

Objectives

- Represent/Understand the different Nationally Determined Contributions (NDCs) submitted by various countries in the context of their decarbonisation goals.
- Cluster NDCs using an analytical method based on their similarities and distinct characteristics.
- Implement a deep analytical RAG System to create a Q&A Chatbot.
- Understand system limitations and approach further adjustments.

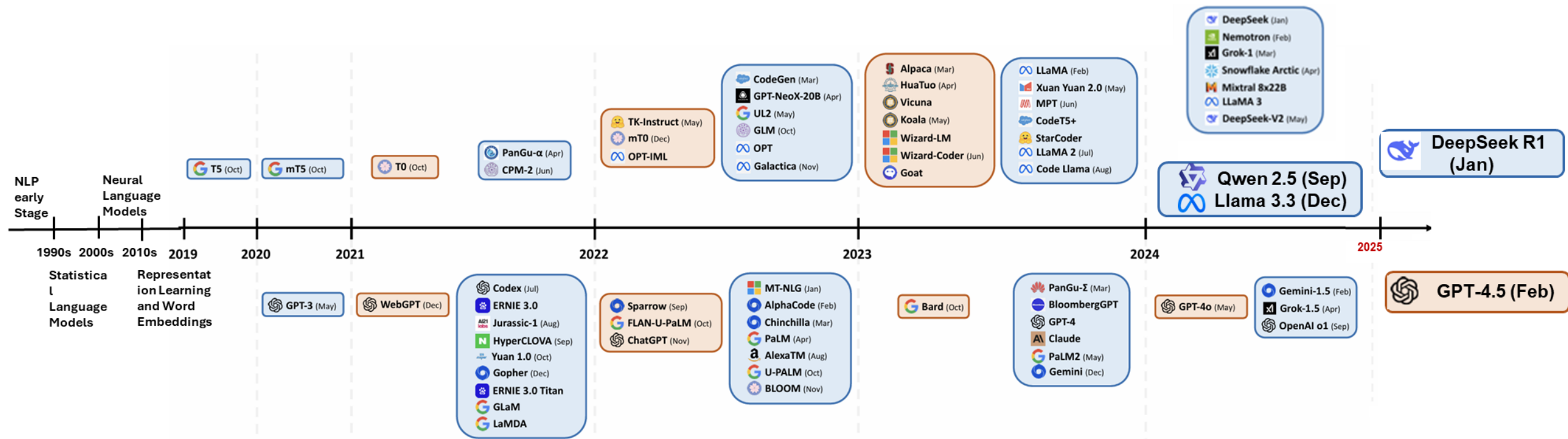


Input: Nationally Determined Contributions (NDCs)

- Number of documents: 252
- Geographical location:
Global / Country-level
- Content of Interest:
Overview of national
strategies and
decarbonisation goals



The Rapid Development of Large Language Models



Blue cards - pre-trained models

Orange cards - instruction-tuned models

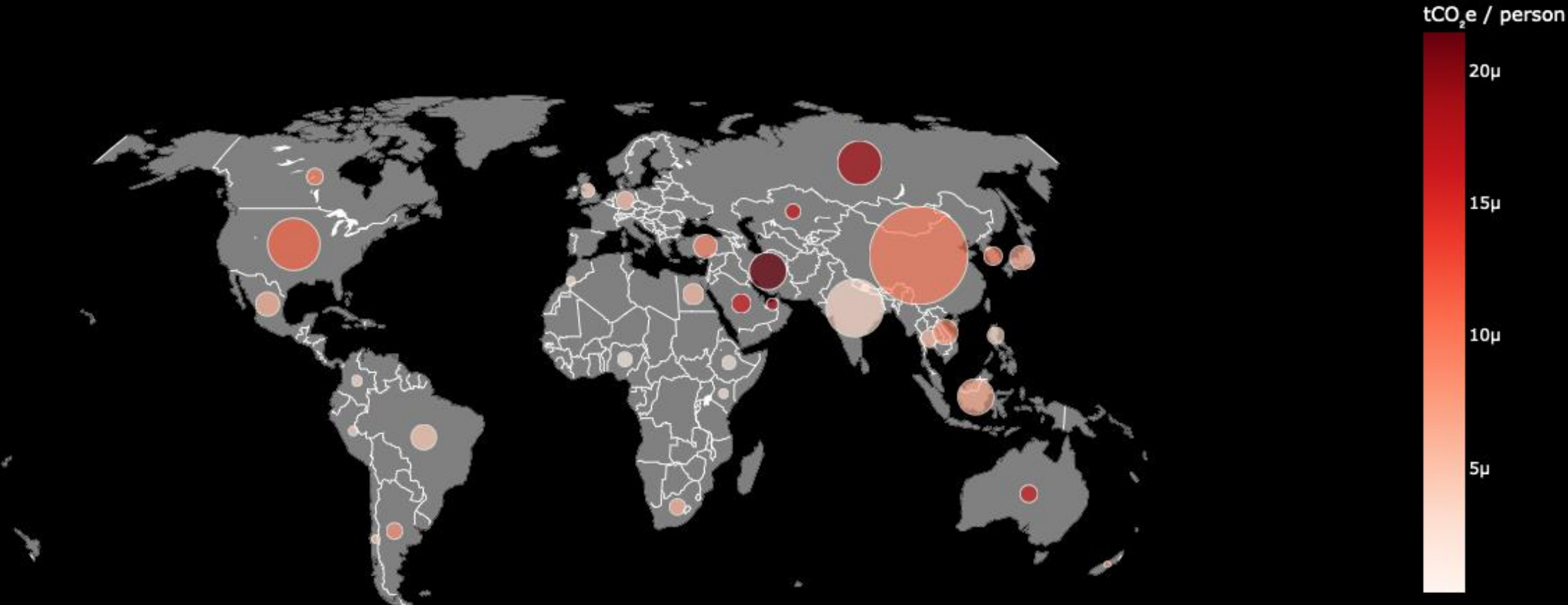
Upper half - open-source

Lower half - closed-source

- The most well-known among them is **ChatGPT** by the U.S. company OpenAI in recent years.
- Another model that made waves is **Deepseek (V3 and R1)**, released by the Chinese company Deepseek.

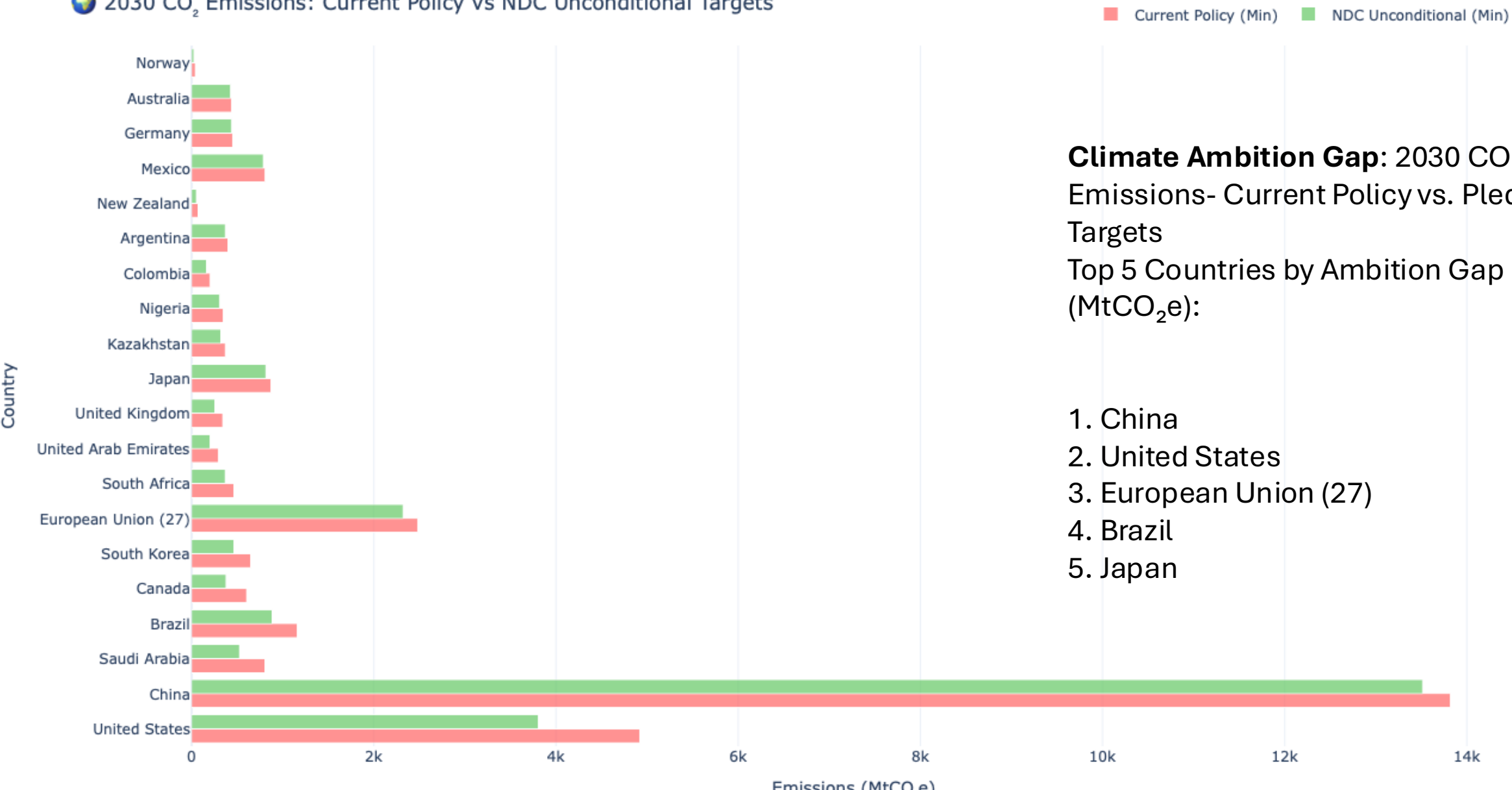
2030 CO₂ Emissions Map: Absolute and Per Capita Values by Country

🌍 2030 NDC Emissions Map



Climate Ambition Gap: 2030 CO2 Emissions- Current Policy vs. Pledged Targets

🌐 2030 CO₂ Emissions: Current Policy vs NDC Unconditional Targets



Climate Ambition Gap: 2030 CO₂ Emissions- Current Policy vs. Pledged Targets

Top 5 Countries by Ambition Gap (MtCO₂e):

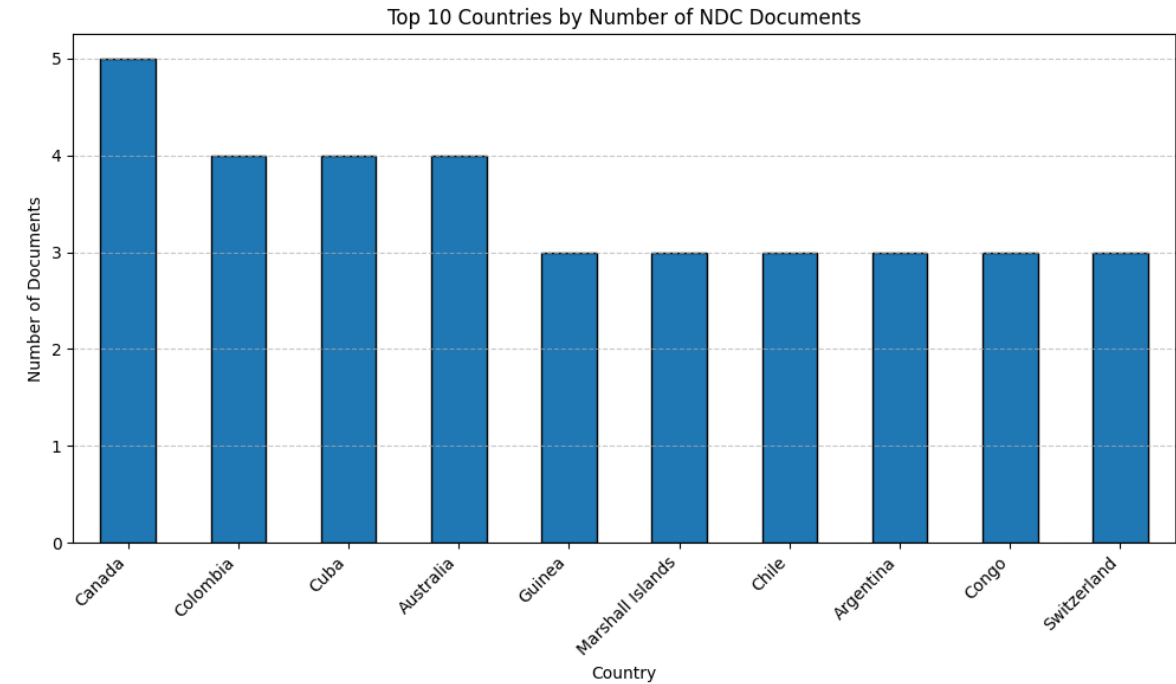
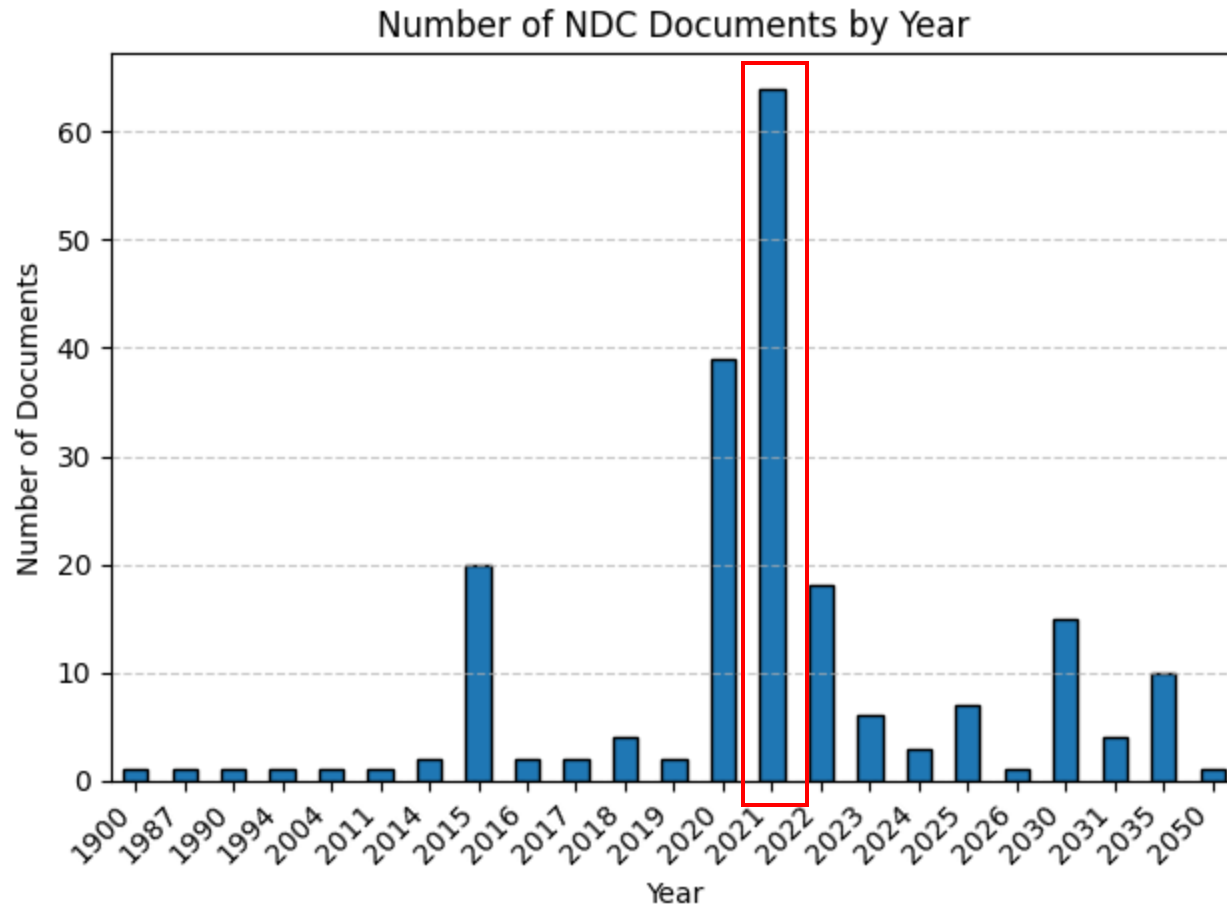
- 1. China
- 2. United States
- 3. European Union (27)
- 4. Brazil
- 5. Japan

Understand the Input: Analytical Method

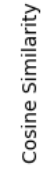
Word Cloud – All Countries' NDC Documents (2021)

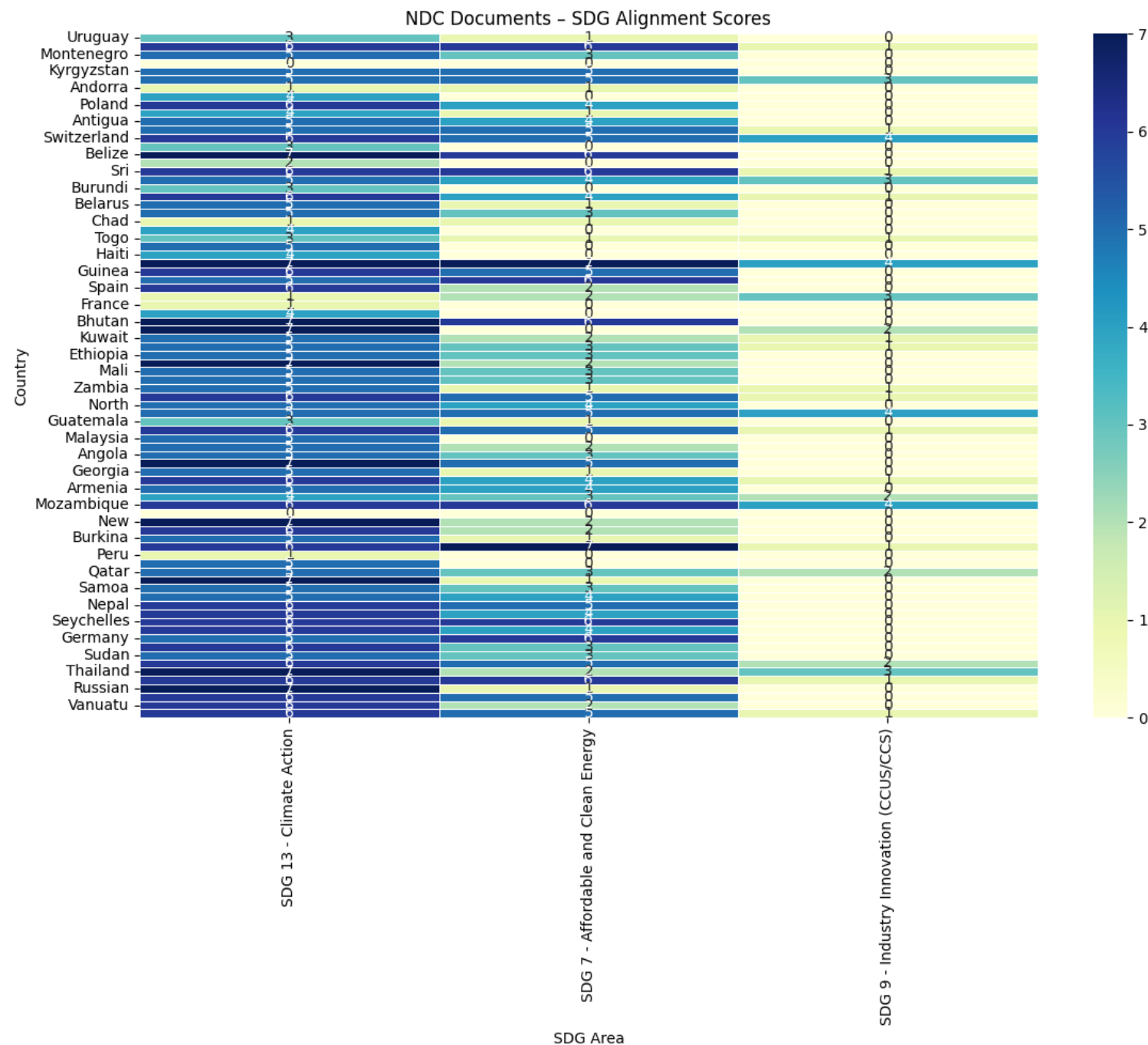


Understand the Input: Analytical Method



 - 1.0





SDG Alignment

SDG 13 (Climate Action) is strongly present across nearly all NDCs.

SDG 7 (Clean Energy) appears in a good number of countries, but less consistently.

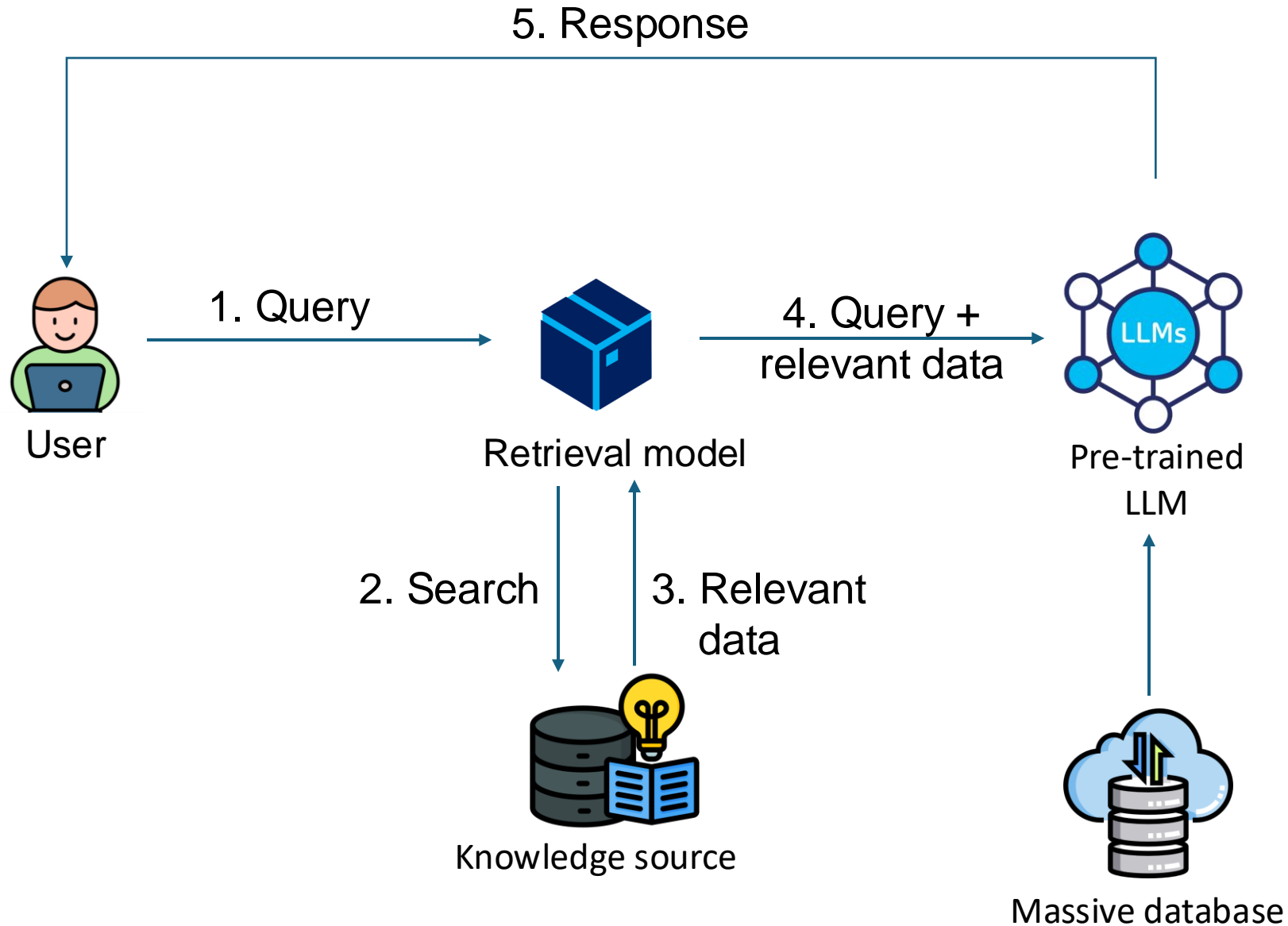
SDG 9 (Industry Innovation – CCUS/CCS) is much rarer — which makes sense, as not many countries discuss CCUS explicitly.

LLM Approach

NDC chatbot based on LLM and RAG:

- Question answering
- Cross-country comparison
- Policy insights

RAG for Policy



Example of RAG System Q&A Chatbot

```
user_query = "How much attention is China spending on Nitrogen emissions?"
```

✓ 4.4s

Python

China has been increasingly focusing on addressing nitrogen emissions as part of its broader environmental and climate change goals. The country has invested significantly in environmental and clean energy technologies. Since 2018, the central government has allocated substantial resources to research and development in these areas. The country's commitment to achieving peak carbon dioxide emissions by 2030 and carbon neutrality by 2060 indicates a comprehensive strategy to reduce greenhouse gas emissions. Through innovations like carbon emissions trading pilots, which have been operational since 2011, China is pioneering policy instruments to manage and reduce emissions.

Nationally Determined Contribution Chatbot

Select Countries:

China ×

US ×

EU ×

India ×

Colombia ×

Canada ×

Japan ×

Egypt ×

UK ×

Argentina ×

Australia ×

Brazil ×

Chile ×

Indonesia ×

Kazakhstan ×

Nigeria ×

Pakistan ×

Singapore ×

UAE ×

Zimbabwe ×

×

▼

Enter your query:

How are the countries planning to deliver their commitment for carbon emission reduction through technology development and investment ?

Submit

LLM Response for China:

China has outlined several strategies and initiatives to deliver on its commitment to reduce carbon emissions. Here's a summary of the key actions the country is taking:

1. ****Policy and Planning****: China is formulating and issuing various policy documents aimed at achieving carbon neutrality. These documents include guidance for accurate and comprehensive implementation of new development philosophies and specific action plans for carbon dioxide peaking by 2030.

LLM Response for Colombia:

Colombia has taken a strategic approach to meet its carbon emission reduction commitments, involving multiple initiatives and collaborations. Key strategies include:

1. ****International Collaborations****: Colombia has been part of joint declarations and agreements with countries like Norway, the United Kingdom, and Germany to work on reducing deforestation and promoting sustainable development. This collaboration aims to decrease greenhouse gas emissions and curb deforestation.

LLM Response for EU:

✓ Execute additional function

Enter Number of Clusters:

3

