FRI Natural language processing course 2024
Project report

University of Ljubljana
Faculty of Computer and Information Science

LLM Prompt Strategies for Commonsense-Reasoning Tasks

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Abstract

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Keywords
Keyword1, Keyword2, Keyword3 ...

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Introduction

Due to their ability to generate human-like text and perform well on a variety of tasks, large language models, *(LLMs)*, have become increasingly popular topic in recent period. Nowadays, they are almost a daily tool for not just researchers, but millions of people.

However, there are still some tasks that LLMs struggle with, such as simple math and logic, commonsense reasoning. This is due to the fact that LLMs are trained on large corpora of text and are not explicitly taught to reason about the world. In order to improve their performance on these tasks, well-constructed prompts have been shown to be effective. In this paper, we will explore different prompt strategies for improving the performance of LLMs on commonsense-reasoning tasks, such as *Chain of Thought* (CoT), *in-context learning*, *plan-and-solve techniques*, etc.

Effectiveness of these techniques will be evaluated on commonsense reasoning datasets; such as *CommonsenseQA* and *BIG-Bench*. The models we will be using for strategies evaluation will be *ChatGPT*, *Gemini*, and *LLaMA*.

Related work

WORK IN PROGRESS

Most modern LLMs have difficulties when faced with simple math and logic (WHAT ELSE) reasoning tasks[]. However well constructed prompts (prompting) has been shown to increase their performance[].

An early technique in this field is Chain-of-Thought (CoT) []. This method adds a tipple of the form *(input, chain of thought, output)* with the hope that when the model gets an input (a question) it will follow it up with a chain of thought and then the output. The example CoT that is passed to the LLM breaks down problem into smaller steps that are easier to solve. The benefits of this approach is that when the model can allocate more steps/time to the more difficult aspects of the problem and it also give the user some insight in to the models reasoning.

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.

Tables

Use the table environment to insert tables.

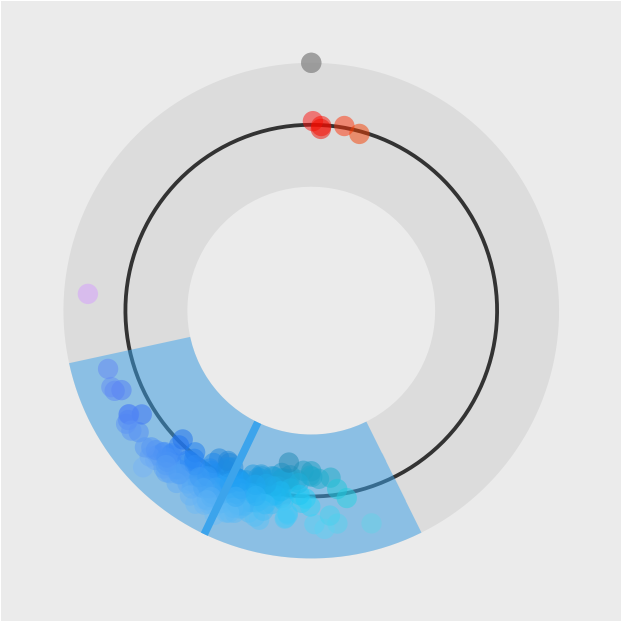

Figure 1. A random visualization. This is an example of a figure that spans only across one of the two columns.

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)
import(ggplot)

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

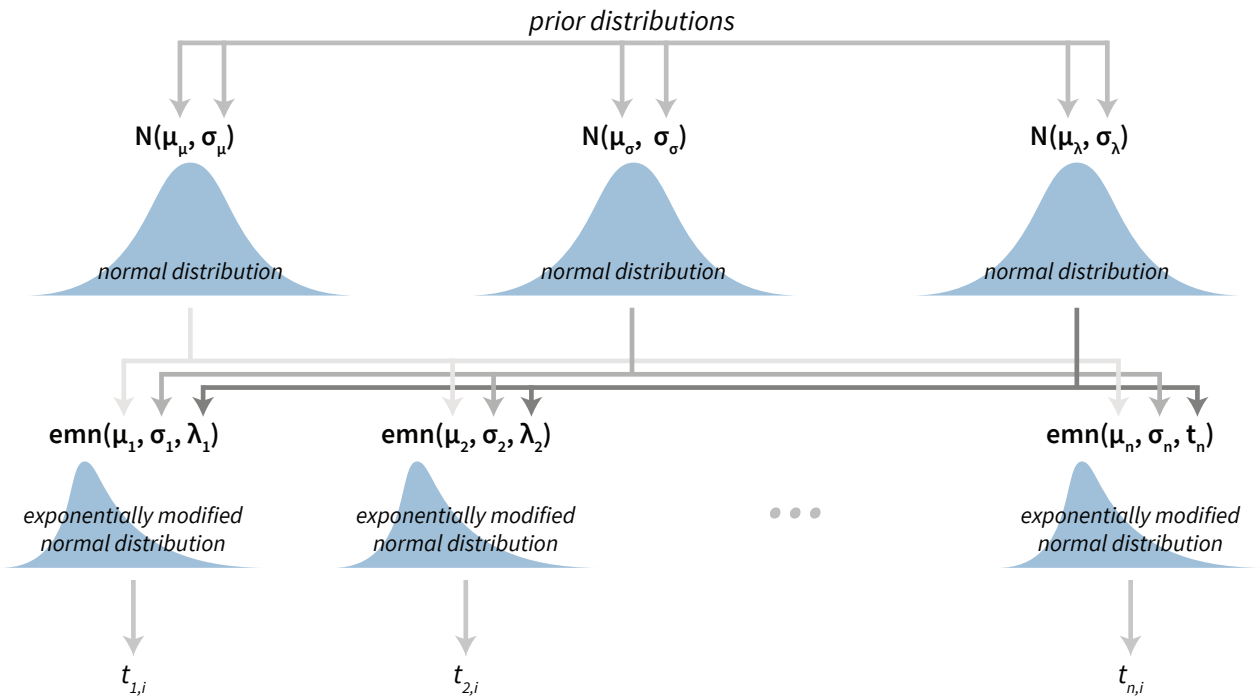

Figure 2. Visualization of a Bayesian hierarchical model. This is an example of a figure that spans the whole width of the report.

```
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.

More random text

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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