: Imagem em formato PDF vectorial



a Novelo de lã

b Tempestade com neve

Figure 2.4: Exemplo de utilização de *subbottom*