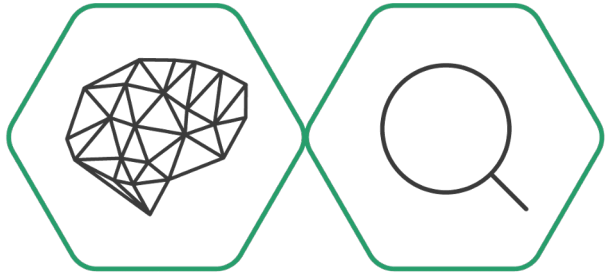
# Data Driven Narrative Temporal Analysis



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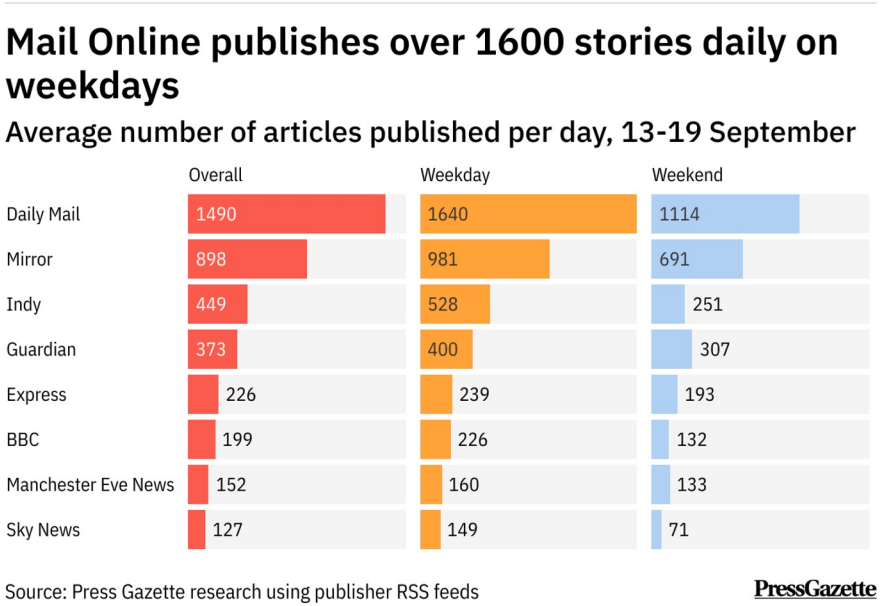
Xingyi Song, USFD
Martin Hyben, KInIT
Andrey Tagarev, ONTO

24/06/2025

VERA.AI Outcome Event

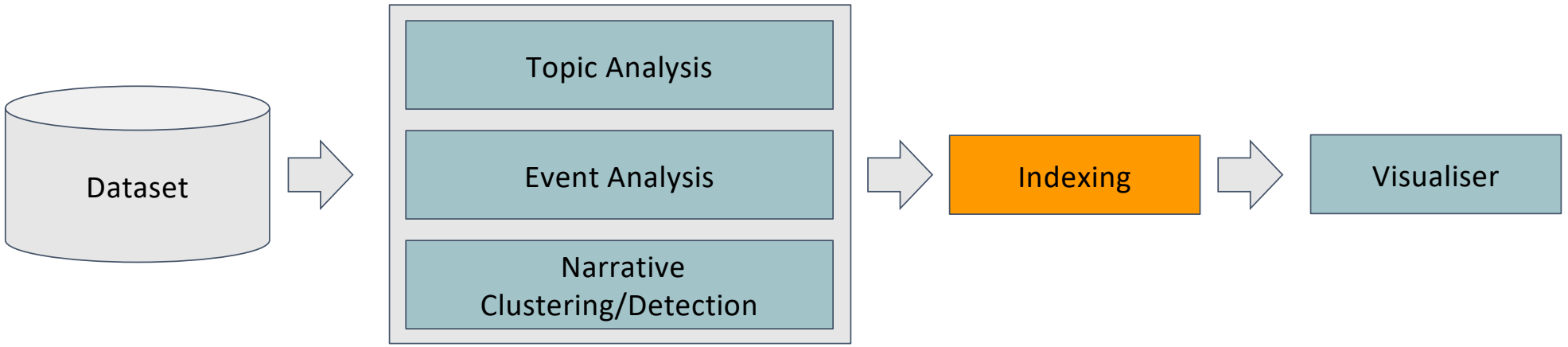
# Temporal Analysis

- Studying how topics, documents, and their relationships change across time slices.
  - When did a topic surface?
  - How long did it stay?
  - What preceded or followed?
- The amount of information require data driven method to aid the analysis



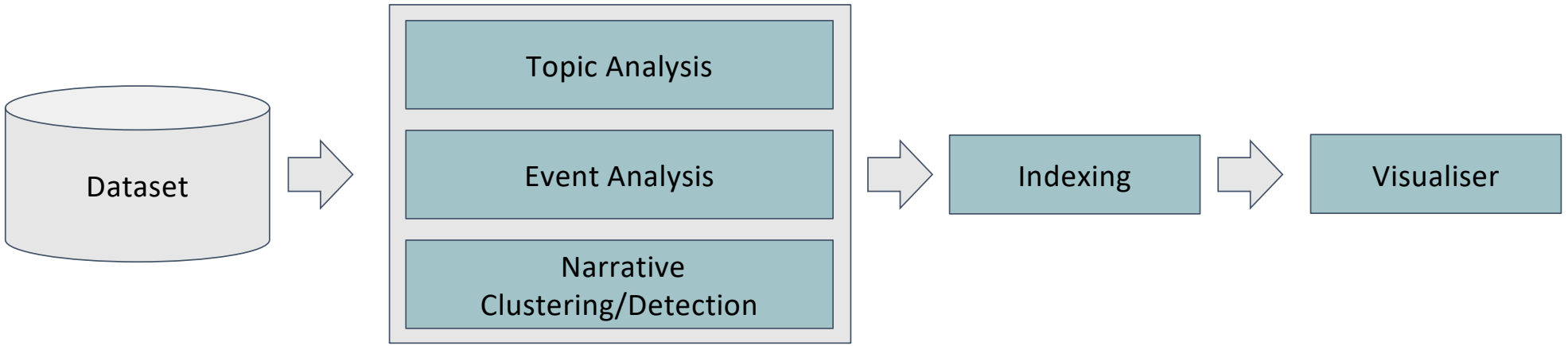

https://pressgazette.co.uk/media-audience-and-business-data/at-1500-stories-per-day-mail-online-is-uks-most-prolific-news-website/

# Narrative Features



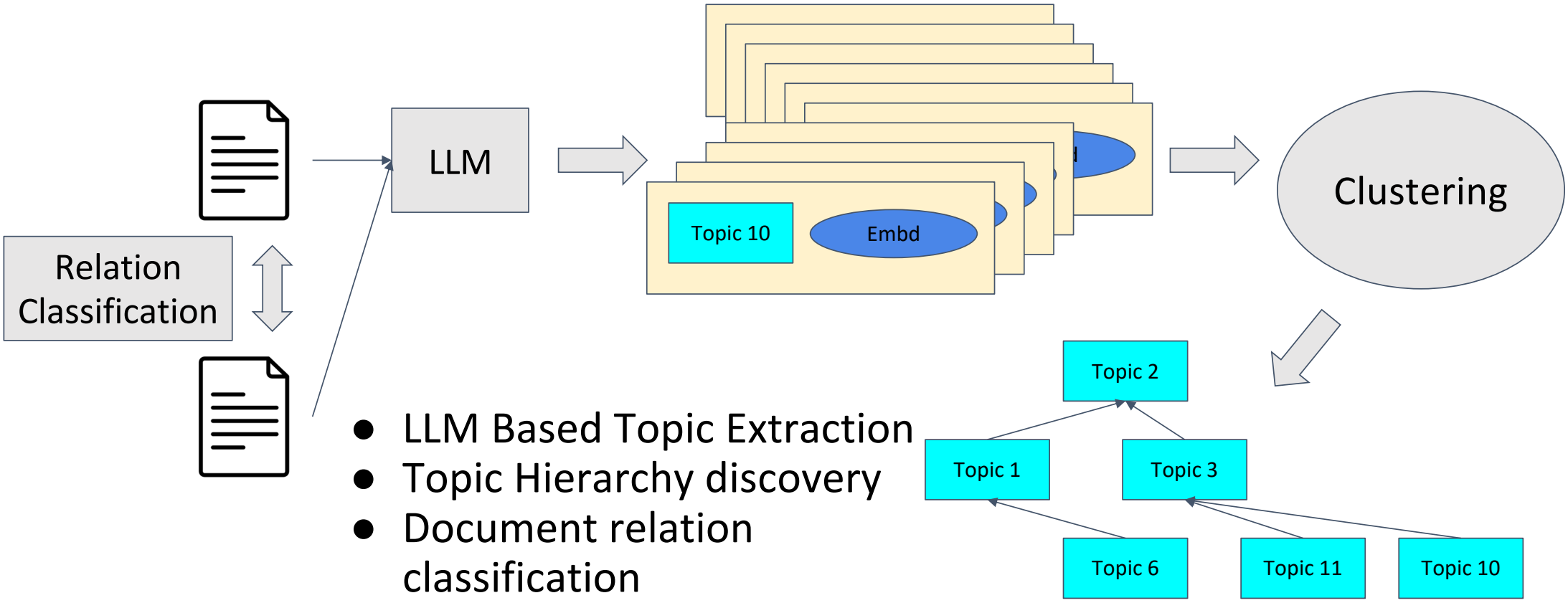

| doc_id | text | Topic | Topic hierarchy | Cluster | Location | ….. |
|---|---|---|---|---|---|---|
| 1 | "Hainan Welcomes Sally: Preparing to Take the Lead as a Cadre Who Stands Firm Against the Wind"Headline: Preparing to Face the Wind: … | Hainan Island Typhoon Sally | L2: Typhoons L1: Natural Disasters | 1 | Hainan | |
| 2 | "Hunan's Double 11: Over 170 E-commerce Enterprises in Longping High-Tech Zone Unite for Battle""A Small Space Writes a Big Story" - Insider Report on the …. | E-commerce Enterprises Zone Development | L1: E-commerce Industry | 2 | Hunan | |

# General Architecture




Feature Extraction

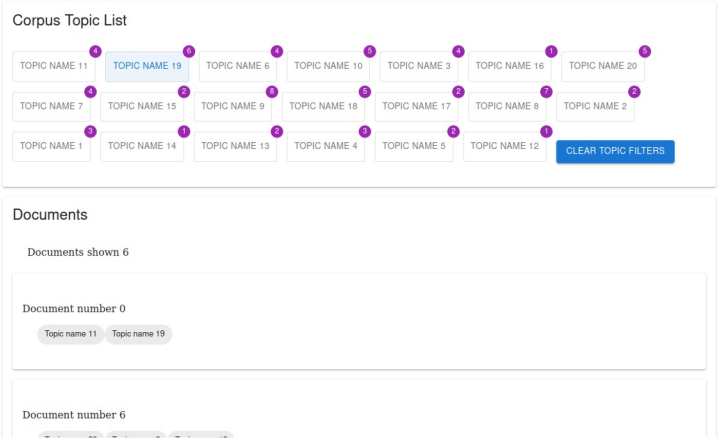
# USFD - Topic Discovery and Temporal Analysis

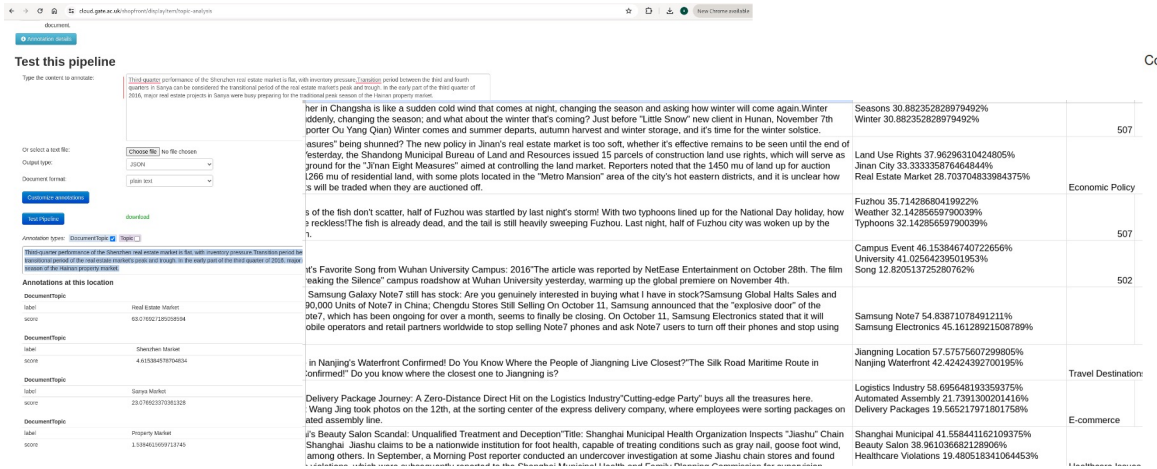


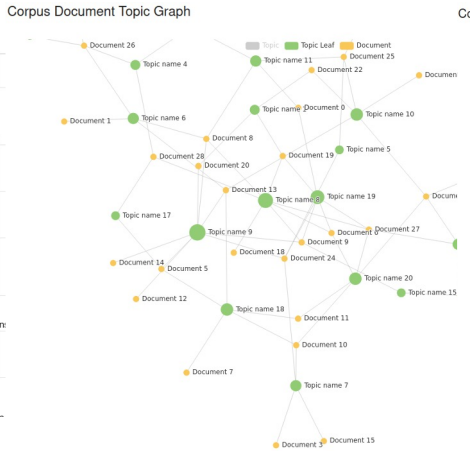

- LLM Based Topic Extraction
- Topic Hierarchy discovery
- Document relation classification

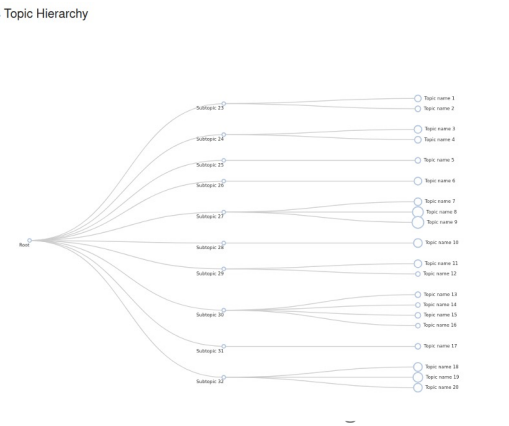
# USFD - Topic Discovery and Temporal Analysis

- API and UI available
  - https://cloud-api.gate.ac.uk/process/topic-analysis
  - https://temporal-analysis.demos.gate.ac.uk/

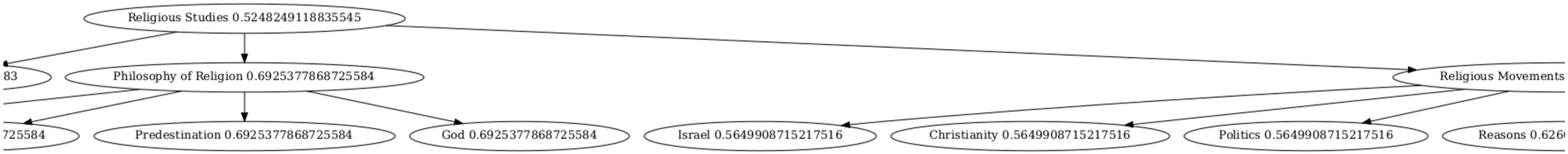


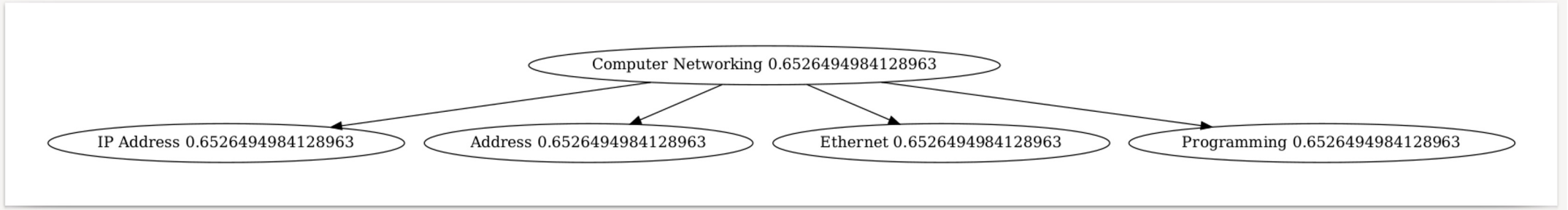



# Example of Topic Hierarchy

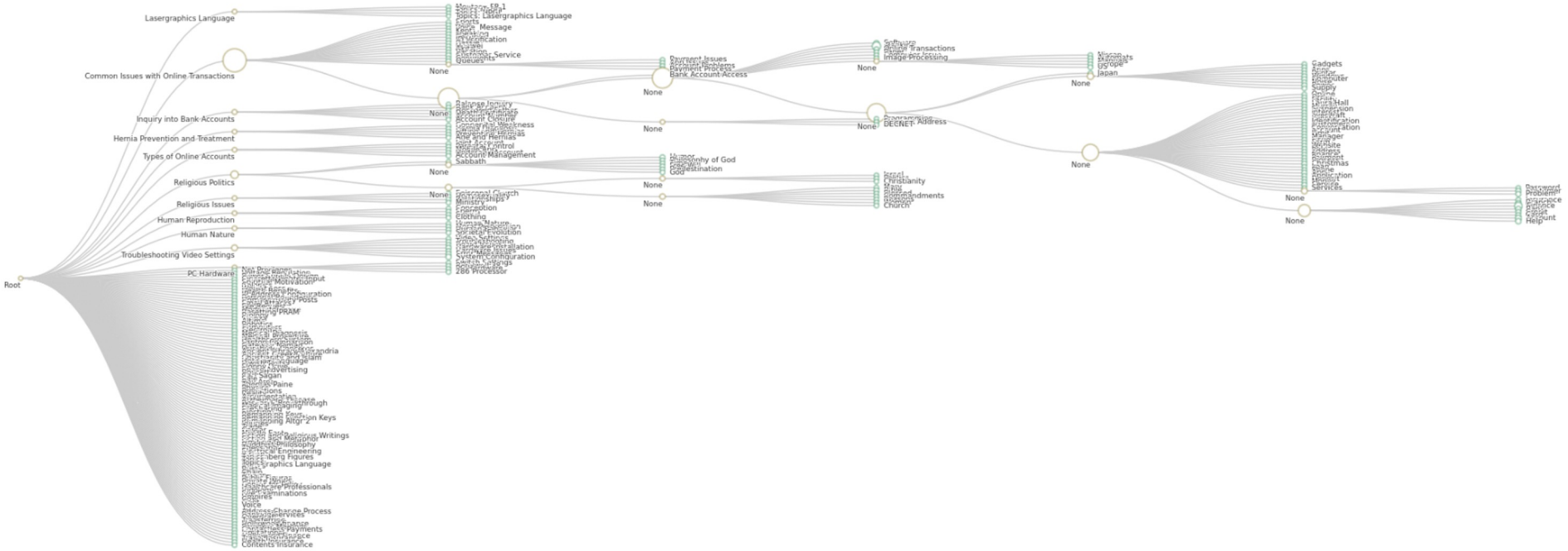



- Automatically generated topic hierarchy based on the corpus
- Allows filtering text for temporal analysis based on the topic granularity.

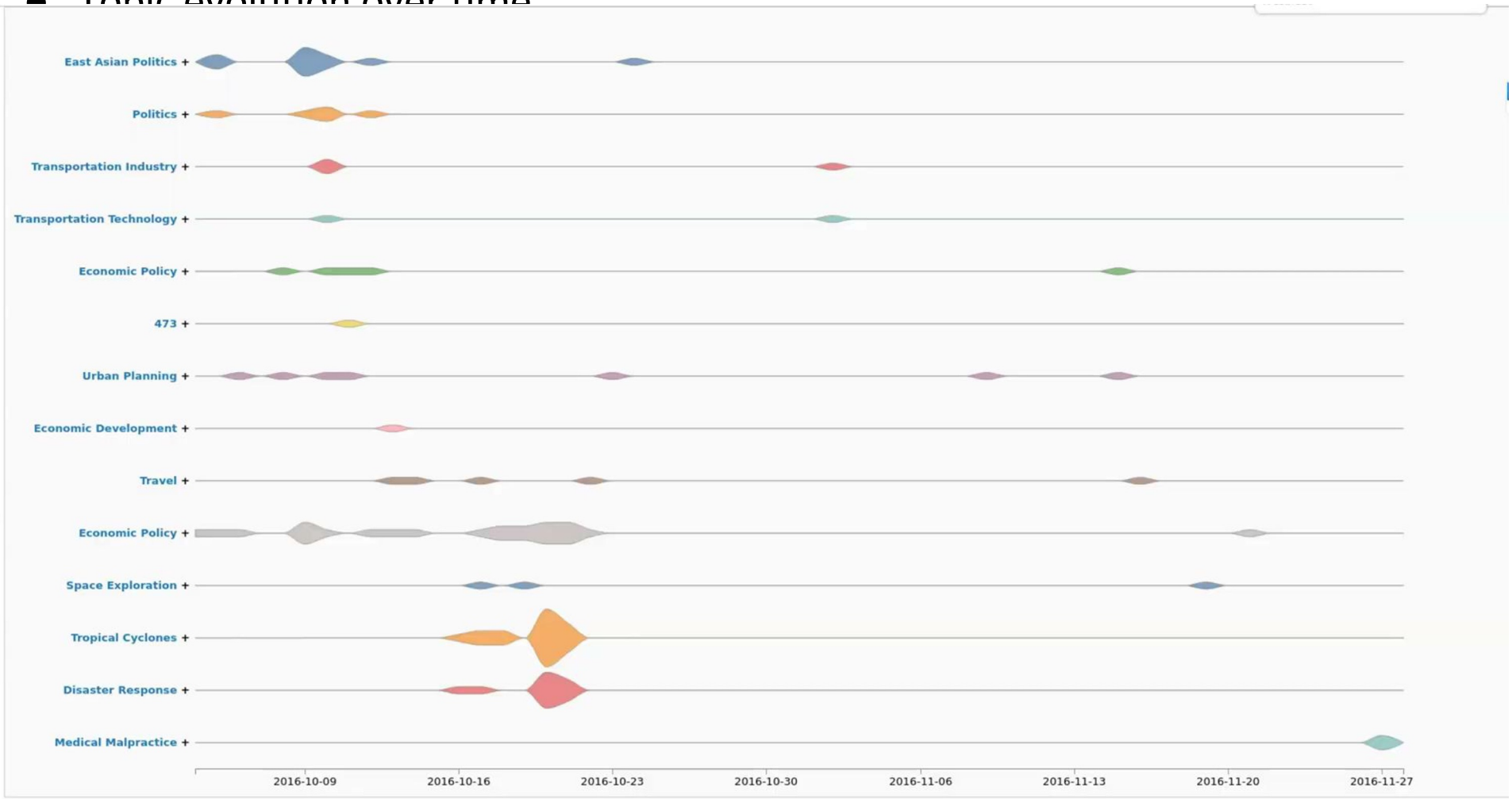
# Topic Discovery

Corpus Topic Hierarchy

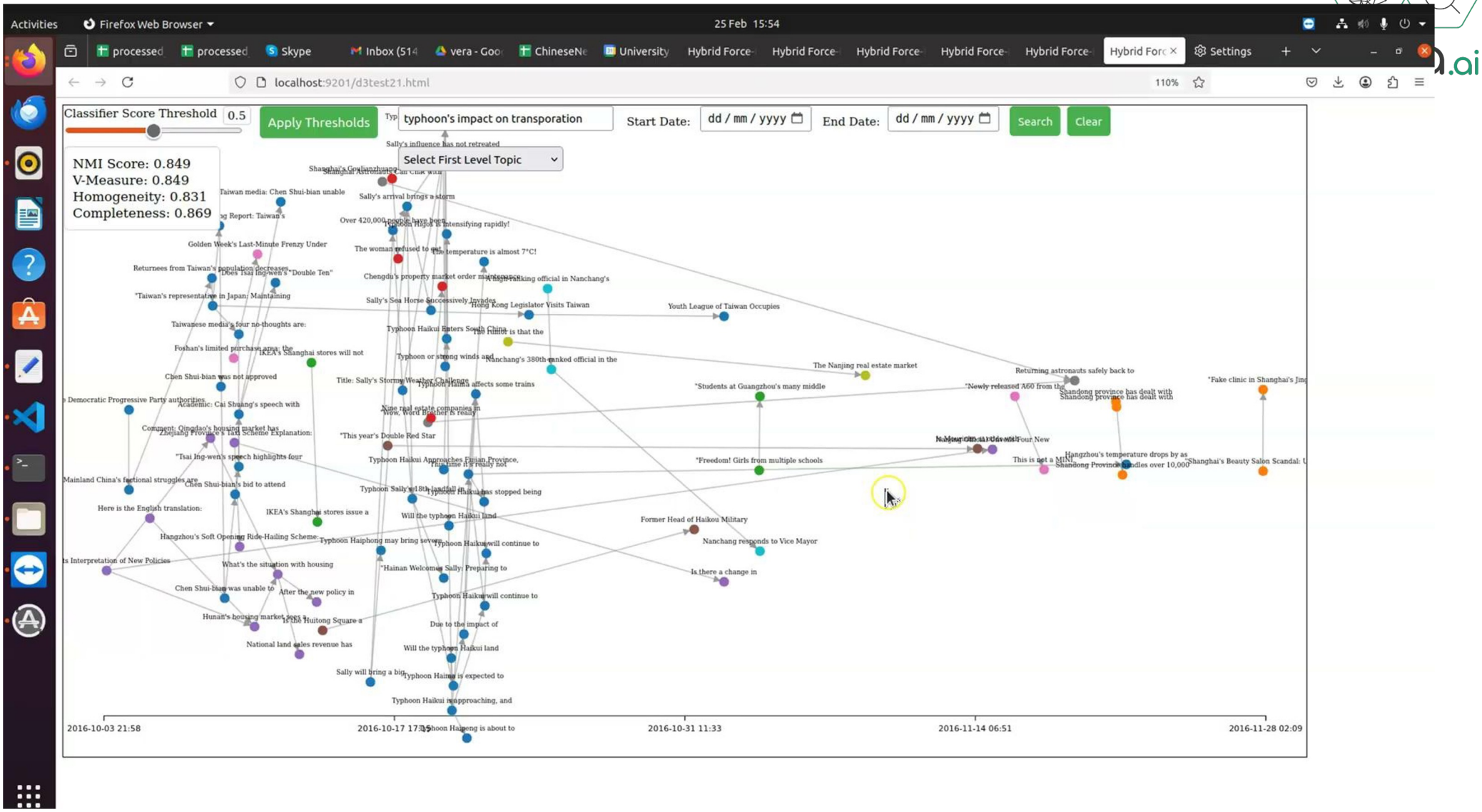


# Topic Level Temporal Analysis

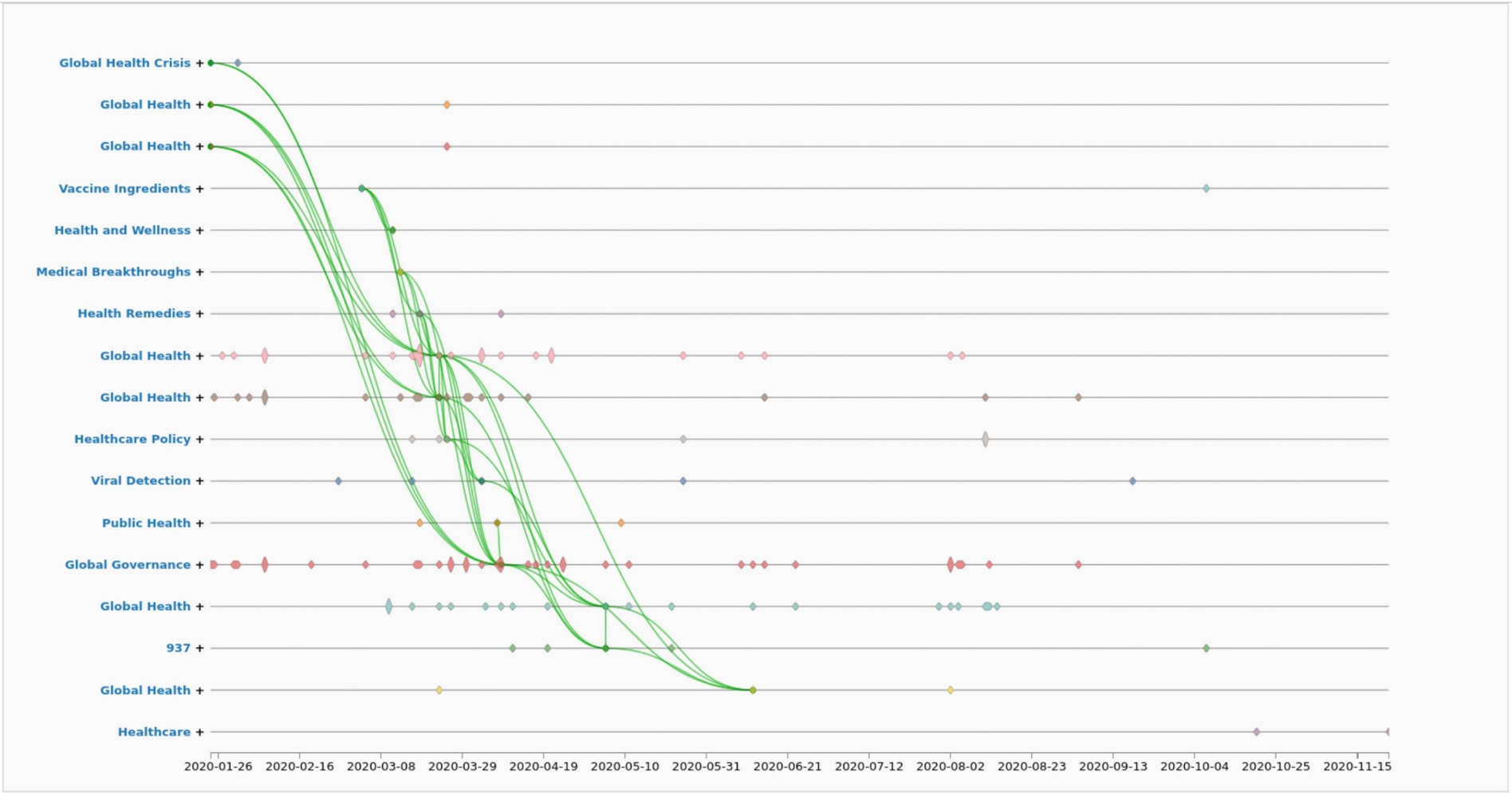
- Display topic volume over time
- Topic evolution over time

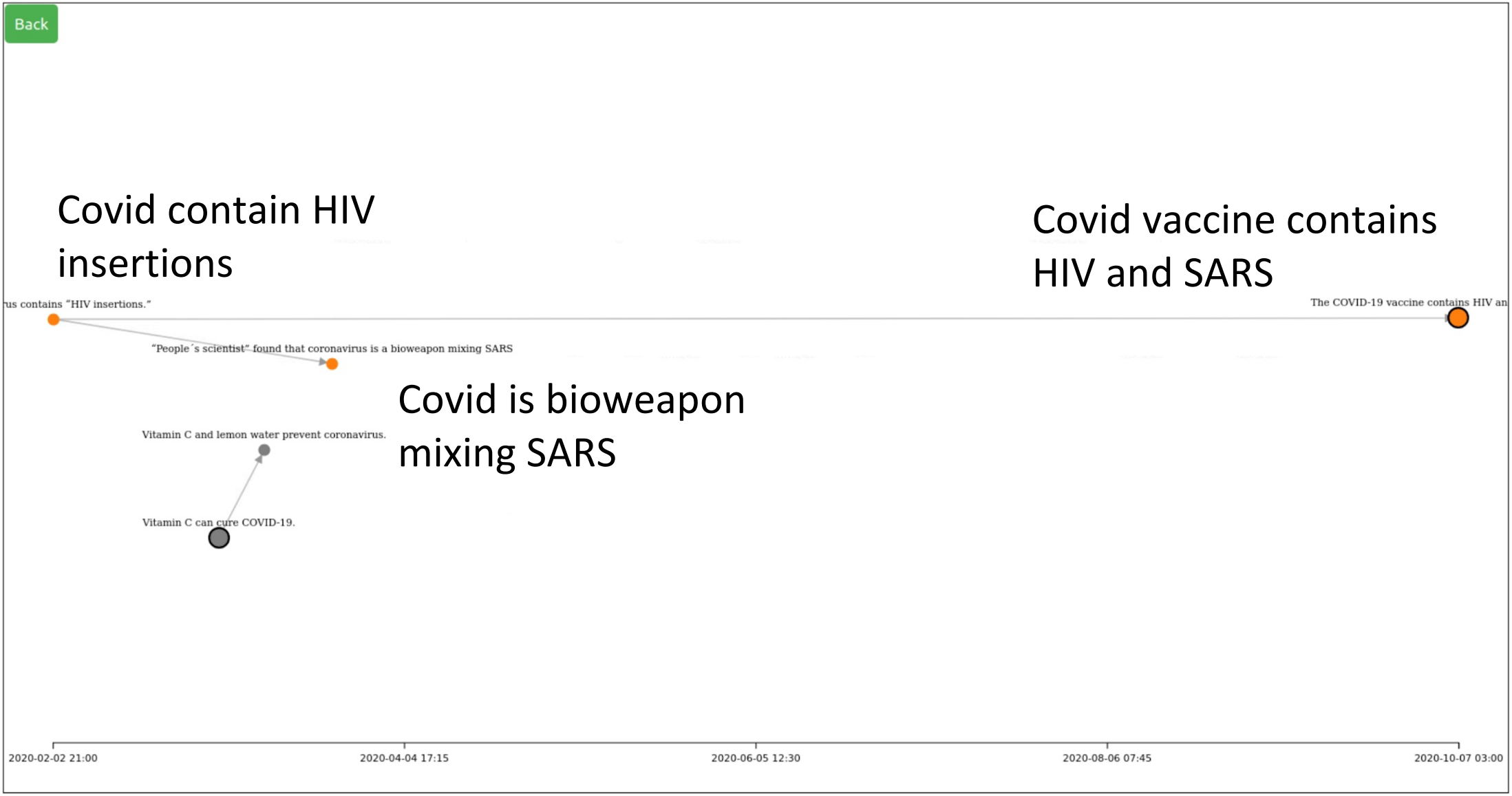


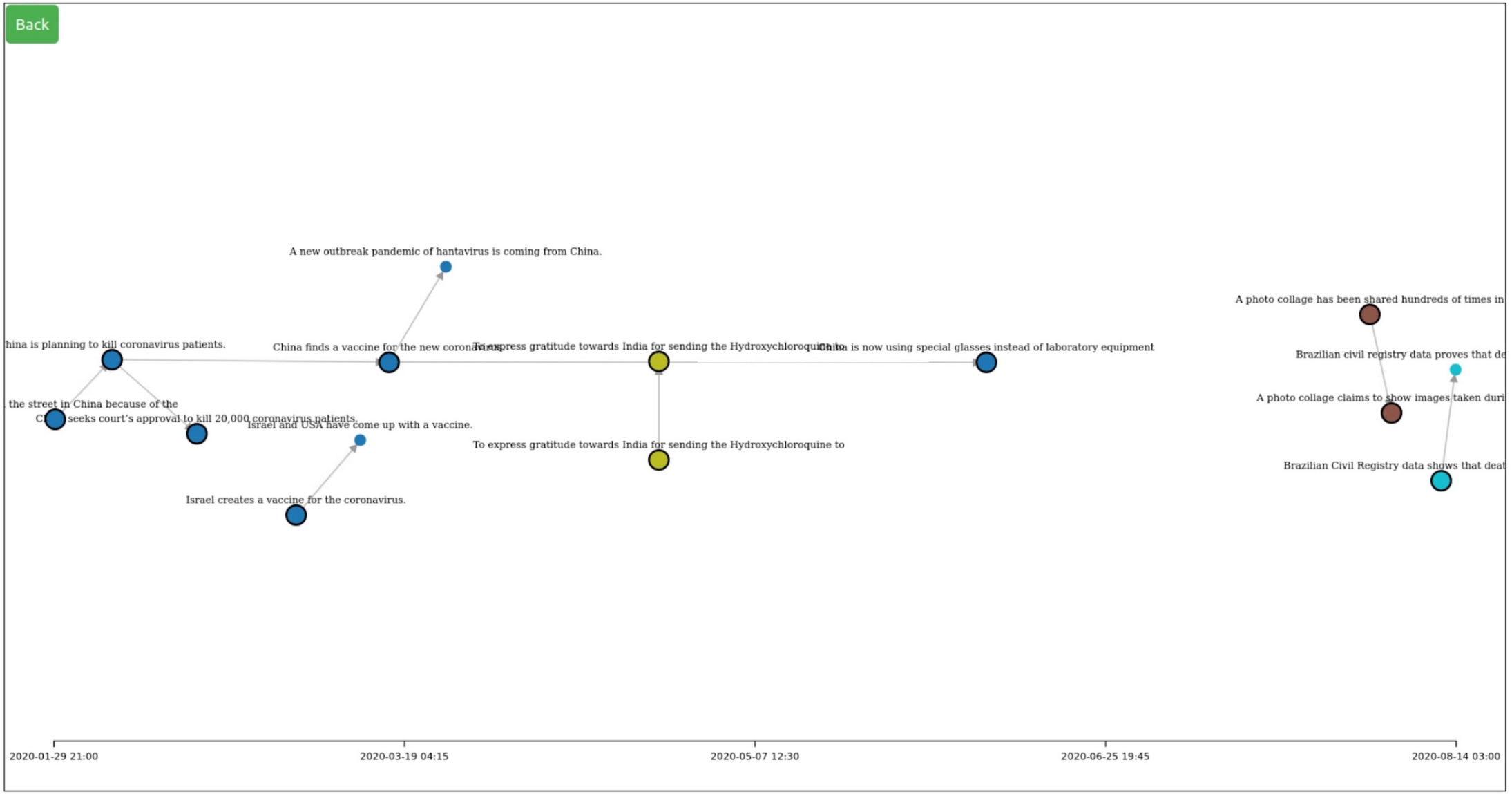
# Document Level Temporal Analysis



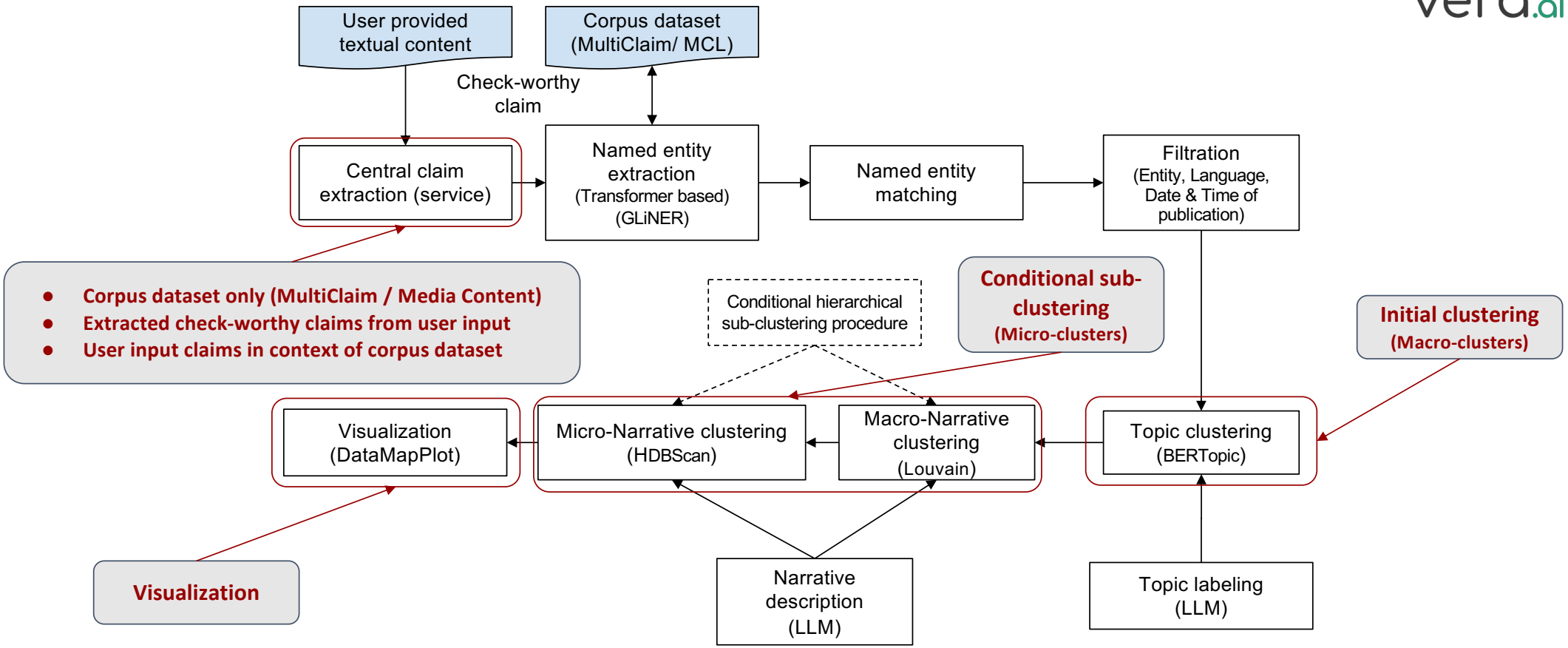
# IFCN Covid Misinformation




Back
Covid contain HIV insertions
Covid vaccine contains HIV and SARS
us contains “HIV insertions.”
The COVID-19 vaccine contains HIV an
“People´s scientist” found that coronavirus is a bioweapon mixing SARS
Covid is bioweapon mixing SARS
Vitamin C and lemon water prevent coronavirus.
Vitamin C can cure COVID-19.
2020-02-02 21:00
2020-04-04 17:15
2020-06-05 12:30
2020-08-06 07:45
2020-10-07 03:00


Back
A new outbreak pandemic of hantavirus is coming from China.
hina is planning to kill coronavirus patients.
China finds a vaccine for the new coronavirus
To express gratitude towards India for sending the Hydroxychloroquine to
China is now using special glasses instead of laboratory equipment
A photo collage has been shared hundreds of times in
Brazilian civil registry data proves that de
the street in China because of the
C seeks court’s approval to kill 20,000 coronavirus patients.
Israel and USA have come up with a vaccine.
To express gratitude towards India for sending the Hydroxychloroquine to
A photo collage claims to show images taken duri
Brazilian Civil Registry data shows that deat
Israel creates a vaccine for the coronavirus.
2020-01-29 21:00
2020-03-19 04:15
2020-05-07 12:30
2020-06-25 19:45
2020-08-14 03:00

# KInIT UI Demo




Narrative detection pipeline diagram.

# KInIT UI Demo

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BBC NEWS

## Attack on US military base 'nothing to do with Qatar', Iran says

Iran launched missiles at a US military base in Qatar on Monday, in what it said was retaliation for American strikes against its nuclear sites over the weekend.

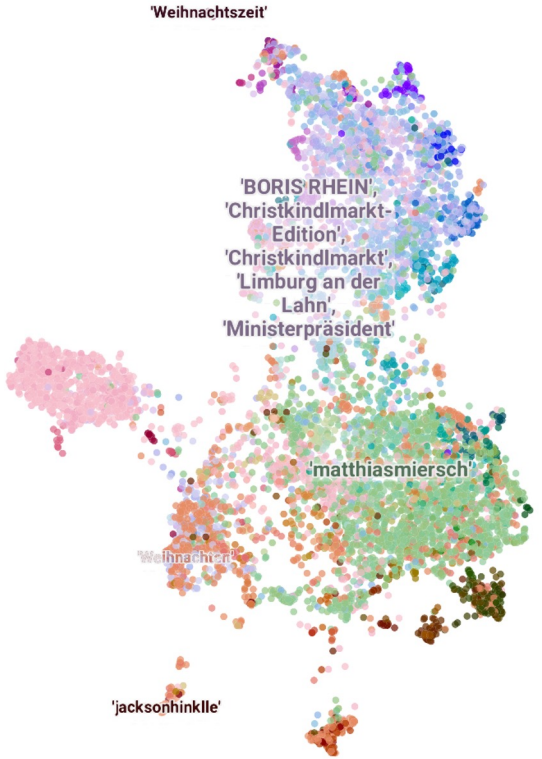
Witnesses reported hearing loud bangs in the sky above the capital, Doha, while videos showed bright flashes in the sky as air defence systems attempted to intercept missiles.

Donald Trump described the attack as "very weak" and "expected", and suggested peace in the region could proceed.

On Tuesday, the US president announced a ceasefire between Israel and Iran had come into effect.

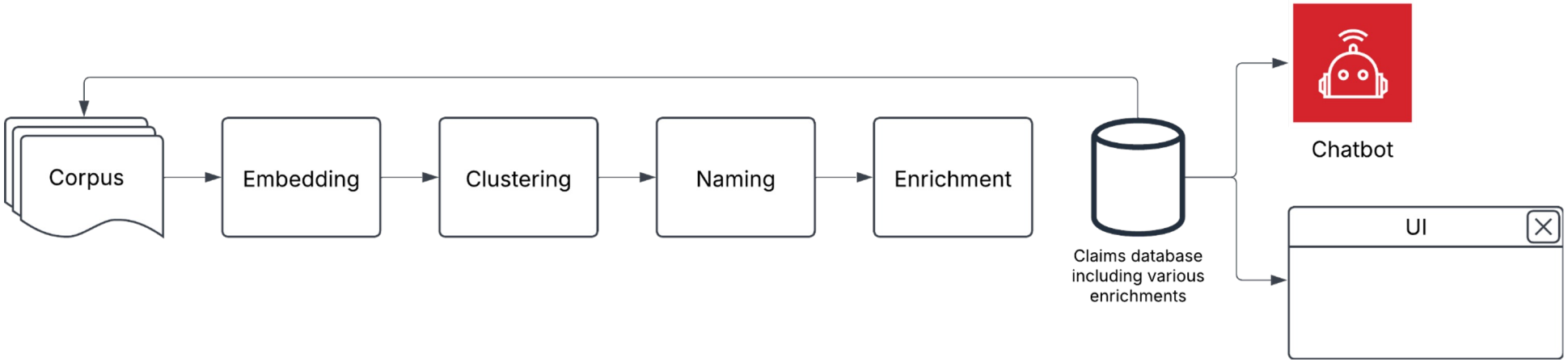
Here is what we know.

User input



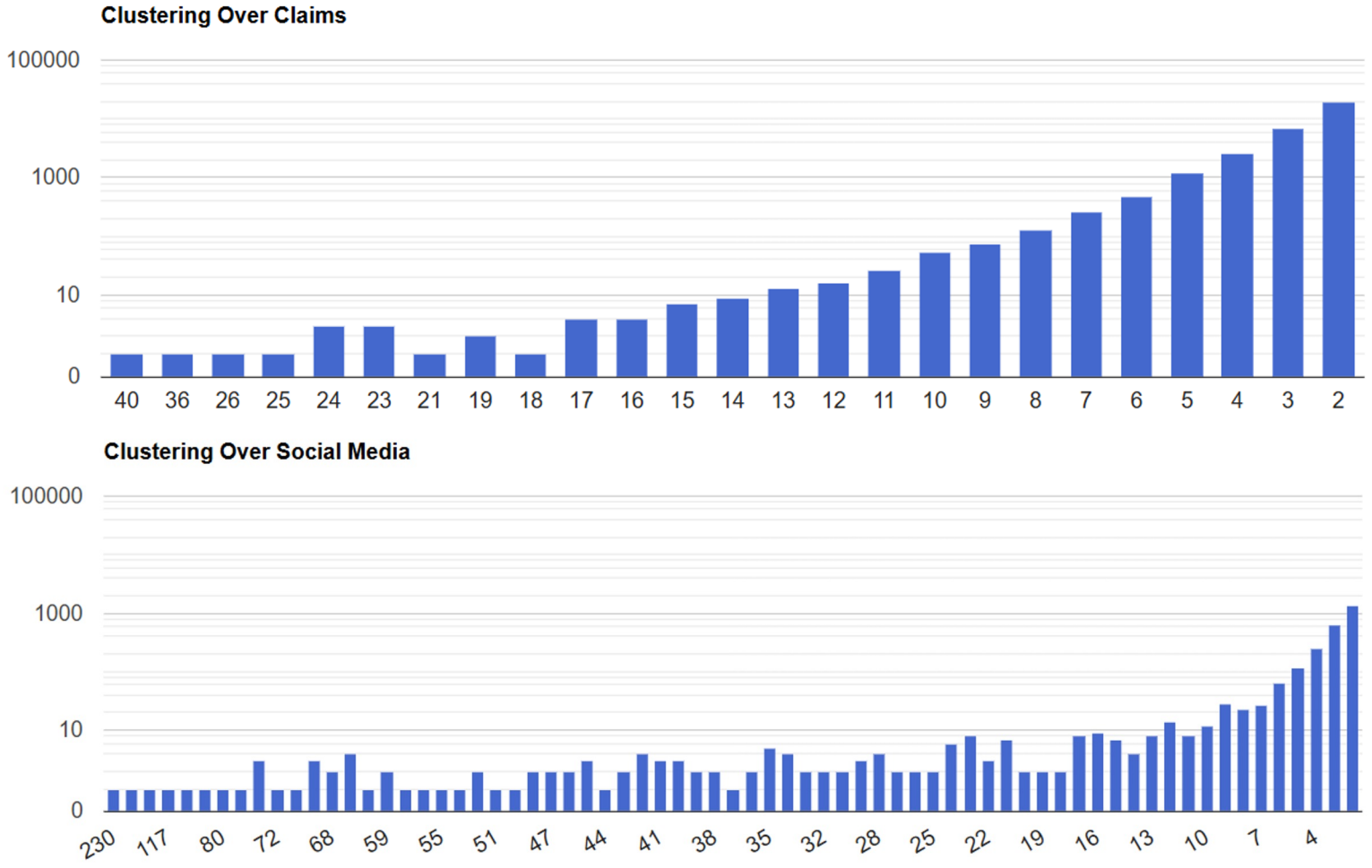

Corpus dataset
(Media Content Library)

# ONTO UI Demo: Introduction




- Embedding: paraphrase-mpnet-base-v2
- Clustering: GPU-adapted stochastic HDBSCAN (cuml)
- Naming: Small Language Model (phi-4-mini-instruct)
- Enrichment: Multilingual Entity Linking and Event Detection
- Enrichment with inference: Time spans

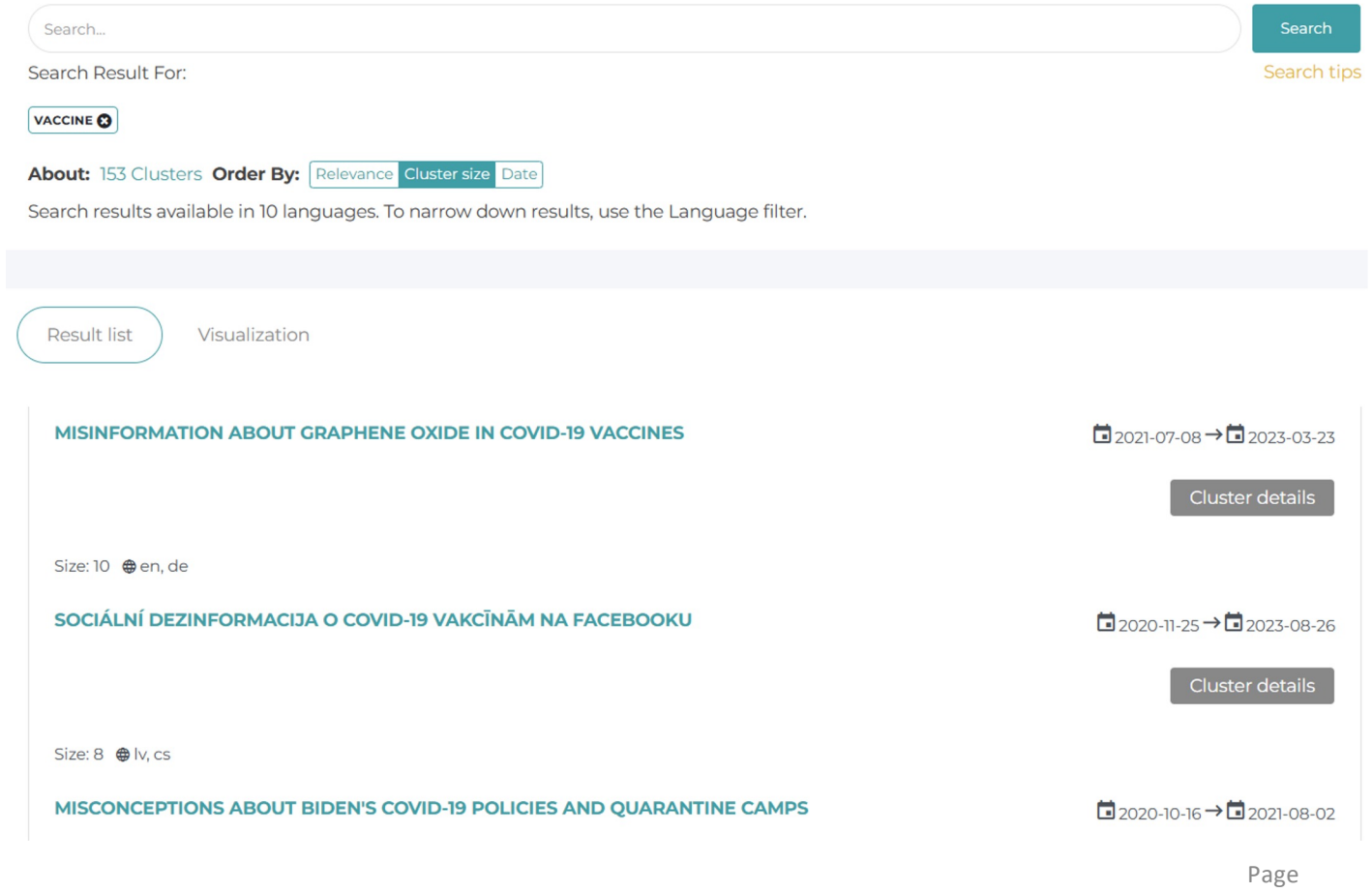
# ONTO UI Demo


Clustering Over Claims
100000
1000
10
0
40 36 26 25 24 23 21 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2
Clustering Over Social Media
100000
1000
10
0
230 117 80 72 68 59 55 51 47 44 41 38 35 32 28 25 22 19 16 13 10 7 4

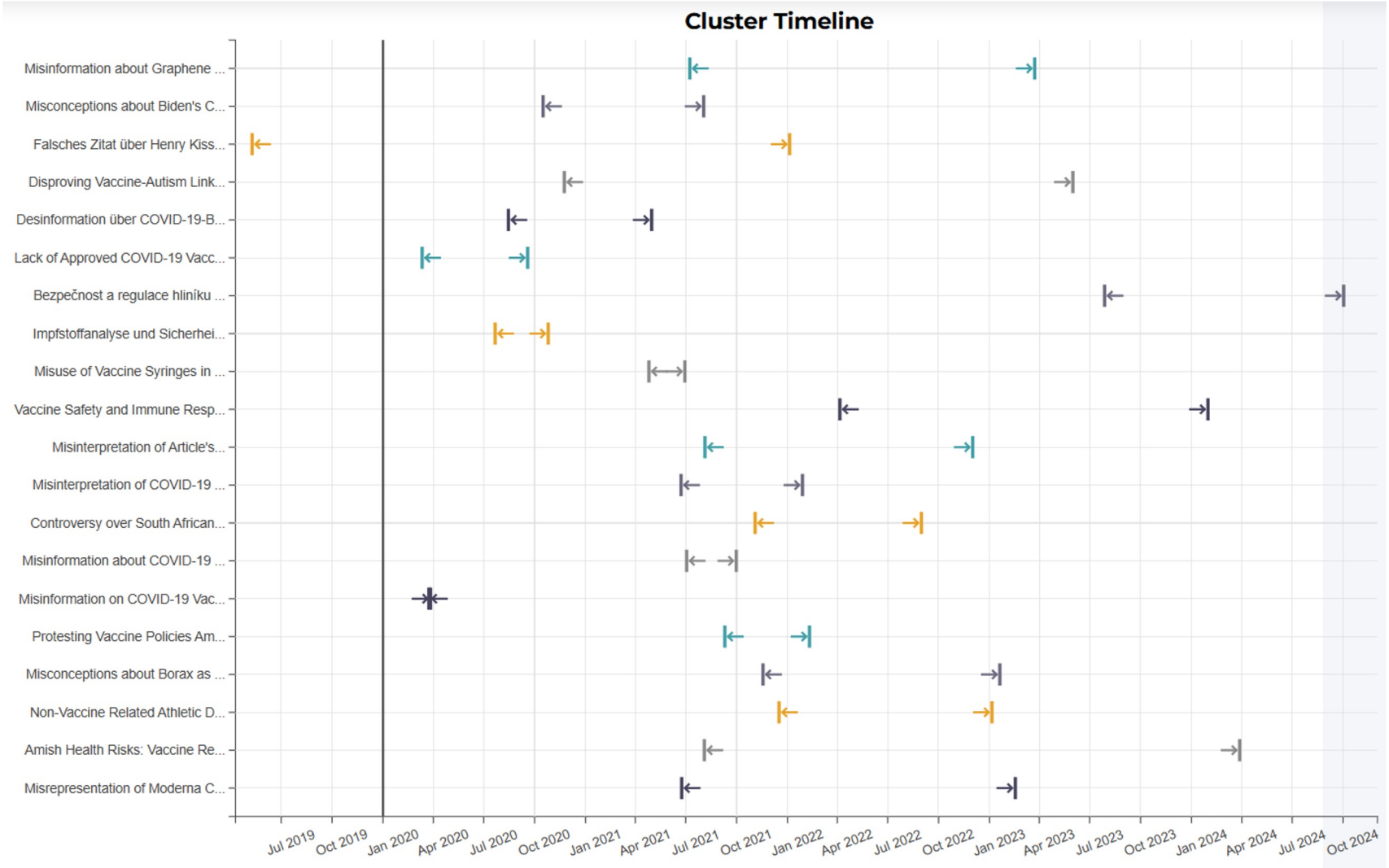
# Onto UI Demo: Cluster Search

Cluster search:

- Multilingual
- Facets
- Ordering by
  - Relevancy
  - Size
  - Recency
- Example:
  - Vaccine-related clusters



# Onto UI Demo: Cluster Timelines



# Onto UI Demo: Single Cluster View

## Misinformation about Graphene Oxide in COVID-19 Vaccines

Size: **10**
Languages **en, de**
Start date: **2021-07-08**
End date: **2023-03-23**
Key concepts: VACCINE | MESSENGER RNA | MODERNA | SPAIN | GERMANY | ASTRAZENECA | VACCINE HESITANCY | COVID | PFIZER | EUROPEAN MEDICINES AGENCY | GRAPHENOXID | GRAPHENE | MARBURG MARBURGVIRUS | OXIDE | UNIVERSITY OF ALMERÍA | BIONTECH | BARBADOS | COVID-19 | GRAPHITE OXIDE | LEAD | SPECTROSCOPY | ANDRÉ CAMPRA | FERROFLUID

### CLAIM

Pfizer Documents Do NOT Prove COVID Vaccines Contain Graphene Oxide

Document details

Leadstories

2023-03-23

2023-01-17

### CLAIM

Ein altes Video von 2021 kursiert erneut. Darin behauptet ein Mann, der mRNA-Impfstoff gegen Covid-19 von Biontech/Pfizer würde „giftiges“ Graphenoxid enthalten und verweist dazu auf ein „internes“ Do ... Show more

# Onto UI Demo: Chatbot Integration

Here are the five biggest narrative clusters that mention the European Commission:

1. **Common Misinterpretation of EU Language Guidelines** - This cluster contains 8 claims.
2. **Misleading Apeel Product Claims** - This cluster contains 6 claims.
3. **Common theme: European Parliament's special committee on future democratic shield and false claims of EU annulling national elections** - This cluster contains 6 claims.
4. **Misinterpretation of Ursula von der Leyen's Handwashing Video** - This cluster contains 3 claims.
5. **Misleading Information on EU Car Ownership Legislation** - This cluster contains 3 claims.

These clusters represent recurring themes or narratives involving the European Commission.

Can you give me an overview of the major themes in disinformation claims that discuss elections in 2024?

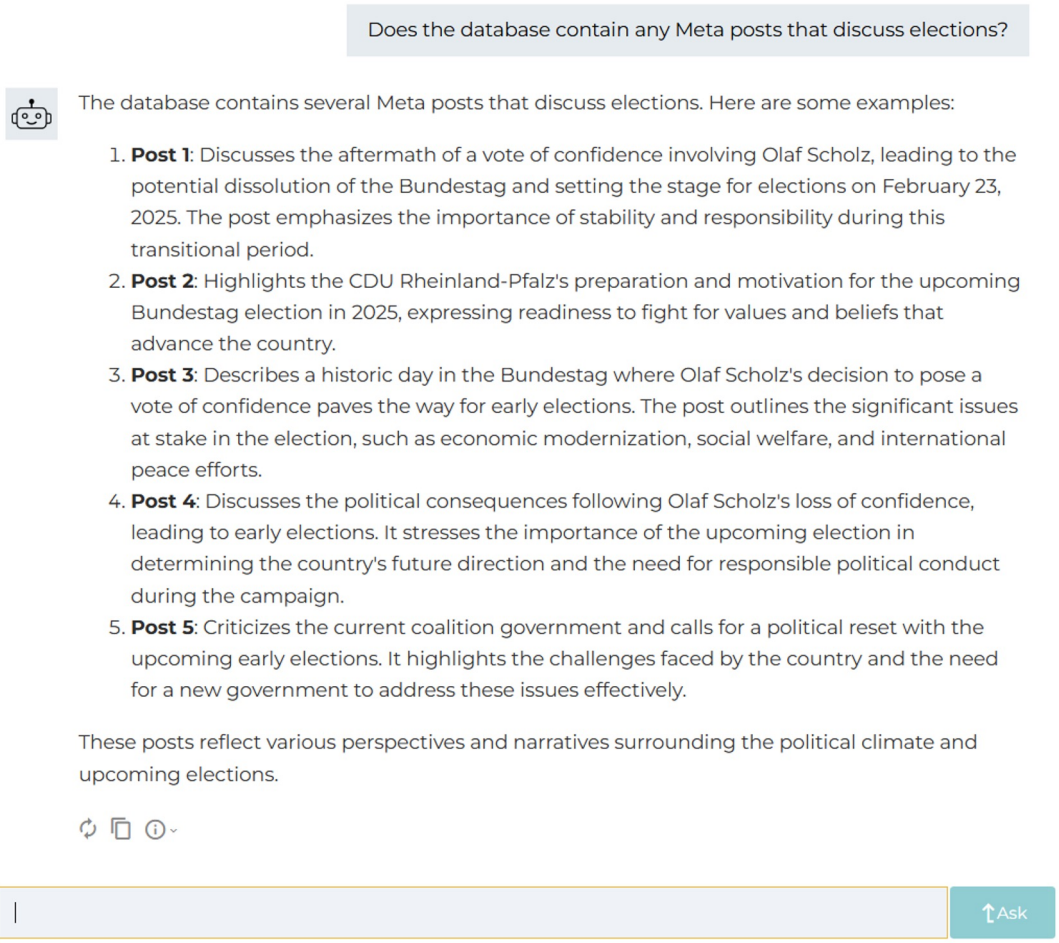
Here are the major themes in disinformation claims related to the 2024 elections:

## United States Elections 2024

1. **Trump's Endorsement of God Bless the USA Bible Company** - This cluster contains 1 claim.
2. **Voter Eligibility and Recount Issues** - This cluster contains 1 claim.

Ask

# Onto UI Demo: Chatbot Integration



**Xyingy Song (USFD)**
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CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

The University Of Sheffield.

ATC ATHENS TECHNOLOGY CENTER

KINIT

ontotext

Deutsche Welle

Università degli Studi di Napoli Federico II

1506 Università degli Studi di Urbino Carlo Bo

AFP

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