Report

UNIVERSITY
OF SKÖVDE

1977

Title

Subtitle (optional)

Mini Project in Informatics with a
specialization in Data Mining/Machine learning/
deep learning,

Student: First name Family name
Student code:
Course: IT734A
Autumn term/Spring term Year
Year-month-day of submission

Abstract

An abstract is a summary that provides a brief account of the main con-tent of an academic paper. The purpose of the abstract is partly to generate interest, and partly to present the main issue and key results. Most importantly, the abstract should capture what the report is about. The abstract is best written when you have almost completed your project. Only then will you know what you have actually written. A good idea is to work on a draft summary alongside your paper, and revise it as you go along. The summary is a difficult text to write, as it is to cover a lot of con-tent in a small space. But, that is also why it is a useful text to work on – it forces you to formulate what your project is about. The abstract should not be long, only around 250 words

Keywords: Keyword 1, keyword 2, ..., keyword 3...Keyword 4, keyword 5, ..., keyword 6

Contents

1. Introduction

Write a short introduction to the assignment you have selected. Why did you choose this assignment, i.e., what are the analysis problems/questions/hypotheses, challenges, and the gain(s) of solving the problems? Give the reader a short introduction and the necessary background information about the themes that you will concentrate on in your report. Make sure that concepts are explained/defined. Do not forget to refer to your sources – both in your written text and in a reference list. If you are unsure how to refer to your sources, please have a look here: `https://www.his.se/en/library/write-and-cite/referencing/`

1.1 Research questions/hypotheses

Based on the problem domain described above, list and describe your research questions/hypotheses to be answered in your report. These questions can also be used during your user evaluation, i.e., will the users be able to answer these questions with the help of your tool?

2. Background

How do you plan to address the problem and answer your hypotheses? Review and describe the related literature. It is encouraged to make use of the seminar papers already provided, if applicable. What are the previous researches' questions, results, and solutions and how do they relate to your problem? For example, if your project is about analyzing predictions of the effects of global warming, how have others addressed this problem? Which analysis techniques have they used for their particular data and why? That is, can the related research found help you in your work on your data, analysis, visualization, and evaluation?

3. Data

Briefly describe the dataset and the parameters that will be important for you in order to answer your questions/hypotheses. Indicate the source. If available online, providing a URL link helps the readers.

3.1 Data preparation

Describe what you did in order to use the data for analysis.

4. Approach

Describe the techniques that you will use for managing and analyzing your data and the tool(s) that you will use for data management/data analysis and evaluation. Motivate

why you have chosen a certain method over others and describe how you plan to evaluate your solution. This section should give a detailed account of what you did in order to answer your questions.

5. Results

Describe your final data analysis results and everything that you discovered on the way the put you forward and you think is worth describing here. Elaborate on the significance of your findings/results and convey your thoughts.

6. Discussion

What do the results mean (their significance and to whom) and how do they answer your research questions/hypotheses? From the evaluation and validation of the tool, what can you conclude?

6.1 Limitations and Challenges

What could have been investigated if given more time? What have been difficult when solving the problem and getting answers for your research questions/hypotheses?

7. Conclusion

Write the conclusion. What did you gain from the project assignment? Briefly explain your questions/hypotheses, findings, and meaningful discussion points in relation to the data collection, data management, data analysis, visualization and interaction concepts, and evaluation of your tool. What additional investigations need to be performed (or what is the limitation) in order to say that your solution is a good one for the problem?

8. Reflections on own work

- Describe how you decided to scope (and/or re-scope) your problem formulation during the work, and given the data you had access to.

- Describe how you searched for knowledge on how to scope the DS question you wanted to answer

- understand how to implement, test, and validate your results.

- Which sources helped you to get progress and how?

- What would you have done differently if you were to start over again, for understanding the problem faster and for understanding what could be done with the data you had access to?

- What else is there that you would have changed about this assignment?

A. Appendices

If your paper includes appendices, they are to be placed at the very end of your paper. If you have conducted a survey or interviews, the questionnaire and interview guide are to be included as appendices. If you have made some ML implementation, attach the code. If you are unsure about what to include as an appendix, consult with your lecturer or supervisor. Make sure to name the appendices correctly, like A, B and C.

A.1   LaTeX usage examples

This chapter is included solely as a help and reference for using LaTeX. It should not appear in the final document.

A.2   Introduction

This chapter shows examples of using LaTeXfor common operations.

A.3   Styles

Styles such as **bold**, *italic*, and underline can be applied to text. You can also use apply colors, and *combine* **styles**. It is recommended to use only bold to emphasize, and not abuse this resource.

A.4   Listings

With itemize you can create unnumbered lists:

- strawberries
- Peaches
- Pineapples
- Nectarines

  Similarly, enumerate allows you to create numbered lists:

1. Prepare the memory of the TFG
2. Prepare the presentation
3. Present the TFG
4. Apply for the Bachelor's degree

A.5   Subsections

Subsections can be defined with the subsection command:

A.5.1 First subsection

This is a subsection

A.5.2 Second subsection

This is another subsection.

A.6 Images and figures

All images and figures in the document will be placed in the "fig" folder. They can be included as follows:

Figure 1: An example of image

Note that the figures are automatically numbered according to the chapter and the number of figures that have previously appeared in that chapter. There are many ways to define the size of a figure, but it is advisable to use the one shown in this example: the width of the figure is defined as a percentage of the total width of the page, and the height is automatically scaled. In this way, the maximum width of a figure would be 1.0 * textwidth, which would ensure that it is displayed at the maximum possible size without exceeding the margins of the document.

Note that LaTeX tries to include figures in the same place where they are declared, but sometimes this is not possible due to space constraints. In those cases, LaTeX will place the figure as close to its declaration as possible, perhaps on a different page. This is normal behavior and should not be avoided.

A.7 References

Notice how the "label" command has been used several times in the source code for this section. This command allows you to mark an element, be it a chapter, section, figure, etc. to make a numeric reference to it. To reference a "label", use the "ref" command including the name of the reference:

This is the chapter **??**.

Examples of styles are shown in the **??** section.

The subsection **??** explains...

In Figure **??** we see that...

This saves us from having to directly write the indexes of the sections and figures we want to mention, since LaTeX does it for us and also takes care of keeping them updated in case they change (try moving this chapter to the end of the document and see how all referenced indices are updated automatically). Also, "ref" references act as hyperlinks within the document that take you to the referenced element when you click on them.

It is usual to name "label" with a prefix indicating the type of element to find it later more easily, but it is not mandatory.

A.8 Code snippets

Code snippets can be included via listing:

```python
num = float(input("Enter␣a␣number:␣"))
if num > 0:
    print("Positive␣number")
elif num == 0:
    print("Zero")
else:
    print("Negative␣number")
```

Code extraction 1: Python code

A wide variety of languages are supported:

```java
public class Test {
    public static void main(String[] args) {
        System.out.println("Hello,␣world!");
    }
}
```

Code extraction 2: Java coode

Code snippets can also be referenced via label/ref: Code snippets **??** and **??**.

A.9 Links

You can link to an external website using the url command: https://www.example.com. A link can also be linked to text using the href command: example domain.

A.10 Citations and bibliography

In LaTeX, bibliography items are stored in a bibliographic file in a format called BibTeX, in the case of this project they are in "bibliography.bib". To cite an element, use

the "cite" command. You can cite both scientific papers [**?**] or books [**?**] as well as web links [**?**]. Citations are automatically numbered and included in the bibliography section of the document.

Note how bibliographic items stored in "bibliography.bib" have an associated tag, which is the one included when citing them using cite. Adding a reference to the bibliographic file does not make it automatically appear in the bibliography section of the work, it is necessary to cite it somewhere in it.

A.11   Equations

LaTeX has a powerful engine for displaying mathematical equations and an extensive catalog of mathematical symbols. The math environment can be activated in many ways. To include simple equations in a text, they can be surrounded by dollar signs: $1 + 2 = 3$, $\sqrt{81} = 3^2 = 9$, $\forall x \in y \; \exists \; z : S_z < 4$.

More complex equations can be expressed separately and are numbered: equation **??**.

$$\lim_{x \to 0} \frac{e^x - 1}{2x} \overset{\left[\frac{0}{0}\right]}{\underset{\text{H}}{=}} \lim_{x \to 0} \frac{e^x}{2} = \frac{1}{2} + 7 \int_0^2 \left(-\frac{1}{4} \left(e^{-4t_1} + e^{4t_1 - 8} \right) \right) dt_1 \tag{1}$$

There is here an extensive list of symbols that can be used in math mode.

A.12   Special characters and symbols

Some characters and symbols must be escaped in order to be rendered in the document, as they have a special meaning in LaTeX. Some of them are:

- The dollar sign $ is used for equations.

- The percentage % is used for comments in the source code.

- The euro symbol € often causes problems if typed directly.

- The underscore _ is used for subscripts in math mode.

- Quotes must be expressed 'like this' for single quotes and "like this" for double quotes. Spanish quotation marks can be expressed "like this".

- The backslash \ is used for LaTeX commands.

- Other symbols that must be escaped include the braces { }, the ampersand &, the hash #, and the greater-than > and less-than < symbols.