

Sistema de Asistencia de Manejo para Optimización de Combustible en Buses de Transmisión Manual usando Machine Learning



Trabajo de Fin de Carrera (MTR280)
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Abstract

This is where you write your abstract ...

haguirre: Hey! I have a note

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Introducción

1

El mundo en el que vivimos es cada vez un mundo más y más interconectado. En los últimos años se ha desarrollado tecnología que permite que objetos que antes eran simplemente operados por nosotros, ahora se comuniquen e interactuen con nosotros de una manera más inteligente, que nos ahorra esfuerzos y mejora la calidad y seguridad de cada uno de ellos. Esto se ve claramente reflejado en el área automotriz.

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Chapter 1

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Getting started

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1.1 What is lorem ipsum? Title with math σ

3

Lorem Ipsum is simply dummy text of the printing and typesetting industry (see Section 1.3).
 Lorem Ipsum [1] has been the industry's standard dummy text ever since the 1500s, when an
 unknown printer took a galley of type and scrambled it to make a type specimen book. It
 has survived not only five centuries, but also the leap into electronic typesetting, remaining
 essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets
 containing Lorem Ipsum passages, and more recently with desktop publishing software like
 Aldus PageMaker including versions of Lorem Ipsum [1].

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The most famous equation in the world: $E^2 = (m_0c^2)^2 + (pc)^2$, which is known as the
energy-mass-momentum relation as an in-line equation.

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A *L^AT_EX* class file is a file, which holds style information for a particular L^AT_EX.

13

$$CIF : \quad F_0^j(a) = \frac{1}{2\pi i} \oint_{\gamma} \frac{F_0^j(z)}{z-a} dz \quad (1.1)$$

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1.2 Why do we use lorem ipsum?

16

It is a long established fact that a reader will be distracted by the readable content of a page
 when looking at its layout. The point of using Lorem Ipsum is that it has a more-or-less
 normal distribution of letters, as opposed to using 'Content here, content here', making it
 look like readable English. Many desktop publishing packages and web page editors now use
 Lorem Ipsum as their default model text, and a search for 'lorem ipsum' will uncover many

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1 web sites still in their infancy. Various versions have evolved over the years, sometimes by
2 accident, sometimes on purpose (injected humour and the like).

3 **1.3 Where does it come from?**

4 Contrary to popular belief, Lorem Ipsum is not simply random text. It has roots in a piece of
5 classical Latin literature from 45 BC, making it over 2000 years old. Richard McClintock, a
6 Latin professor at Hampden-Sydney College in Virginia, looked up one of the more obscure
7 Latin words, consectetur, from a Lorem Ipsum passage, and going through the cites of the
8 word in classical literature, discovered the undoubtable source. Lorem Ipsum comes from
9 sections 1.10.32 and 1.10.33 of "de Finibus Bonorum et Malorum" (The Extremes of Good
10 and Evil) by Cicero, written in 45 BC. This book is a treatise on the theory of ethics, very
11 popular during the Renaissance. The first line of Lorem Ipsum, "Lorem ipsum dolor sit
12 amet..", comes from a line in section 1.10.32.

13 The standard chunk of Lorem Ipsum used since the 1500s is reproduced below for those
14 interested. Sections 1.10.32 and 1.10.33 from "de Finibus Bonorum et Malorum" by Cicero
15 are also reproduced in their exact original form, accompanied by English versions from the
16 1914 translation by H. Rackham

17 "Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor inci-
18 didunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation
19 ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in repreh-
20 derit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat
21 cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum."

22 Section 1.10.32 of "de Finibus Bonorum et Malorum", written by Cicero in 45 BC:
23 "Sed ut perspiciatis unde omnis iste natus error sit voluptatem accusantium doloremque
24 laudantium, totam rem aperiam, eaque ipsa quae ab illo inventore veritatis et quasi architecto
25 beatae vitae dicta sunt explicabo. Nemo enim ipsam voluptatem quia voluptas sit aspernatur
26 aut odit aut fugit, sed quia consequuntur magni dolores eos qui ratione voluptatem sequi
27 nesciunt. Neque porro quisquam est, qui dolorem ipsum quia dolor sit amet, consectetur,
28 adipisci velit, sed quia non numquam eius modi tempora incidunt ut labore et dolore magnam
29 aliquam quaerat voluptatem. Ut enim ad minima veniam, quis nostrum exercitationem ullam
30 corporis suscipit laboriosam, nisi ut aliquid ex ea commodi consequatur? Quis autem vel
31 eum iure reprehenderit qui in ea voluptate velit esse quam nihil molestiae consequatur, vel
32 illum qui dolorem eum fugiat quo voluptas nulla pariatur?"

33 1914 translation by H. Rackham: "But I must explain to you how all this mistaken
34 idea of denouncing pleasure and praising pain was born and I will give you a complete

account of the system, and expound the actual teachings of the great explorer of the truth, the master-builder of human happiness. No one rejects, dislikes, or avoids pleasure itself, because it is pleasure, but because those who do not know how to pursue pleasure rationally encounter consequences that are extremely painful. Nor again is there anyone who loves or pursues or desires to obtain pain of itself, because it is pain, but because occasionally circumstances occur in which toil and pain can procure him some great pleasure. To take a trivial example, which of us ever undertakes laborious physical exercise, except to obtain some advantage from it? But who has any right to find fault with a man who chooses to enjoy a pleasure that has no annoying consequences, or one who avoids a pain that produces no resultant pleasure?"

Section 1.10.33 of "de Finibus Bonorum et Malorum", written by Cicero in 45 BC: "At vero eos et accusamus et iusto odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias excepturi sint occaecati cupiditate non provident, similique sunt in culpa qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem rerum facilis est et expedita distinctio. Nam libero tempore, cum soluta nobis est eligendi optio cumque nihil impedit quo minus id quod maxime placeat facere possimus, omnis voluptas assumenda est, omnis dolor repellendus. Temporibus autem quibusdam et aut officiis debitis aut rerum necessitatibus saepe eveniet ut et voluptates repudiandae sint et molestiae non recusandae. Itaque earum rerum hic tenetur a sapiente delectus, ut aut reiciendis voluptatibus maiores alias consequatur aut perferendis doloribus asperiores repellat."

1914 translation by H. Rackham: "On the other hand, we denounce with righteous indignation and dislike men who are so beguiled and demoralized by the charms of pleasure of the moment, so blinded by desire, that they cannot foresee the pain and trouble that are bound to ensue; and equal blame belongs to those who fail in their duty through weakness of will, which is the same as saying through shrinking from toil and pain. These cases are perfectly simple and easy to distinguish. In a free hour, when our power of choice is untrammelled and when nothing prevents our being able to do what we like best, every pleasure is to be welcomed and every pain avoided. But in certain circumstances and owing to the claims of duty or the obligations of business it will frequently occur that pleasures have to be repudiated and annoyances accepted. The wise man therefore always holds in these matters to this principle of selection: he rejects pleasures to secure other greater pleasures, or else he endures pains to avoid worse pains."

Chapter 2

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My second chapter

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2.1 Reasonably long section title

3

I'm going to randomly include a picture Figure 2.1.

4

If you have trouble viewing this document contact Krishna at: kks32@cam.ac.uk or raise an issue at <https://github.com/kks32/phd-thesis-template/>

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Enumeration

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Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed vitae laoreet lectus. Donec lacus quam, malesuada ut erat vel, consectetur eleifend tellus. Aliquam non feugiat lacus. Interdum et malesuada fames ac ante ipsum primis in faucibus. Quisque a dolor sit amet dui malesuada malesuada id ac metus. Phasellus posuere egestas mauris, sed porta arcu vulputate ut. Donec arcu erat, ultrices et nisl ut, ultricies facilisis urna. Quisque iaculis, lorem non maximus pretium, dui eros auctor quam, sed sodales libero felis vel orci. Aliquam neque nunc, elementum id accumsan eu, varius eu enim. Aliquam blandit ante et ligula tempor pharetra. Donec molestie porttitor commodo. Integer rutrum turpis ac erat tristique cursus. Sed venenatis urna vel tempus venenatis. Nam eu rhoncus eros, et condimentum elit. Quisque risus turpis, aliquam eget euismod id, gravida in odio. Nunc elementum nibh risus, ut faucibus mauris molestie eu. Vivamus quis nunc nec nisl vulputate fringilla. Duis tempus libero ac justo laoreet tincidunt. Fusce sagittis gravida magna, pharetra venenatis mauris semper at. Nullam eleifend felis a elementum sagittis. In vel turpis eu metus euismod tempus eget sit amet tortor. Donec eu rhoncus libero, quis iaculis lectus. Aliquam erat volutpat. Proin id ullamcorper tortor. Fusce vestibulum a enim non volutpat. Nam ut interdum nulla. Proin lacinia felis malesuada arcu aliquet fringilla. Aliquam condimentum, tellus eget maximus

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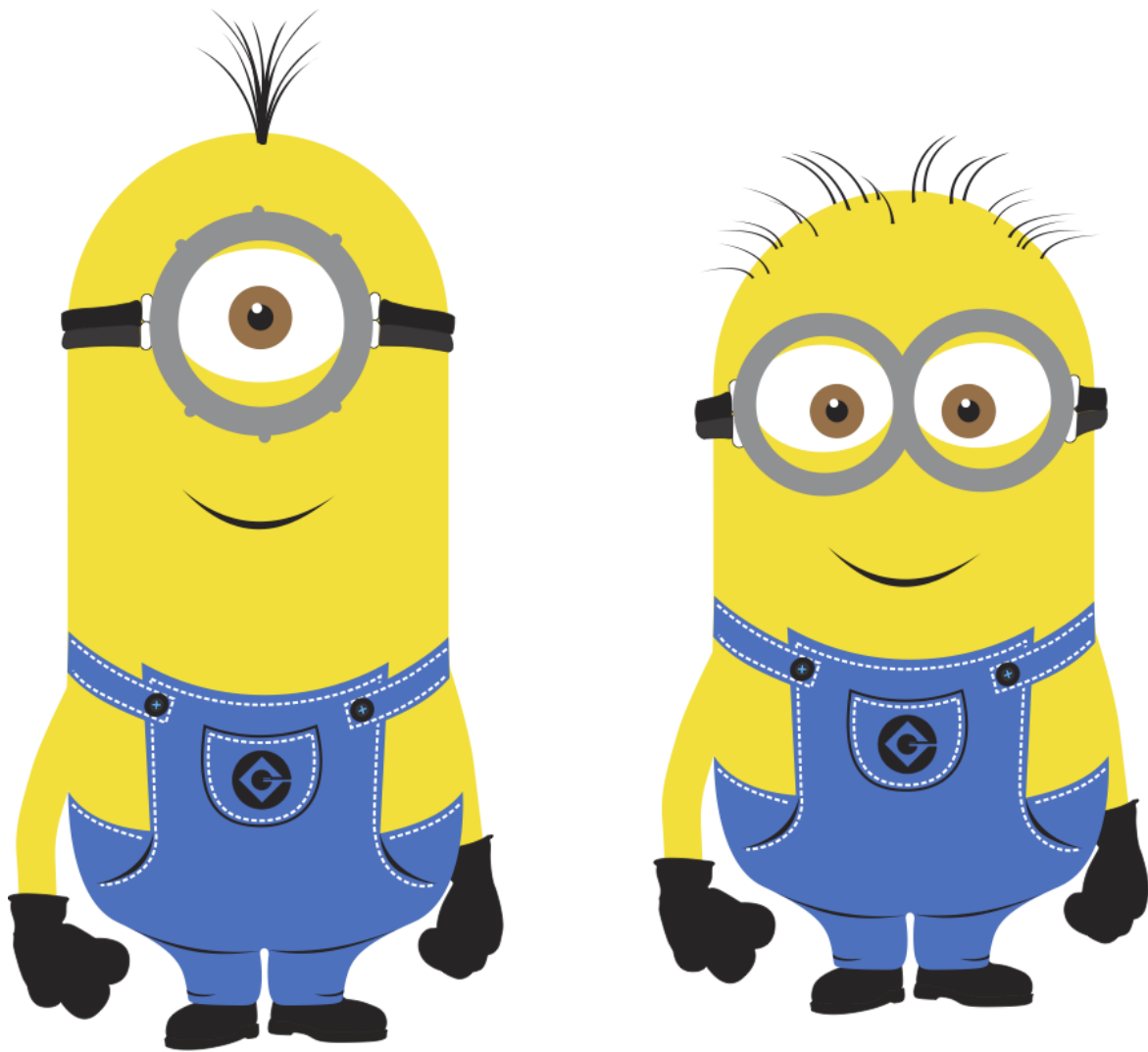


Fig. 2.1 This is just a long figure caption for the minion in Despicable Me from Pixar

porttitor, quam sem luctus massa, eu fermentum arcu diam ac massa. Praesent ut quam id leo molestie rhoncus. Praesent nec odio eget turpis bibendum eleifend non sit amet mi. Curabitur placerat finibus velit, eu ultricies risus imperdiet ut. Suspendisse lorem orci, luctus porta eros a, commodo maximus nisi.

Nunc et dolor diam. Phasellus eu justo vitae diam vehicula tristique. Vestibulum vulputate cursus turpis nec commodo. Etiam elementum sit amet erat et pellentesque. In eu augue sed tortor mollis tincidunt. Mauris eros dui, sagittis vestibulum vestibulum vitae, molestie a velit. Donec non felis ut velit aliquam convallis sit amet sit amet velit. Aliquam vulputate, elit in lacinia lacinia, odio lacus consectetur quam, sit amet facilisis mi justo id magna. Curabitur aliquet pulvinar eros. Cras metus enim, tristique ut magna a, interdum egestas nibh. Aenean lorem odio, varius a sollicitudin non, cursus a odio. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae;

1. The first topic is dull

2. The second topic is duller

(a) The first subtopic is silly

(b) The second subtopic is stupid

3. The third topic is the dullest

Morbi bibendum est aliquam, hendrerit dolor ac, pretium sem. Nunc molestie, dui in euismod finibus, nunc enim viverra enim, eu mattis mi metus id libero. Cras sed accumsan justo, ut volutpat ipsum. Nam faucibus auctor molestie. Morbi sit amet eros a justo pretium aliquet. Maecenas tempor risus sit amet tincidunt tincidunt. Curabitur dapibus gravida gravida. Vivamus porta ullamcorper nisi eu molestie. Ut pretium nisl eu facilisis tempor. Nulla rutrum tincidunt justo, id placerat lacus laoreet et. Sed cursus lobortis vehicula. Donec sed tortor et est cursus pellentesque sit amet sed velit. Proin efficitur posuere felis, porta auctor nunc. Etiam non porta risus. Pellentesque lacinia eros at ante iaculis, sed aliquet ipsum volutpat. Suspendisse potenti.

Ut ultrices lectus sed sagittis varius. Nulla facilisi. Nullam tortor sem, placerat nec condimentum eu, tristique eget ex. Nullam pretium tellus ut nibh accumsan elementum. Aliquam posuere gravida tellus, id imperdiet nulla rutrum imperdiet. Nulla pretium ullamcorper quam, non iaculis orci consectetur eget. Curabitur non laoreet nisl. Maecenas lacinia, lorem vel tincidunt cursus, odio lorem aliquet est, gravida auctor arcu urna id enim. Morbi accumsan bibendum ipsum, ut maximus dui placerat vitae. Nullam pretium ac tortor nec venenatis. Nunc non aliquet neque.

Itemize

- The first topic is dull
- The second topic is duller
 - The first subtopic is silly
 - The second subtopic is stupid
- The third topic is the dullest

Description

The first topic is dull

The second topic is duller

The first subtopic is silly

The second subtopic is stupid

The third topic is the dullest

2.2 Hidden section

Lorem ipsum dolor sit amet, consectetur adipiscing elit. In magna nisi, aliquam id blandit id, congue ac est. Fusce porta consequat leo. Proin feugiat at felis vel consectetur. Ut tempus ipsum sit amet congue posuere. Nulla varius rutrum quam. Donec sed purus luctus, faucibus velit id, ultrices sapien. Cras diam purus, tincidunt eget tristique ut, egestas quis nulla. Curabitur vel iaculis lectus. Nunc nulla urna, ultrices et eleifend in, accumsan ut erat. In ut ante leo. Aenean a lacinia nisl, sit amet ullamcorper dolor. Maecenas blandit, tortor ut scelerisque congue, velit diam volutpat metus, sed vestibulum eros justo ut nulla. Etiam nec ipsum non enim luctus porta in in massa. Cras arcu urna, malesuada ut tellus ut, pellentesque mollis risus. Morbi vel tortor imperdiet arcu auctor mattis sit amet eu nisi. Nulla gravida urna vel nisl egestas varius. Aliquam posuere ante quis malesuada dignissim. Mauris ultrices tristique eros, a dignissim nisl iaculis nec. Praesent dapibus tincidunt mauris nec tempor. Curabitur et consequat nisi. Quisque viverra egestas risus, ut sodales enim blandit at. Mauris quis odio nulla. Cras euismod turpis magna, in facilisis diam congue non. Mauris faucibus nisl a orci dictum, et tempus mi cursus.

Etiam elementum tristique lacus, sit amet eleifend nibh eleifend sed ¹. Maecenas dapibus augue ut urna malesuada, non tempor nibh mollis. Donec sed sem sollicitudin, convallis velit aliquam, tincidunt diam. In eu venenatis lorem. Aliquam non augue porttitor tellus faucibus porta et nec ante. Proin sodales, libero vitae commodo sodales, dolor nisi cursus magna, non tincidunt ipsum nibh eget purus. Nam rutrum tincidunt arcu, tincidunt vulputate mi sagittis id. Proin et nisi nec orci tincidunt auctor et porta elit. Praesent eu dolor ac magna cursus euismod. Integer non dictum nunc.

¹My footnote goes blah blah blah! ...



Fig. 2.2 Best Animations

¹ Subplots

² I can cite Wall-E (see Fig. 2.2b) and Minions in despicable me (Fig. 2.2c) or I can cite the whole figure as Fig. 2.2

Chapter 3

1

My third chapter

2

3.1 First section of the third chapter

3

And now I begin my third chapter here ...

4

And now to cite some more people [1]

5

3.1.1 First subsection in the first section

6

...and some more

7

3.1.2 Second subsection in the first section

8

...and some more ...

9

First subsub section in the second subsection

10

...and some more in the first subsub section otherwise it all looks the same doesn't it? well we can add some text to it ...

11

12

3.1.3 Third subsection in the first section

13

...and some more ...

14

First subsub section in the third subsection

15

...and some more in the first subsub section otherwise it all looks the same doesn't it? well we can add some text to it and some more and some more and some more and some more and some more and some more and some more ...

16

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18

1 Second subsub section in the third subsection

2 ... and some more in the first subsub section otherwise it all looks the same doesn't it? well
3 we can add some text to it ...

4 3.2 Second section of the third chapter

5 and here I write more ...

6 3.3 The layout of formal tables

7 This section has been modified from “Publication quality tables in L^AT_EX^{*}” by Simon Fear.

8 The layout of a table has been established over centuries of experience and should only
9 be altered in extraordinary circumstances.

10 When formatting a table, remember two simple guidelines at all times:

11 1. Never, ever use vertical rules (lines).

12 2. Never use double rules.

13 These guidelines may seem extreme but I have never found a good argument in favour
14 of breaking them. For example, if you feel that the information in the left half of a table is
15 so different from that on the right that it needs to be separated by a vertical line, then you
16 should use two tables instead. Not everyone follows the second guideline:

17 There are three further guidelines worth mentioning here as they are generally not known
18 outside the circle of professional typesetters and subeditors:

19 3. Put the units in the column heading (not in the body of the table).

20 4. Always precede a decimal point by a digit; thus 0.1 *not* just .1.

21 5. Do not use ‘ditto’ signs or any other such convention to repeat a previous value. In
22 many circumstances a blank will serve just as well. If it won't, then repeat the value.

23 A frequently seen mistake is to use ‘\begin{center}’ ... ‘\end{center}’ inside a figure or
24 table environment. This center environment can cause additional vertical space. If you want
25 to avoid that just use ‘\centering’

Table 3.1 A badly formatted table

	Species I		Species II	
Dental measurement	mean	SD	mean	SD
I1MD	6.23	0.91	5.2	0.7
I1LL	7.48	0.56	8.7	0.71
I2MD	3.99	0.63	4.22	0.54
I2LL	6.81	0.02	6.66	0.01
CMD	13.47	0.09	10.55	0.05
CBL	11.88	0.05	13.11	0.04

Table 3.2 A nice looking table

Dental measurement	Species I		Species II	
	mean	SD	mean	SD
I1MD	6.23	0.91	5.2	0.7
I1LL	7.48	0.56	8.7	0.71
I2MD	3.99	0.63	4.22	0.54
I2LL	6.81	0.02	6.66	0.01
CMD	13.47	0.09	10.55	0.05
CBL	11.88	0.05	13.11	0.04

Table 3.3 Even better looking table using booktabs

Dental measurement	Species I		Species II	
	mean	SD	mean	SD
I1MD	6.23	0.91	5.2	0.7
I1LL	7.48	0.56	8.7	0.71
I2MD	3.99	0.63	4.22	0.54
I2LL	6.81	0.02	6.66	0.01
CMD	13.47	0.09	10.55	0.05
CBL	11.88	0.05	13.11	0.04

References

1

- [1] H. Ma, H. Xie, and D. Brown, “Eco-driving assistance system for a manual transmission bus based on machine learning,” *IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS*, vol. 19, pp. 572–581, 2018.

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Appendix A

How to install L^AT_EX

Windows OS

TeXLive package - full version

1. Download the TeXLive ISO (2.2GB) from
<https://www.tug.org/texlive/>
2. Download WinCDEmu (if you don't have a virtual drive) from
<http://wincdemu.sysprogs.org/download/>
3. To install Windows CD Emulator follow the instructions at
<http://wincdemu.sysprogs.org/tutorials/install/>
4. Right click the iso and mount it using the WinCDEmu as shown in
<http://wincdemu.sysprogs.org/tutorials/mount/>
5. Open your virtual drive and run setup.pl

or

Basic MikTeX - T_EX distribution

1. Download Basic-MiK_TE_X(32bit or 64bit) from
<http://miktex.org/download>
2. Run the installer
3. To add a new package go to Start » All Programs » MikTeX » Maintenance (Admin)
and choose Package Manager

- 1 4. Select or search for packages to install

2 **TexStudio - T_EX editor**

- 3 1. Download TexStudio from
4 <http://texstudio.sourceforge.net/#downloads>
5 2. Run the installer

6 **Mac OS X**

7 **MacTeX - T_EX distribution**

- 8 1. Download the file from
9 <https://www.tug.org/mactex/>
10 2. Extract and double click to run the installer. It does the entire configuration, sit back
11 and relax.

12 **TexStudio - T_EX editor**

- 13 1. Download TexStudio from
14 <http://texstudio.sourceforge.net/#downloads>
15 2. Extract and Start

16 **Unix/Linux**

17 **TeXLive - T_EX distribution**

18 **Getting the distribution:**

- 19 1. TeXLive can be downloaded from
20 <http://www.tug.org/texlive/acquire-netinstall.html>.
21 2. TeXLive is provided by most operating system you can use (rpm,apt-get or yum) to get
22 TeXLive distributions

Installation

1. Mount the ISO file in the mnt directory

```
mount -t iso9660 -o ro,loop,noauto /your/texlive####.iso /mnt
```

2. Install wget on your OS (use rpm, apt-get or yum install)

3. Run the installer script install-tl.

```
cd /your/download/directory
./install-tl
```

4. Enter command 'i' for installation

5. Post-Installation configuration:

<http://www.tug.org/texlive/doc/texlive-en/texlive-en.html#x1-320003.4.1>

6. Set the path for the directory of TexLive binaries in your .bashrc file

For 32bit OS

For Bourne-compatible shells such as bash, and using Intel x86 GNU/Linux and a default directory setup as an example, the file to edit might be

```
edit ~/.bashrc file and add following lines
PATH=/usr/local/texlive/2011/bin/i386-linux:$PATH;
export PATH
MANPATH=/usr/local/texlive/2011/texmf/doc/man:$MANPATH;
export MANPATH
INFOPATH=/usr/local/texlive/2011/texmf/doc/info:$INFOPATH;
export INFOPATH
```

For 64bit OS

```
edit ~/.bashrc file and add following lines
PATH=/usr/local/texlive/2011/bin/x86_64-linux:$PATH;
export PATH
MANPATH=/usr/local/texlive/2011/texmf/doc/man:$MANPATH;
export MANPATH
```

```
1 INFOPATH=/usr/local/texlive/2011/texmf/doc/info:$INFOPATH;  
2 export INFOPATH  
3
```

4 **Fedora/RedHat/CentOS:**

```
5 sudo yum install texlive  
6 sudo yum install psutils
```

7 **SUSE:**

```
8 sudo zypper install texlive
```

9 **Debian/Ubuntu:**

```
10 sudo apt-get install texlive texlive-latex-extra  
11 sudo apt-get install psutils
```


Appendix B

1

Installing the CUED class file

2

\LaTeX .cls files can be accessed system-wide when they are placed in the `<texmf>/tex/latex` directory, where `<texmf>` is the root directory of the user's \TeX installation. On systems that have a local `texmf` tree (`<texmflocal>`), which may be named “`texmf-local`” or “`localtexmf`”, it may be advisable to install packages in `<texmflocal>`, rather than `<texmf>` as the contents of the former, unlike that of the latter, are preserved after the \LaTeX system is reinstalled and/or upgraded.

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It is recommended that the user create a subdirectory `<texmf>/tex/latex/CUED` for all CUED related \LaTeX class and package files. On some \LaTeX systems, the directory look-up tables will need to be refreshed after making additions or deletions to the system files. For \TeX Live systems this is accomplished via executing “`texhash`” as root. \TeX users can run “`initexmf -u`” to accomplish the same thing.

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Users not willing or able to install the files system-wide can install them in their personal directories, but will then have to provide the path (full or relative) in addition to the filename when referring to them in \LaTeX .

14

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16

Index

- ¹ LaTeX class file, 3