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Narrative Aspects of Real-World Events

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The story so far

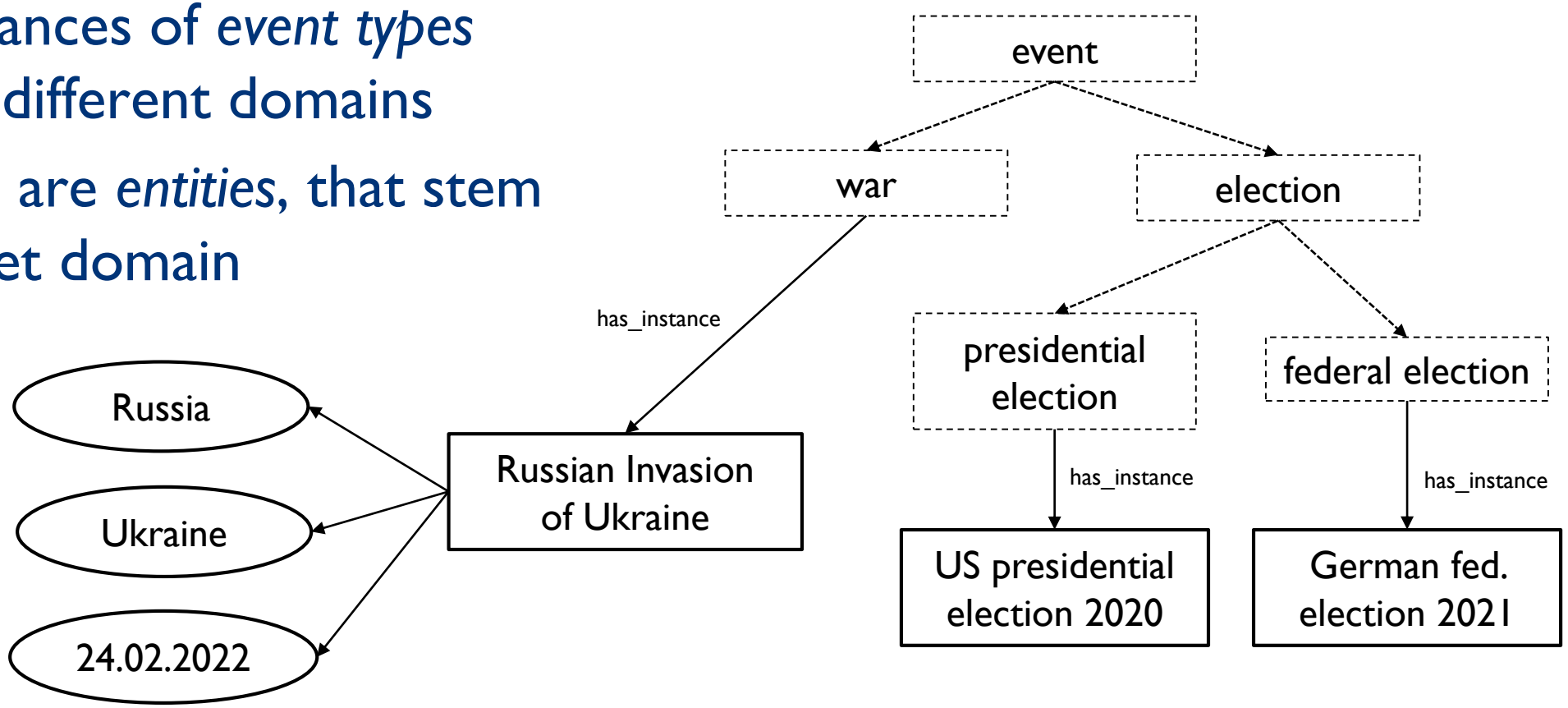
- I *started* my PhD in *mid 2020* and since then we encountered:
  - A global **pandemic** (2020-2022?)
  - **Attacks** on the capitol in Washington D.C. (2021)
  - A US **presidential election** (2020) and a German **federal election** (2021)
  - A **war** between Russia and Ukraine (2022)
  - The **football world cup** in Qatar (2022)
  - …

What happened?

Conclusion: *events* shape our lives in various forms

What are events?

- Events are *interactions* between *participants* bound in *space* and *time*
  - Can be instances of *event types* defined for different domains
  - Participants are *entities*, that stem from a target domain



Well-known applications

Detour

- Extraction and Detection
  - Extract factual information about events mostly from news and social media texts
  - Open vs. Closed style extractions
- Prediction & Forecasting
  - Predict future events
  - Utilize events for improving forecasting robustness

Russian Invasion of Ukraine
Russia Steps Up Attacks on Ukrainian Fortifications in the East
The New York Times

Role	Slot
War Party 1	
War Party 2	
Date	
Location	

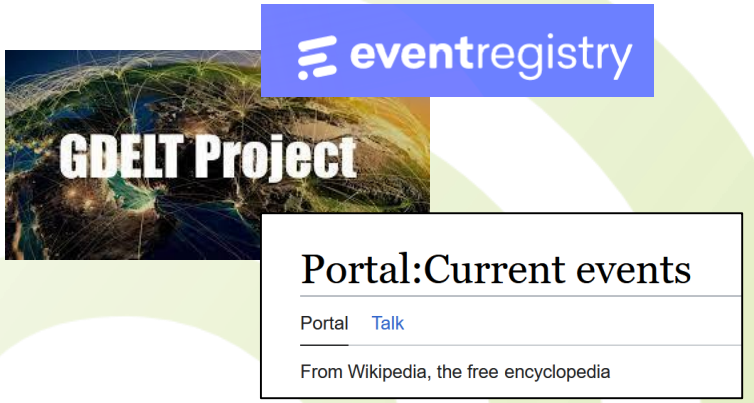
extract

Role	Slot
War Party 1	Ukraine
War Party 2	Russia
Date	24.02.2022
Location	Ukraine

[2,3,4]

New applications?

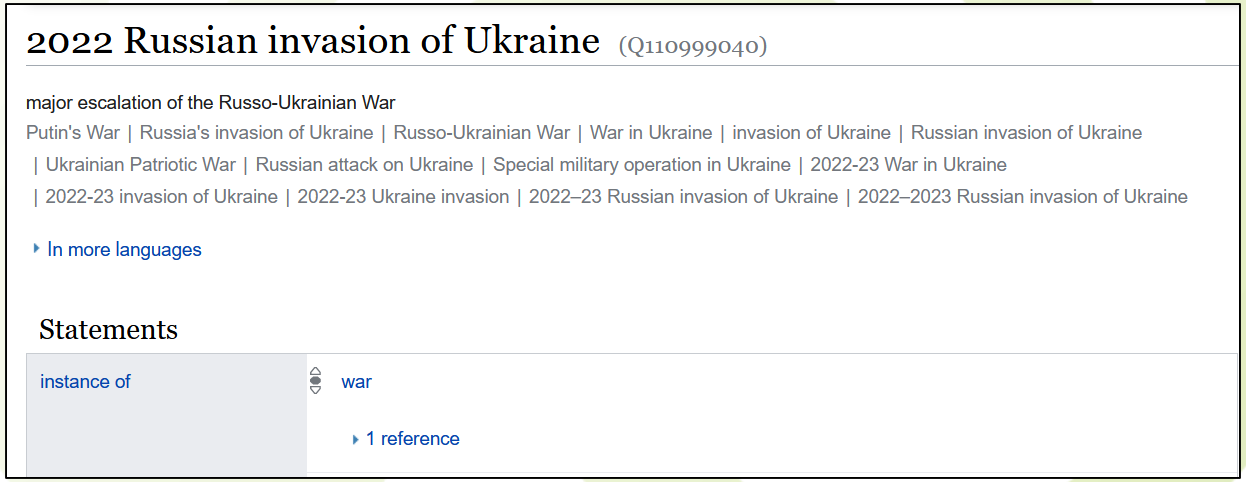
- What about databases or information systems providing information about events?
  - Some are available, e.g., GDELT, Event Registry
  - Mostly: news collections with event schema and keyword search support



- Focus on *event-centric information systems*
  - i.e., information systems focusing on events with *innovative* access paths
  - high level objective: *understand* what happened in the event

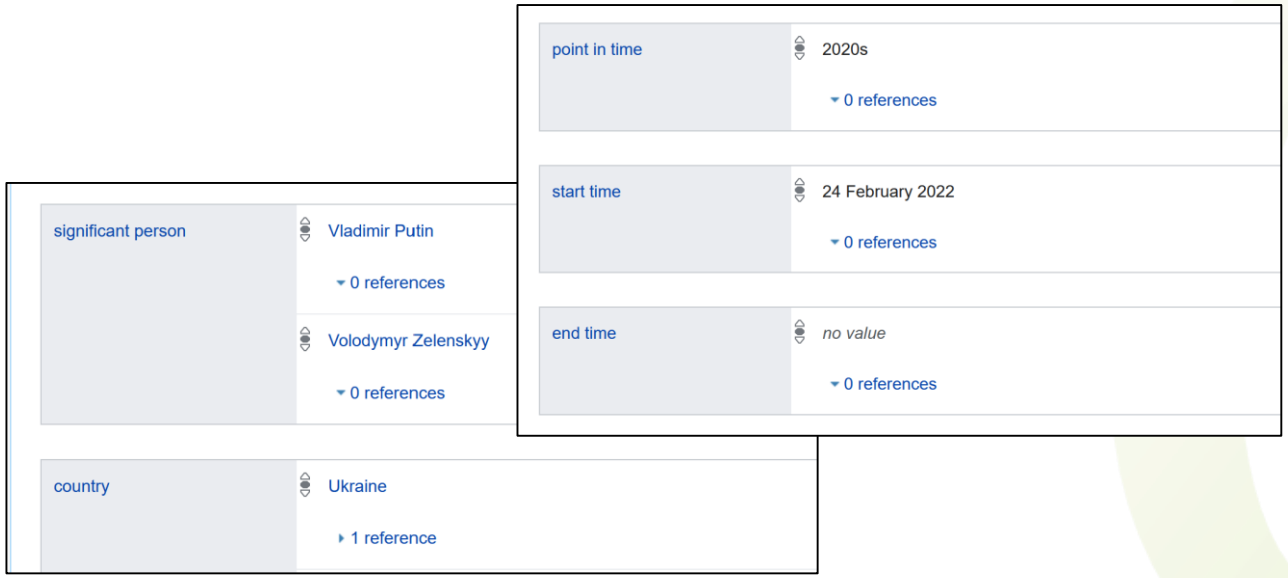
Knowledge Graph Representation

- A knowledge graph is a collection of *facts* encoded as *subject-predicate-object* triples
  - e.g., ⟨War, has_instance, Russia_Ukraine_War⟩
  - Is a way to represent and reason about knowledge
  - The largest general-purpose and public available knowledge graph today is Wikidata
    - over 100m entities
    - named events



Wikidata and RUvsUKR

- **Example**: Wikidatas‘ representation of the 2022 Russian Invasion of Ukraine



⟨RUvsUKR, significant person, Vladimir Putin⟩
⟨RUvsUKR, significant person, Volodymyr Zelenskyy⟩
⟨RUvsUKR, start time, 24 February 2022⟩
…

(simplified)

What we can express

- „**When** did the Russian Invasion of Ukraine started?“
  - 24.02.2022
    - `SELECT ?time WHERE { wd:Q110999040 wdt:P580 ?time. }`
- „**Who** was the president of Ukraine at the start of the Russian invasion?“
  - Volodymyr Zelenskyy
- „Which battles [i.e. **subevents**] occurred in the RUvsUKR event?“
  - Attack on Snake Island, Siege of Mariupol, …

So far, so good. But what now?

What we can’t, but want to express

- „**Who** was an *aggressor* in the conflict?“
  - aggressor is not part of the vocabulary of SOTA knowledge graphs
- „**Was** this a *war or special military operation*?“
  - Conflicting information, must be resolved
- „Which *past war* can be seen as a historical **analogy**?“
  - KGs allow for similarity queries but not analogical queries
  - Analogies, however, are often used in decision and sense making

What is missing?

Detour

- The problem was discussed already during the inception of Wikidata
  - Knowledge Graphs are constructed (mostly) from texts, i.e., from document collections
  - However, document collections contain more information than purely the sum of all extracted facts

TECHNOLOGY

The Atlantic

The Problem With Wikidata

By Mark Graham

APRIL 6, 2012

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[5]

What is missing?

Detour

- Knowledge graphs only contain ‚*pure facts*‘ in form of triples
  - Different perspectives on a subject are not covered
  - Subtleties and frames are not covered
  - Complex facts are hard to represent
  - … (compare Suchanek (2020))

  - **Can we recover ‘the whole story’ behind an event from just a knowledge graph?**

No.

What is missing?

Detour

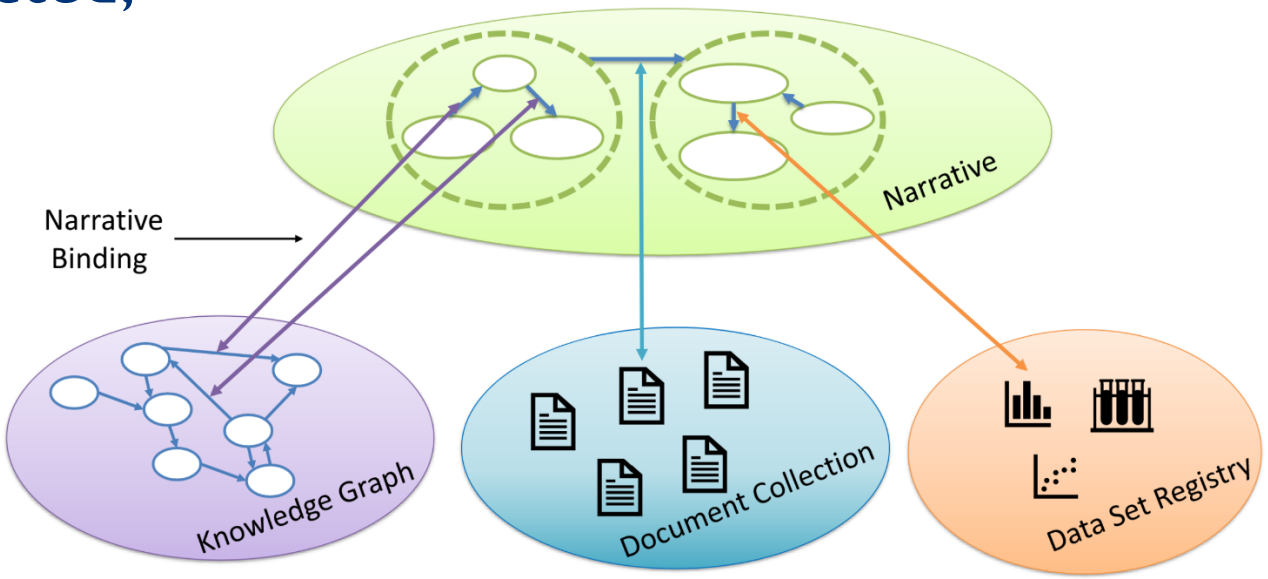
- We need multiple sources to complete the picture
  - Leads to the problem of *information fusion*
  - Also: beside the facts we have *additional aspects*, e.g.:
    - temporal and/or causal dependencies
    - characterizations of event participants
    - developments enrolling over time
    - roles for participants
    - …
- Those aspects should **not** be stored in the KG itself.

[1,6,8]

Enter Narratives

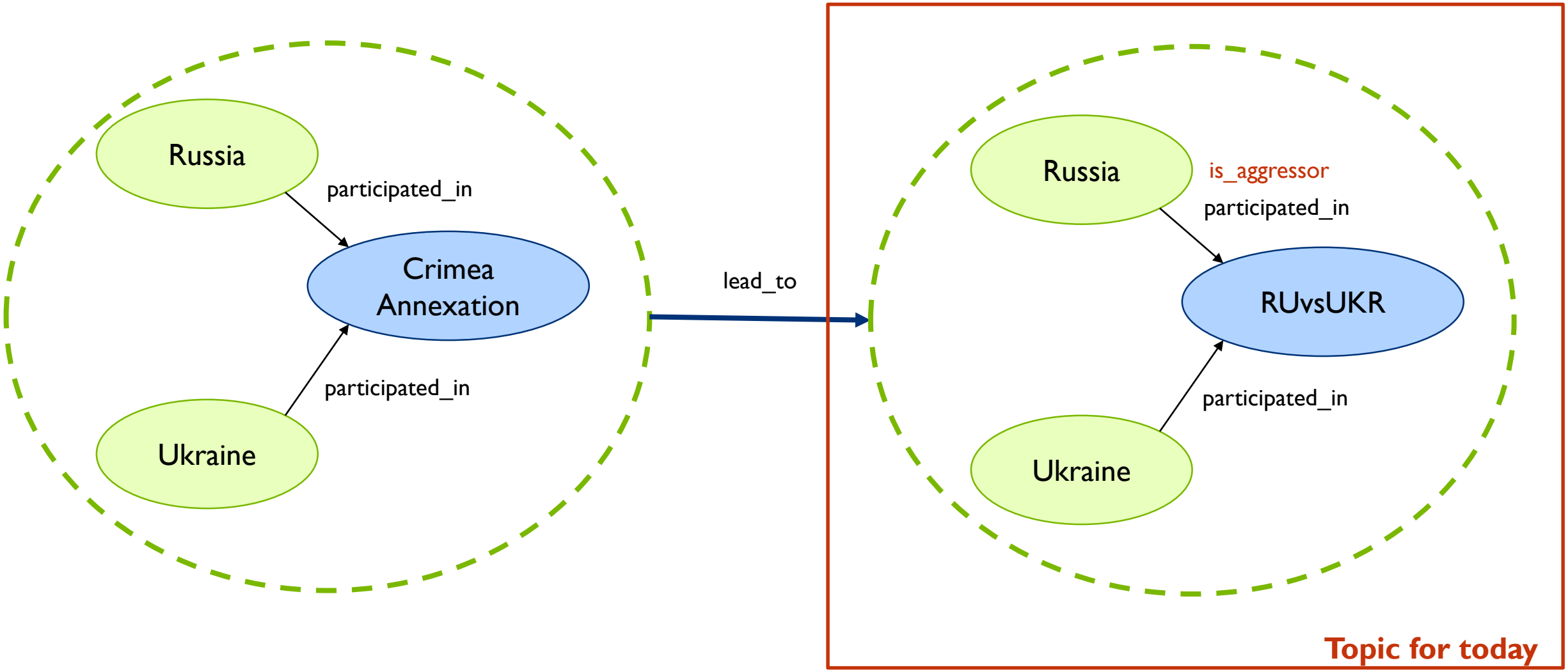
Detour

- Idea: the beforementioned aspects can be modeled as an overlay over multiple knowledge sources
  - We call this a *narrative overlay* or **narrative** for short
  - Narratives contain a plot involving entities, events, and their relationships, modeled as a directed, edge-labelled graph
  - Edges of the narrative are *bound* to the underlying repositories to make the narrative *plausible*



Example Narrative

Detour

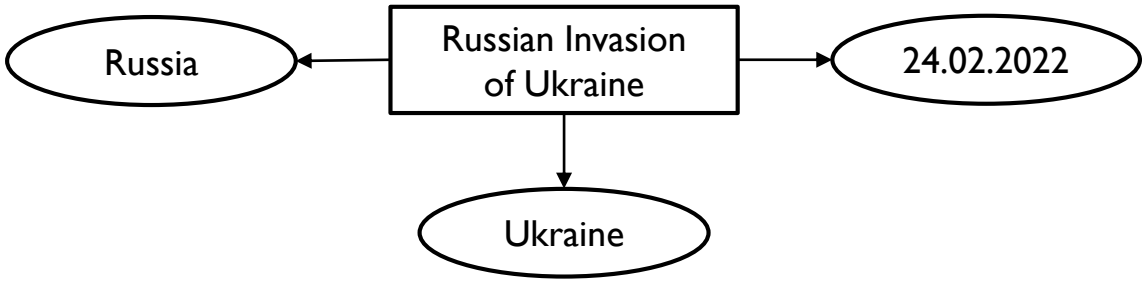


Narrative Information Access

- There are *two layers*:
  - *Factual layer*, i.e., facts about a event in a knowledge base.
  - *Narrative layer*, i.e., what is expressed in the discourse about the event

Russia *is_aggressor_in* RUvsUKR

Ukraine *was_threat_to* Russia



- Different data sources:
  - Factual layer: structured repositories
  - Narrative layer: unstructured repositories

Event-Centric Information Systems

- Three tasks (to tackle the problem of *understanding*)
  - event-centric *narrative queries*:

1

    - pure facts + narrative aspects
    - e.g. ,"a **war** in the **20th century** where the **president** of one country was a ***coward***"

  - narrative *archetype* categorization

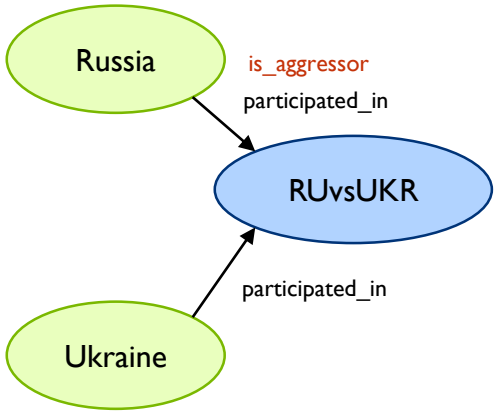
2

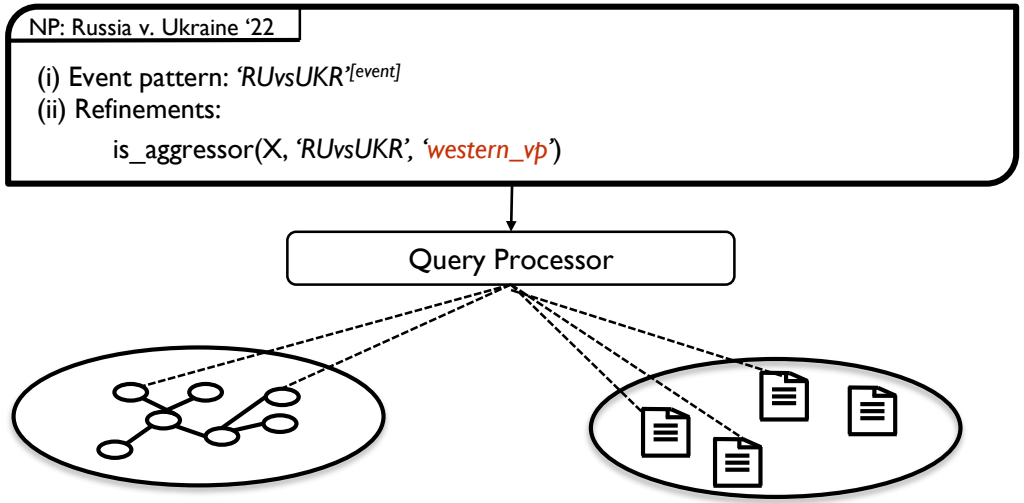
    - Can we tell the story of an event on the basis of an archetype

  - event *analogy queries*:
    - e.g.,"which **incident** was analogous to the 9/11 attacks?"

Queries: Narrative Prototypes

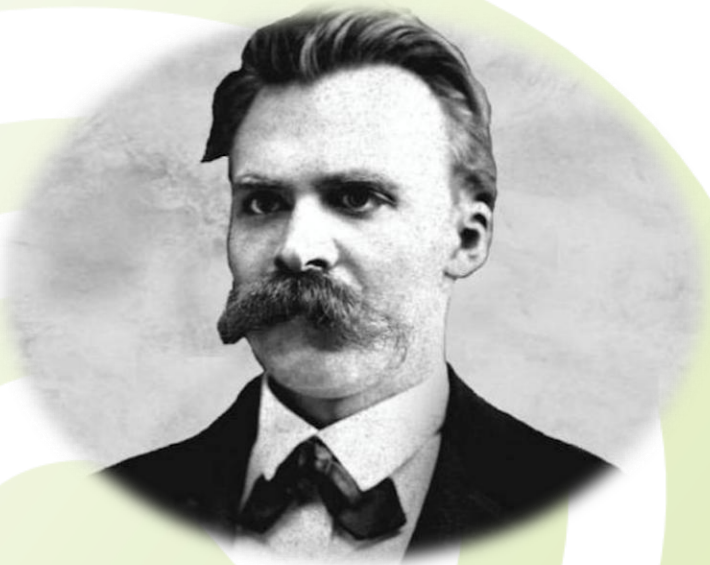
- Model a short story consisting of:
  - An event pattern
    - Event type or concrete named event
  - Refinements:
    - Value comparisons
    - Aggregations on factual data,
    - Subjective attributions, i.e., viewpoint dependent information





Through Different Eyes

- Core ingredients: *viewpoints* and *attributions*
  - Viewpoints allow the representation of multiple perspectives on events
    - Conflicting views on participant roles
    - Multiple valid interpretations
  - In contrast to attributes, attributions can change their values based on the viewpoint chosen
    - e.g., is somebody an ‘aggressor’ or not
    - Allows for a ‘characterization’ of the event and its’ participants



Attributions – more formal

- Attributions can be modeled as functions with:
  - attribution(*event*, *participant*, *viewpoint*) → {0, 1}
    - Where *event* is a named event from a KG, *participant* is a entity, and *viewpoint* stems from a set of viewpoints
  - e.g., is_aggressor('RUvsUKR', 'Russia', 'western world')
  - the viewpoint may be omitted, if the attribution should hold in all viewpoints. We then call it an *objective attribution*
- Evaluate attributions by *witnesses*, i.e., documents supporting the claim

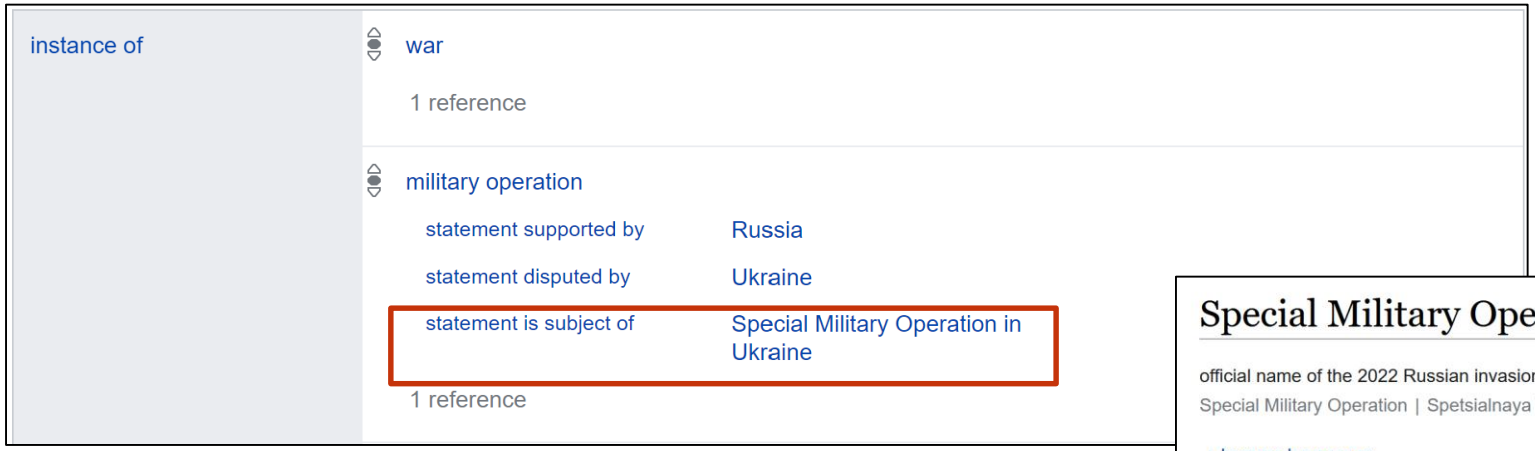
Attributions – how to proceed?

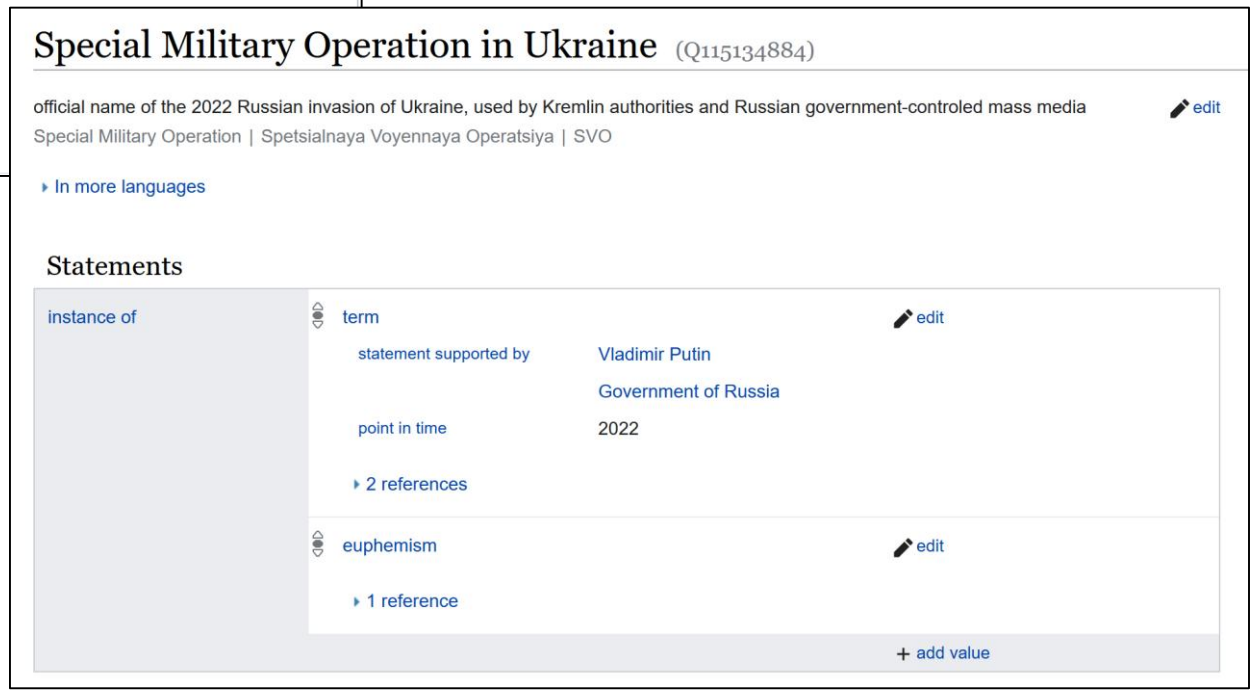
- **Open problems**
  - Further definition of attribution characteristics
    - Domain for attributions?
    - Narrative roles (protagonist, nemesis,…) + characterization?
  - Construction of data sets and evaluation algorithms
    - Basically a classification problem
    - Interweaving viewpoints is a challenge

Viewpoints

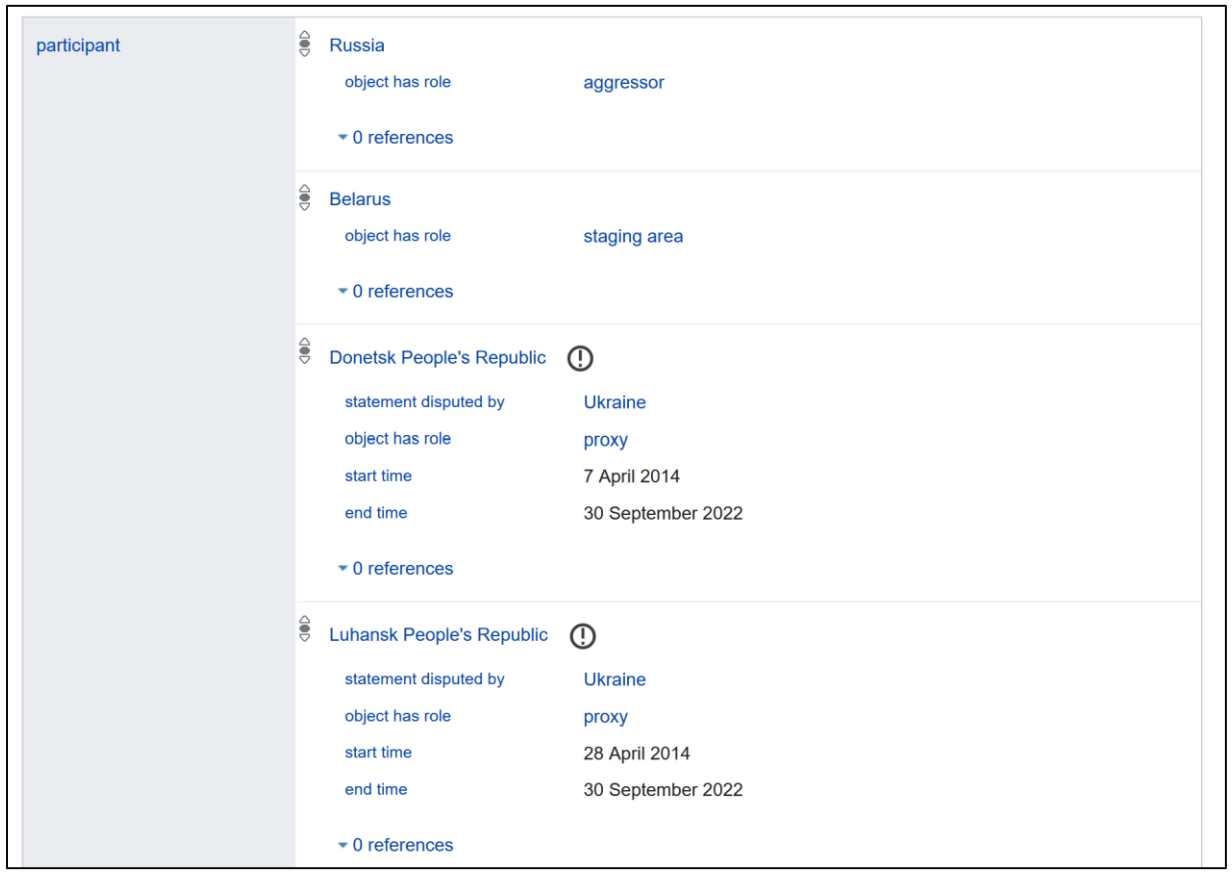
- A *viewpoint* specifies whether an attribution holds or not
  - Idea: allow multiple perspectives on events
  - Viewpoints are (for now) pre-determined and each document is attached to a certain viewpoint
  - *Example:* the role assigned to Russia in the current war depends on the viewpoint chosen. Chinese and Russian newspaper will tell a different story than German newspapers

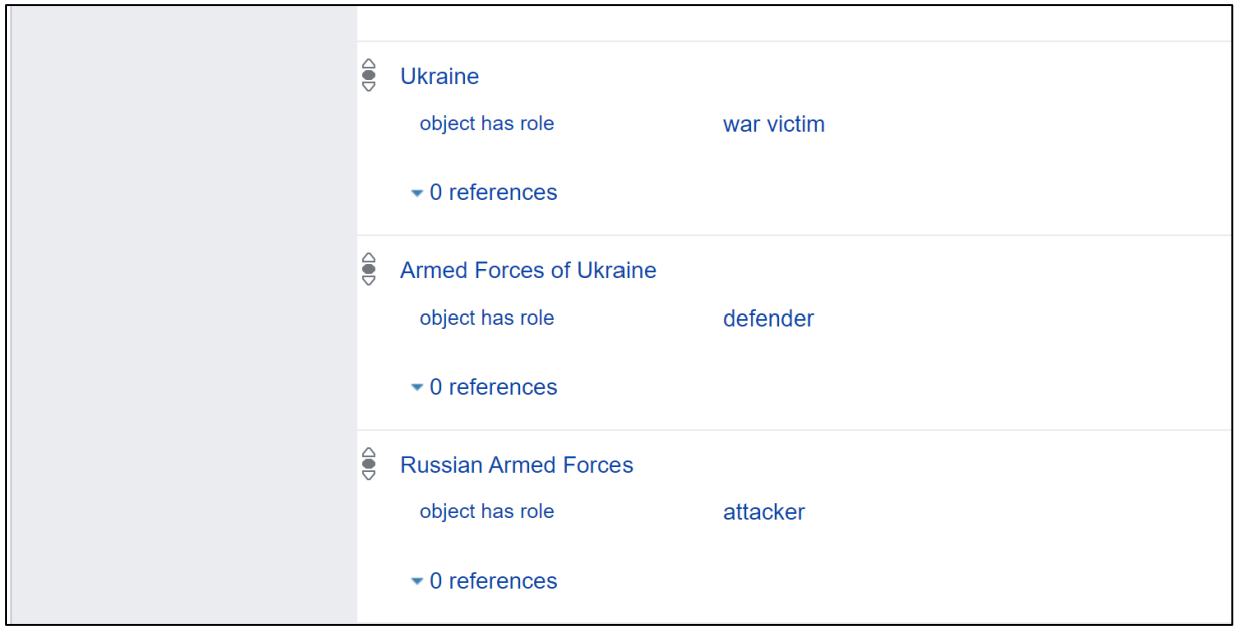
Viewpoints in KGs (I)





Viewpoints in KGs (II)





A view on … viewpoints

I

- Shoehorning in viewpoints like this has multiple problems:
  - Generates a high number of triples (esp. with multiple viewpoints)
  - Complex to query
  - No viewpoint granularity available
    - A statement supported by ‚Ukraine'?
      Questionable semantics anyway
  - **No formal model of viewpoints**, rather a pragmatic one

- How to solve this? Coming soon ☺

Task I

- We have:
  - A motivation and defined problem
  - Narrative Prototypes (formalized + proof of concept) as a means to query

- We miss:
  - A larger scale study on how to evaluate attributions
  - Formalization of viewpoints and integration into the attributions

The next step

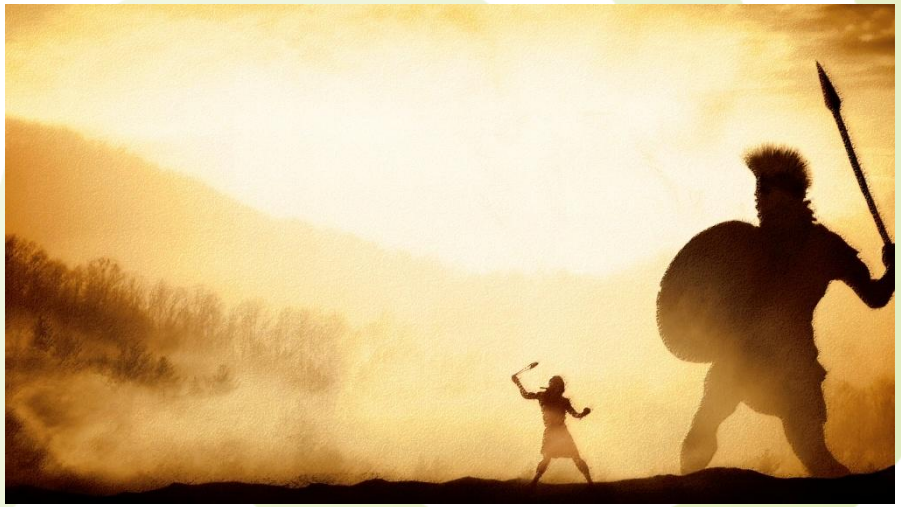
- *Narrative prototypes* allow to query for events by:
  - Setting a *background* for the narrative, i.e., an event type or a concrete event
  - *Characterize* the participants of the story with attributions
  - Determine the *point of view* from which the story is told

- **But, narratives are more!**

[11]

What Narratives can do

- Narratives have a long-standing history as means of communication
  - Transportation of information, emotions, and moral judgements
  - Narratology and narrative psychology are active fields of research in this regard
  - Each narrative *transports* a number of *associations*
    - e.g., the narrative of David vs. Goliath (DvsG) typically associates sympathy with the David character



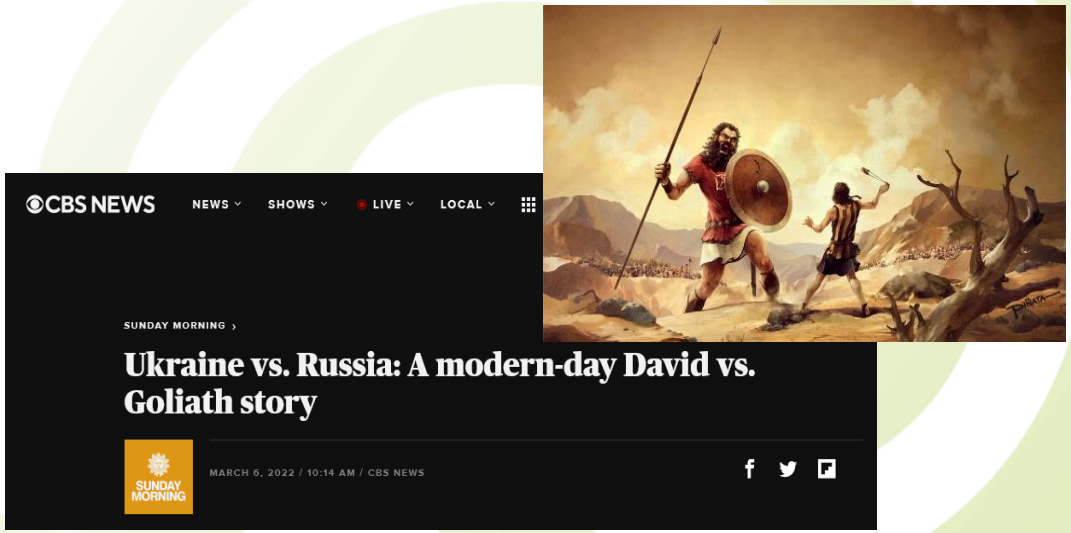
On archetypes

- David vs. Goliath can be seen as a *narrative archetype*
  - Also known as *master narrative* or *master plot*
  - A well-known story with common interpretation of the characters
  - Simple or abstract story to which one can reduce other stories, i.e., a pattern
- Associations in archetypes do not work universally, each archetype is part of a *narrative canon*

Casting RUvsUKR as DvsG

- „A vast invading army under the command of an autocrat … a much smaller country under siege, its leader refusing to flee. The world is focused on Ukrainian President Volodymyr Zelensky, who is leading a defiant nation in this ~~David vs. Goliath~~ battle against Russia's Vladimir Putin."

CBS news, March 6, 2022
https://www.cbsnews.com/news/ukraine-vs-russia-a-modern-day-david-vs-goliath-story/



Modeling archetypes

- Archetypes add another layer to the event discourse, namely, communicating the event with a certain *intent* and *effect*
- To model this sender-receiver communication we rely on *speech acts* (originally Austin(1962))
  - Three parts of speech:
    - **Illocutionary** act: intention of the sender
    - **Locutionary** act: the performance of the illocution
    - **Perlocutionary** act: the effect of the locution

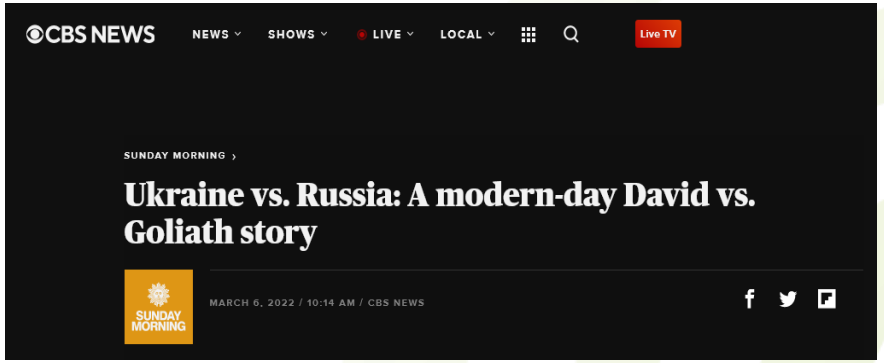
[12]

Coming back

Illocutionary act:

- Frame the Russian invasion as an act to be condemned
- Produce *sympathy* with Ukraine and the current president

Locutionary act:

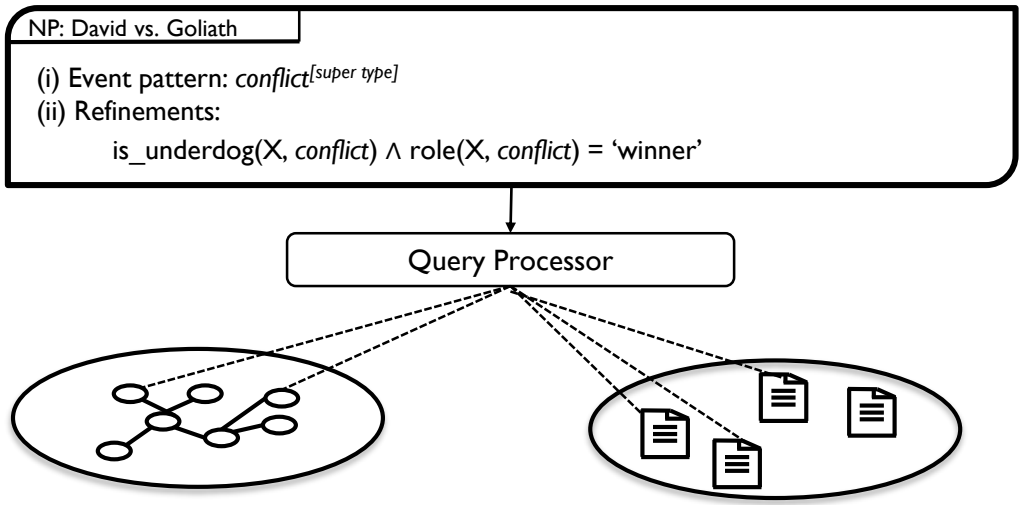


Perlocutionary act:

- Possibilities:
  - Awake sympathy with Ukraine
  - Condemn Vladimir Putin

Approximating Archetypes

- Some archetypes can be modeled as narrative prototype, e.g., DvsG
- Leads to a categorization task, i.e., given an event *e* and a archetype *a*, can we categorize *e* as an event that can be told by *a*?



Potential use cases

- *Framing* of events
  - While framing is a known problem in other disciplines, in CS it mostly is reduced to glorified topic modeling
  - Main problem: what is the *frame* in framing.
    - Frames are used to direct the recipients train of thought into a specific direction
    - Idea: use an archetype as a frame
    - Use case: can we frame an event by an archetype
- However, this research is at the very beginning…

Key Points

1. Events are composed of factual knowledge and narrative aspects.
2. Representing, reasoning, and querying both types of information is of great value to understand the event better.
3. In the end it might be possible, to use this base as a means to categorize events by possible archetypes.

Thank You!

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If you have any questions, contact me via:

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Literature

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