

From Gao et al. [1] we have substantial examples of why RAG is important and how it helps AI be more accurate and reliable. The authors propose a novel RAG model that combines a large language model with a retrieval mechanism, allowing the model to generate responses based on both pre-trained knowledge and external sources. This approach significantly improves the accuracy of the responses, making the model more reliable and informative.

For this project, we will, however, focus on a type of RAG that incorporates web-scraped data to address the problem of outdated information. The knowledge embedded in large language models tends to become outdated over time [2], making it crucial to retrieve and integrate external sources dynamically.

Pokhrel et al. [3] explore the integration of AI and web scraping in RAG. Their approach combines web scraping, vectorization, and semantic search, allowing users to input a specific website and then ask questions exclusively based on its content. While this method effectively retrieves domain-specific information, it requires the user to specify a website beforehand. In our work, we wish to build upon this approach by enabling both targeted and general prompts. If a user requests information from a specific website, our chat-bot will focus on that source. However, if no specific website is provided, the system will still perform web scraping in the background, integrating newly retrieved knowledge with the model's pre-trained information. This ensures that responses remain accurate and up to date while maintaining flexibility for both broad and focused queries.

The concept of leveraging web-scraped data through RAG was explored by Kanataria et al. [4], where authors proposed a novel framework that integrates RAG techniques with large language models (LLMs) like Llama 3, Mistral, and Gemini, enhancing the process of data retrieval and summarization from online sources. This framework combines web scraping, embedding models, and FAISS for efficient indexing, ensuring the delivery of real-time, personalized information. Our goal is to combine this approach with the one suggested by Pokhrel et al. [3], allowing the chatbot to dynamically retrieve and integrate information from any user-provided website, as well as from general web scraping.

Methods

Use the Methods section to describe what you did and 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 \LaTeX examples 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:

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

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.

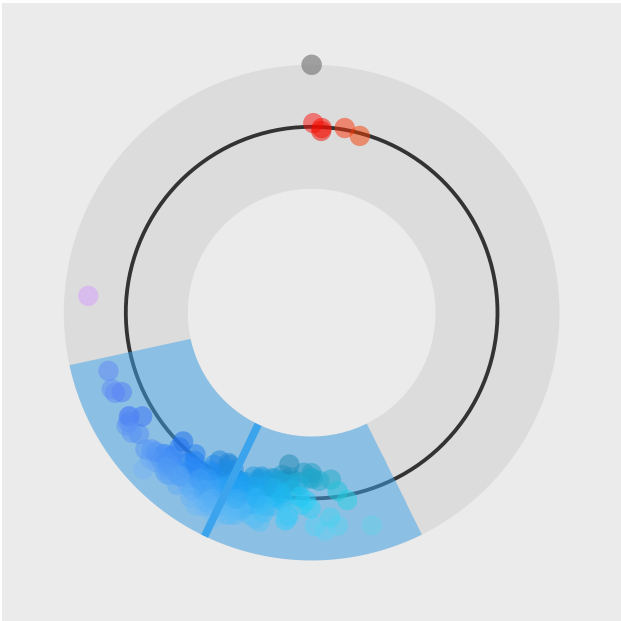


Figure 1. A random visualization. This is an example of a figure that spans only across one of the two columns.

Table 1. Table of grades.

Name		Grade
First name	Last Name	
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() +
```

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.

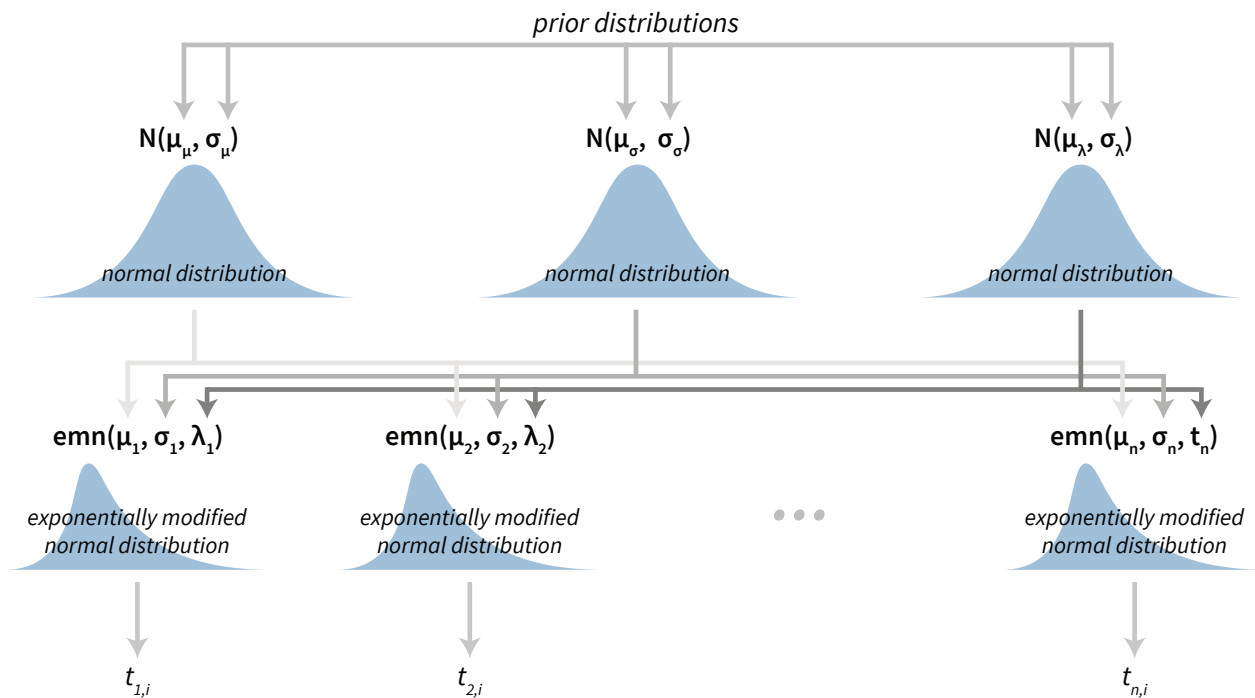


Figure 2. Visualization of a Bayesian hierarchical model. This is an example of a figure that spans the whole width of the report.

Acknowledgments

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

References

- [1] Yunfan Gao, Yun Xiong, Xinyu Gao, Kangxiang Jia, Jinliu Pan, Yuxi Bi, Yi Dai, Jiawei Sun, Meng Wang, and Haofen Wang. Retrieval-augmented generation for large language models: A survey, 2024.
- [2] Hangfeng He, Hongming Zhang, and Dan Roth. Rethinking with retrieval: Faithful large language model inference, 2022.
- [3] Sangita Pokhrel, Bina K C, and Prashant Bikram Shah. A practical application of retrieval-augmented generation for website-based chatbots: combining web scraping, vectorization, and semantic search. *Journal of Trends in Computer Science and Smart Technology*, 6(4):424–442, January 2025.
- [4] Nikunj Kanataria, Kunj Pareshbhai Patel, Hetul Niteshbhai Patel, Parth Goel, Krishna Patel, and Dweepna Garg. Rag-enhanced large language model for intelligent assistance from web-scraped data. In *2024 9th International Conference on Communication and Electronics Systems (ICCES)*, pages 1043–1048, 2024.