University *of Ljubljana*
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Natural language processing course: Analysis and comparison of translation errors and biases in LLMs

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Abstract

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Keywords
Natual language processing, bias, translation errors, bias in LLMs

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Introduction

For the purpose of the project, we compiled a dataset of texts containing information about politics for the purpose of finding out how a language model will translate this genre of text and if there might be some political bias in the translations. The LLMs evaluated in this project were ChatGPT, Deepseek and Mistral AI. They were chosen because they are currently popular and widely used and also because they come from three different countries (USA, France and China), which have different cultures as well as legislation. Besides looking at the quality of translations and biases that might be present, we will evaluate if the bias is similar among these three models or if the fact that they are from different countries might affect the bias.

The bias in language might seem insignificant to some, but it can impact how we view things like minority groups or gender roles. Because large language models are made on human language and our texts, they often produce a biased language which is a reflection of our own. As discussed in the article Biases in Large Language Models: Origins, Inventory, and Discussion by Roberto Navigli et al., a language bias occurs in two ways. It starts with the data that is selected to be used to train an LLM, and shows in the output that it produces. Bias can show in gender, religion, age, sexual orientation, race and many more. An example of a gender bias for example would be an LLM using a she when talking about a nurse, but a he when talking about a doctor, even if the text never specifically specifies what gender they are. This usually happens because the data used for training contained most material, where nurses were women and doctors were men, so it leans toward that ”opinion” as well. When training the LLM we should try to make it less biased by choosing different kinds of data, as well as correct any bias that might appear, when fine tuning the model.

Methods

Use the Methods section to describe what you did an how you did it – in what way did you prepare the data, what algorithms did you use, how did you test various solutions ... Provide all the required details for a reproduction of your work.

Below are LaTeXexamples of some common elements that you will probably need when writing your report (e.g. figures, equations, lists, code examples ...).

Equations

You can write equations inline, e.g. $\cos\pi = -1$, $E = m \cdot c^2$ and α, or you can include them as separate objects. The Bayes's rule is stated mathematically as:

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}, \tag{1}$$

where A and B are some events. You can also reference it – the equation 1 describes the Bayes's rule.

Lists

We can insert numbered and bullet lists:

1. First item in the list.
2. Second item in the list.
3. Third item in the list.

- First item in the list.
- Second item in the list.
- Third item in the list.

We can use the description environment to define or describe key terms and phrases.

Word What is a word?.

Concept What is a concept?

Idea What is an idea?

Random text

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Figures

You can insert figures that span over the whole page, or over just a single column. The first one, Figure 1, is an example of a figure that spans only across one of the two columns in the report.

On the other hand, Figure 2 is an example of a figure that spans across the whole page (across both columns) of the report.

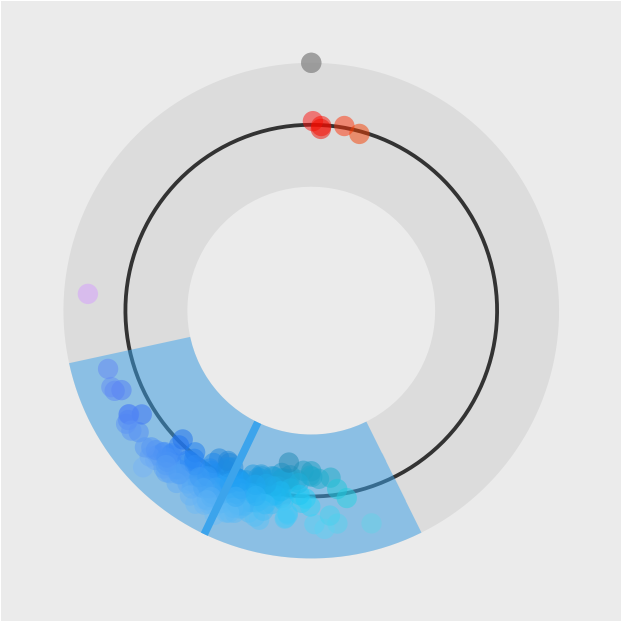

Figure 1. A random visualization. This is an example of a figure that spans only across one of the two columns.

Tables

Use the table environment to insert tables.

Table 1. Table of grades.

Name		
First name	Last Name	Grade
John	Doe	7.5
Jane	Doe	10
Mike	Smith	8

Code examples

You can also insert short code examples. You can specify them manually, or insert a whole file with code. Please avoid inserting long code snippets, advisors will have access to your repositories and can take a look at your code there. If necessary, you can use this technique to insert code (or pseudo code) of short algorithms that are crucial for the understanding of the manuscript.

Listing 1. Insert code directly from a file.

```
import os
import time
import random

fruits = ["apple", "banana", "cherry"]
for x in fruits:
  print(x)
```

Listing 2. Write the code you want to insert.

```
import(dplyr)
```

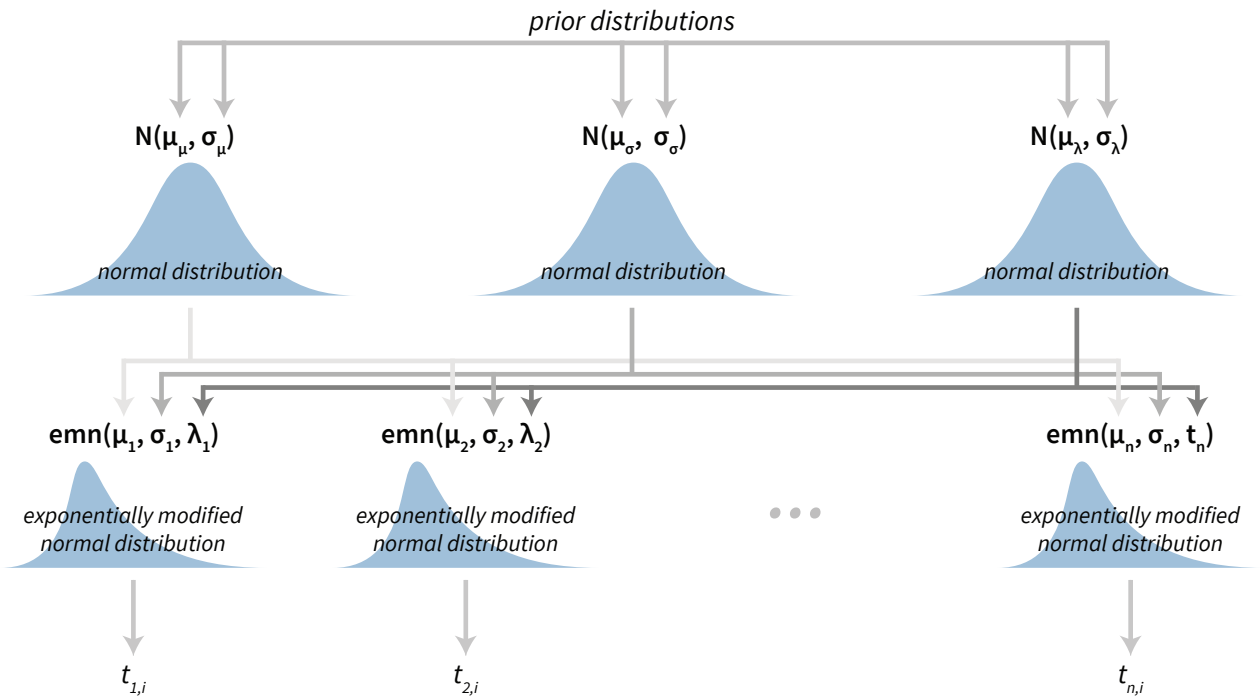

Figure 2. Visualization of a Bayesian hierarchical model. This is an example of a figure that spans the whole width of the report.

```
import(ggplot)

ggplot(diamonds,
           aes(x=carat, y=price, color=cut)) +
  geom_point() +
  geom_smooth()
```

Results

Use the results section to present the final results of your work. Present the results in a objective and scientific fashion. Use visualisations to convey your results in a clear and efficient manner. When comparing results between various techniques use appropriate statistical methodology.

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Discussion

Use the Discussion section to objectively evaluate your work, do not just put praise on everything you did, be critical and exposes flaws and weaknesses of your solution. You can also explain what you would do differently if you would be able to start again and what upgrades could be done on the project

in the future.

Acknowledgments

Here you can thank other persons (advisors, colleagues ...) that contributed to the successful completion of your project.

References

Roberto Navigli, Simone Conia, and Björn Ross. 2023. Biases in Large Language Models: Origins, Inventory, and Discussion. J. Data and Information Quality 15, 2, Article 10 (June 2023), 21 pages. https://doi.org/10.1145/3597307

data used for translation and bias analysis: https://www.theguardian.com/us-news/2025/mar/20/trump-executive-order-education-department
https://arxiv.org/pdf/2412.04782