Noroff University College

Course Name

Cource Code

Title

Undertitle

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Abstract

A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from an article, so it must be able to stand alone. For this reason, references should be avoided. Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself. The abstract is a short summary of your document as a whole. It is always suggested that your abstract should not be longer that 150 words.

Keywords: *Immediately after the abstract, provide a list of 5-10 keywords. Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes. Try* ***not*** *to use overly generic terms such as* ***Cyber Security****,* ***Digital Forensics****, or* ***Data Science***

1 Introduction

This is the first **paragraph**. The number one occurs quite often in this paragraph. I am labelling every paragraph with their number, with this being one.

This is now the second *paragraph*. I am using this text to indicate that we are now in the second paragraph.

Lastly, I am also writing the third and final paragraph. Three paragraphs is all we need for this example. This is teaching you LaTeX in three easy paragraphs. But with additional packages, we can ~~do~~ do more.

1.1 This is a subsection with bullet-points

- Item One
- Item Two

1.2 This is a subsection with enumeration

1. Item One
2. Item Two

2 Mathematics in LaTeX

You can write mathematics inline in three different ways. The first way is $E = mc^2$, The second way is $E = mc^2$, and the last way is $E = mc^2$.
This illustrates how you can write the equation on their own line. This looks a lot better.

$$E = mc^2$$

The above mentioned way is not used often, as it is better to have your equations numbered. The typical way maths is shown when it is numbered is as follows.

$$E = mc^2 \tag{1}$$

There are also other ways where mathematics is much easier to write in LaTeX. We write integrals using $\int$ and fractions using $\frac{a}{b}$.

$$\int_0^1 \frac{1}{e^x} = \frac{e-1}{e} \tag{2}$$

Lower case Greek letters are written as ω δ etc. While upper case Greek letters are written as Ω Δ

Mathematical operators are prefixed with a backslash as $\sin(\beta)$, $\cos(alpha)$, $\log(x)$ etc.

3 Explaining Figures

Figures are one of the most complicated items in LaTeX. Similar to all other things in LaTeX, a figure has to begin and end somewhere. We will also need to upload the figure. The preferred format for LaTeX is PDF or TIFF files.

Figure 3.1: Noroff Logo

As you can see in figure 3.1, this is the logo you encounter every time you are browsing social media. Figure 3.1 is used by Noroffs marketing team even on page 2.

4 Explaining Tables

Table are quite difficult to draw in LaTeX, however, it is something that is needed quite often. Lets start by doing a very basic table.

cell1	cell2	cell3
cell4	cell5	cell6
cell7	cell8	cell9

Table 1: Test table 1

There is a table, however, it does not look like a normal table. We are missing the lines. Let's add the lines to it now.

cell1	cell2	cell3
cell4	cell5	cell6
cell7	cell8	cell9

Table 2: Test table 2

The last table, table 3, depicts the students at NUC that are sick of the online marketing campaign. There are many different ways how we can design it. Something to note, the caption on a table is always **above** and the caption on a figure should always be **below** it.

Table 3: Students marketing opinions

Location	Like	Dislike
Oslo	3	972
Kristiansand	0	5486
Bergen	1	875
Total	4	7333

4.1 Generating tables online

Table 4: Using www.tablesgenerator.com

Merged Heading		
cell1	**cell2**	cell3
cell4	cell5	ell6

Table 5: Using www.latex-tables.com

Merged Heading		
cell1	**cell2**	cell3
cell4	cell5	cell6

5 Booktabs

Table 6: Example of advanced tables

Algorithm	KNN	DT	LR	SVM
Accuracy in general	Medium	Medium	Medium	Good
Explanation ability of the trained model	Good	Good	Medium	Low
Model parameter handling	Low	High	Low	High
Learning time with respect to number of samples and features	-	$\mathcal{O}(n^2d)$	$\mathcal{O}(nd)$	$\mathcal{O}(n^2d + n^3)$
Time to classify a test sample	$\mathcal{O}(knd)$	$\mathcal{O}(d)$	$\mathcal{O}(d)$	$\mathcal{O}(n_{sv}d)$
Tolerance to noise	Low	Medium	Low	Medium
Tolerance to overfitting	Medium	Low	Medium	High
		n = number of observations d = number of features k = number of dimensions n_{sv} = number of support vectors		

6 Multiple columns

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

7 Code highlighting

```
    import numpy as np

    def incmatrix(genl1,genl2):
        m = len(genl1)
        n = len(genl2)
        M = None #to become the incidence matrix
        VT = np.zeros((n*m,1), int)  #dummy variable

        #compute the bitwise xor matrix
        M1 = bitxormatrix(genl1)
        M2 = np.triu(bitxormatrix(genl2),1)

        for i in range(m-1):
            for j in range(i+1, m):
                [r,c] = np.where(M2 == M1[i,j])
                for k in range(len(r)):
                    VT[(i)*n + r[k]] = 1;
                    VT[(i)*n + c[k]] = 1;
                    VT[(j)*n + r[k]] = 1;
                    VT[(j)*n + c[k]] = 1;

                    if M is None:
                        M = np.copy(VT)
                    else:
                        M = np.concatenate((M, VT), 1)

                    VT = np.zeros((n*m,1), int)

        return M
```

Listing 1: Example from internal code

Testing One-line code.

```
Lewi = [ letter for letter in 'Lewi' ]
```

Testing from external file.

```
# Precondition 1: The "rantint" function from the random module is imported.
from random import randint

# Precondition 2: All input values are integers.
class RandomNumRange:
    def randy(self, amount: int, min_range: int, max_range: int) -> list:
        """
        A method providing a set-list of random integers in a specific range.

        Args:
            amount (int): The quantity of items in the return list.
            min_range (int): The first possible selectable number.
            max_range (int): The last possible selectable number.

        Returns:
            list: A list containing all the random integers. Note! These may
            not be unique to each other.
        """
        self.amount = amount
        self.min_range = min_range
        self.max_range = max_range

        return [randint(min_range, max_range) for i in range(amount)]


_inst = RandomNumRange()
random_list = _inst.randy(10, 1, 20)
print(random_list)

# Postcondition 1: The output type is a list.
assert isinstance(list(), type(random_list))

# Postcondition 2: The length of the amount input and the list is equal.
assert len(random_list) == _inst.amount
```

Listing 2: Example from external file

Double backslashes or newline at the end of a line performs a line-break.
Like this text on a new line. The hfill + break can also be used
Like this.

Double backslashes and a asterisk at the end of a line performs a line-break without making it a new paragraph.

noindent before a line in a new paragraph makes it have no indentation. With vspace I can control the space before and after a paragraph.

hfil breaks the line in two.
hspace 1cm makes a space of exactly that width.

This is some text that is to the left

This is some text that is centered

This is some text that to the right

7.1 Testing diagrams

Figure 7.1 shows **one** way of making a diagram.

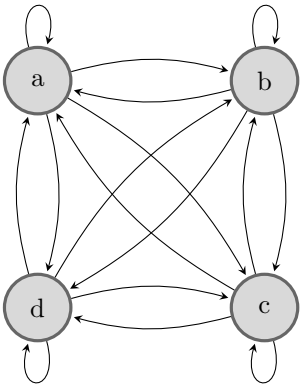

Figure 7.1: Diagram One

Figure 7.2 shows **anoter** way of making a diagram.

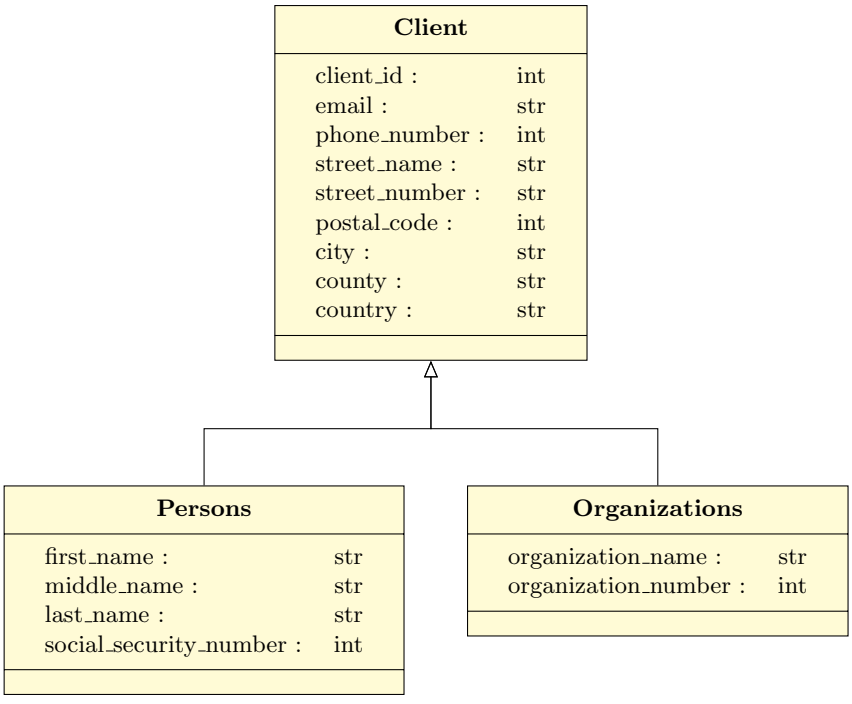

Figure 7.2: Diagram Two

8 The Matrix

Here's a matrix in the center!

$$\begin{matrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{matrix}$$

Here's another matrix $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$ inline of the text.

Here's the little brother $\left(\begin{smallmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{smallmatrix}\right)$ inline of the text.

Here's a matrix justified to the left.

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

Here's a matrix justified to the right.

$$\begin{Bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{Bmatrix}$$

Here's Johnny! $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$

Here's Johnny's brother! $\begin{Vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{Vmatrix}$

Here's Johnny's cousin! $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$

Here's Johnny's baby momma! $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$

Here's Johnny's sista! $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$

9 Citation Test

Making some citations outside brackets Bharathi.Sv and Geetha (2017) like this, and inside (Bollen et al., 2010), like this. We can include all author names (El Alaoui, Youssef, Messoussi, Chaabi, Todoskoff, and Kobi, 2018), like this. Or we can use et al. for more than two authors (Kalyani et al., 2016). We can even have multiple citations (Kim and Jeong, 2019), like this. And finally we can include page numbers (Kordonis et al., 2016, p. 22), like this.

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