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Institut für Informationssysteme
Technische Universität Braunschweig



Modeling Narratives of Real-World Events

Cape-KR 2025, Cape Town, South Africa

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Where do I come from?

**Trump and Harris Neck and Neck
After Summer Upheaval, Times/Siena
Poll Finds**
The New York Times

**In war-battered Gaza, residents grow angry with
 Hamas**

Russia's war on Ukraine grinds into second year as Putin gambles on
the long game **Los Angeles Times**

The Dimming Light of Democracy
**Trump's Army and the Attack on
America**
SPIEGEL International

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

**Road to war: U.S. struggled to
convince allies, and Zelensky, of
risk of invasion**
The Washington Post
Democracy Dies in Darkness

**US election results 2020: Joe
Biden win Donald Trump for US
presidential election - See di
votes here**
BBC NEWS

POLITICS | UNITED STATES OF AMERICA



Trump 'gleefully watched' while riots unfolded

**Ukrainian team blew up Nord Stream
pipeline, claims report**





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POLITICS | UNITED STATES OF AMERICA

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DW



Battle of Leipzig (event_627923)

Change Format Expert View

| Property | Object |
|-------------------------------------|---|
| rdfs.label | Bataille de Leipzig (1813) (fr) |
| rdfs.label | Battaglia di Lipsia (it) |
| rdfs.label | Folkenlager ved Leipzig (no) |
| rdfs.label | bataille de Leipzig (fr) |
| rdfs.label | battaglia di Lipsia (it) |
| rdfs.label | Битва при Лейпциге (bg) |
| rdfs.label | Битва народоџ (ru) |
| rdfs.label | Bitka kod Leipziga (hr) |
| rdfs.label | Bitwa pod Lipskiem (pl) |
| rdfs.label | Slaget ved Leipzig (da) |
| rdfs.label | Batalia de Leipzig (es) |
| rdfs.label | Bătălia de la Leipzig (ro) |
| rdfs.label | Slag bij Leipzig (nl) |
| rdfs.label | Volkerschlacht bei Leipzig (de) |
| rdfs.label | Battle of Leipzig (en) |
| rdfs.label | Bitka pri Leipzigu (sl) |
| rdfs.label | Batalha das Naupós (pt) |
| dcterms.description | 1813 battle during the War of the Sixth Coalition (en) |
| dcterms.description | Schlacht der Koalitionskriege (de) |
| dcterms.description | крупнейшее сражение в мировой истории до Первой мировой войны, произошедшее под Лейпцигом в ходе Войны шестой коалиции (ru) |
| dcterms.description | battaglia delle guerre napoleoniche svoltasi nel 1813 (it) |
| dcterms.description | veidslag in Koninkrijk Saksen (nl) |
| dcterms.description | importante bataille de la guerre de la Sixième Coalition (fr) |
| dcterms.description | In der Völkerschlacht bei Leipzig werden die Truppen Napoleons von den verbündeten Heeren der Österreicher, Preußen, Russen und Schweden besiegt. (de) |
| dcterms.description | Napoleon is defeated by the forces of the Sixth Coalition. More than 600,000 soldiers were killed or wounded, and over 20% of the French army was missing. Many of the German states forming the Confederation of the Rhine joined the Coalition, as a result of the battle. (en) |





What has this to do with narratives?

- We observe events through *narratives* concerning them

Observation 1

Disputed information may exist – also called narrative aspects, i.e., framing applied to specific events

(not the topic for today)

Putin Announces Start to ‘Military Operation’ Against Ukraine

“The invasion has begun,” Ukraine’s Interior Ministry said. Putin says he seeks “demilitarization” of Ukraine but has no plans to occupy it.

The New York Times

Observation 2

Narratives arrange information in a specific way centered around a topic or event respectively

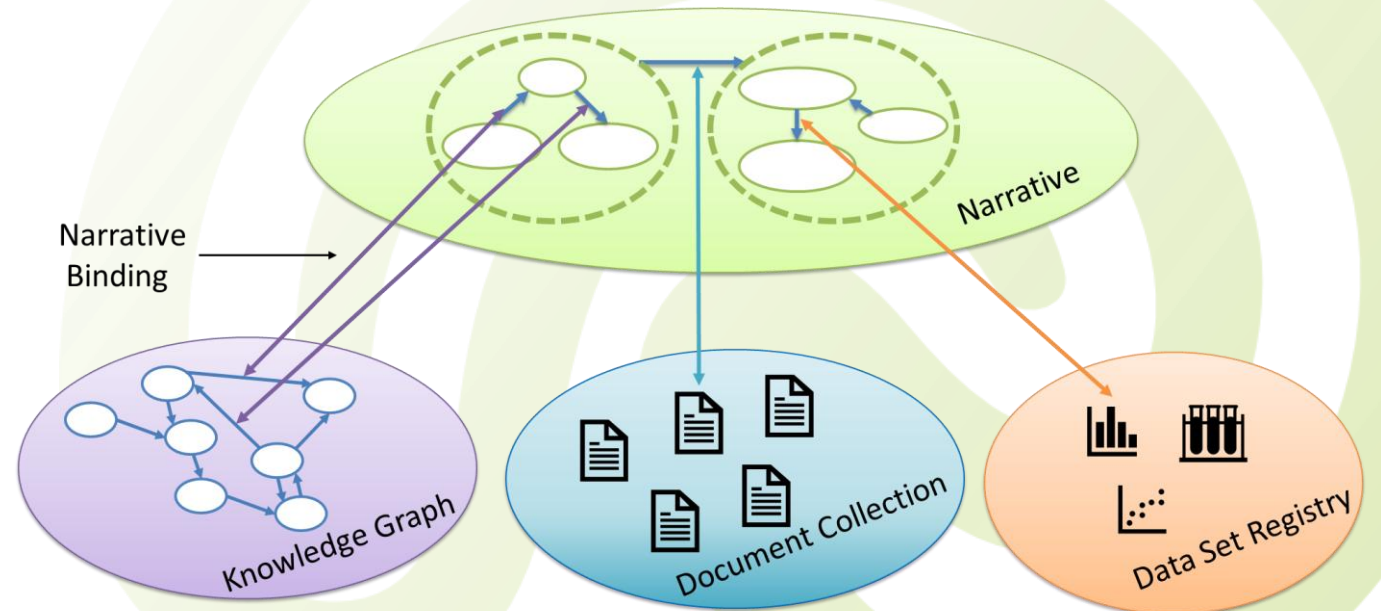
(topic of today)





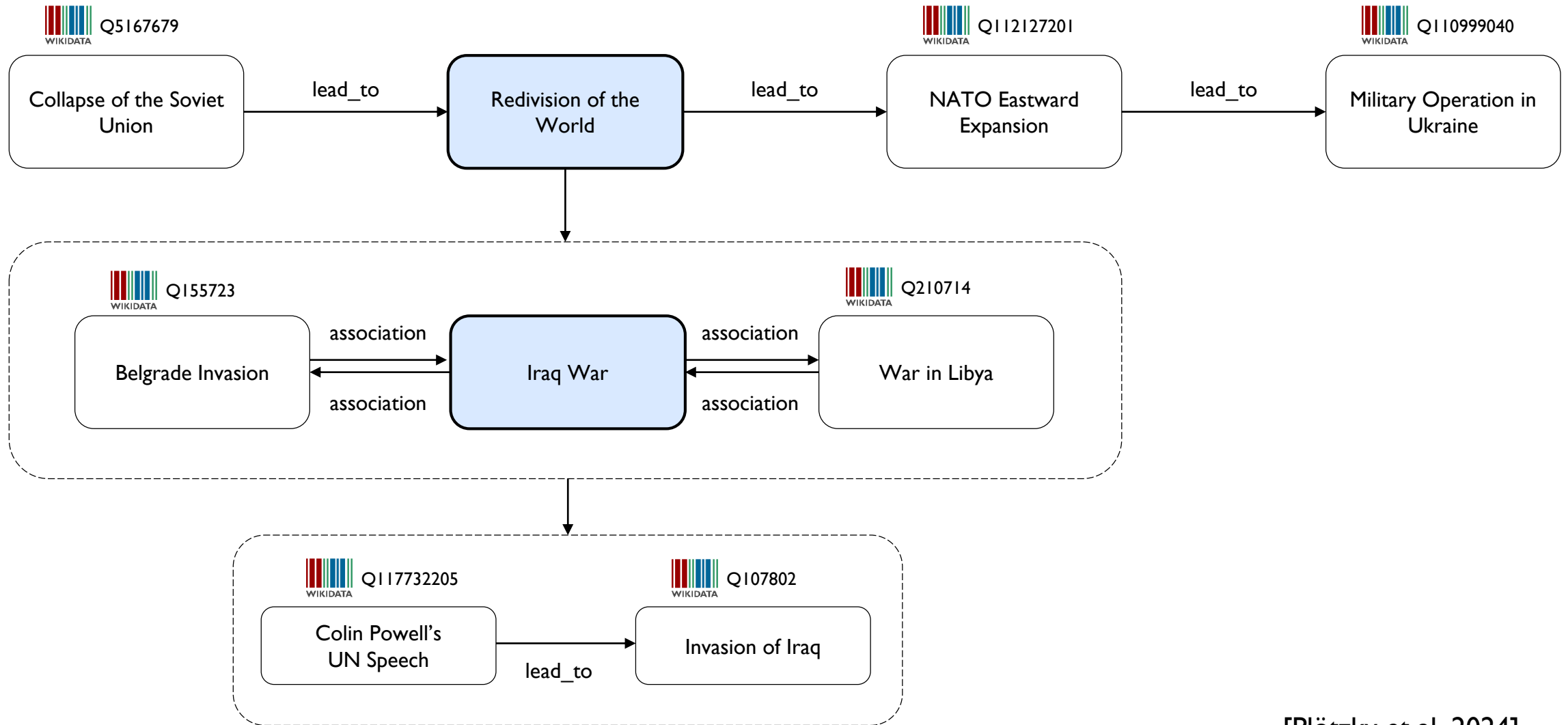
What is a Narrative?

- Basic idea: narratives as logical overlays on top of (potentially heterogeneous) knowledge repositories [Kroll et al. 2020]
 - Bindings ensure grounding in the underlying repositories
 - Formalized as a standard graph where:
 - Nodes = Entities, events, literals
 - Edges = factual and narrative relationships
 - Recursive nodes as encapsulation units





An Example for the Russo-Ukrainian War



[Plötzky et al. 2024]



How do we get them?

- Mined from text by incremental LLM prompting [Plötzky et al. 2024]
- By a narrative query [Kroll et al. 2022]
- As instances of narrative prototypes [Plötzky and Balke 2022]



NP: David vs. Goliath

(i) Event pattern: *conflict*^[super type]

(ii) Refinements:

$is_underdog(X, conflict) \wedge role(X, conflict) = 'winner'$

$\wedge is_aggressor(Y, conflict) \wedge X \neq Y$



What can/could/would like I do with them?

- Representation of *complex event schemas* over knowledge repositories ✓
- Capture narratives of events from multiple *viewpoints* ✓
- Estimate whether a narrative is *plausible* for a specific viewpoint
 - On-going work and basically future work



Thanks!

- **Key Points**

- Narratives can be used in various ways for event-centric knowledge repositories
- A basic narrative structure is defined
- See you at the poster session 😊

- **Contact**

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The Narrative Model

Graph illustrating relationships between events and entities:

- Events: Dissolution of the Soviet Union, Broken Promise, Russo-Ukrainian War, Disolution Negotiations, NATO Eastward Expansion
- Entities: USA, NATO
- Relationships: happenedBefore, causes, hasAggressor, hasPromiseBreaker, association

Legend:

- Event (white box)
- Entity (Participant) (white oval)
- Recursive Node (blue box)
- Narrative Relationship (white line)
- Factual Relationship (blue line)
- Recursive Relationship (blue line with arrow)

Mining Narratives

Flowchart of the narrative mining process:

- Document Selection: Selection based, e.g., on political ideology of the document author
- Event Detection: LLM prompting based on a target real-world event
- Timeline Extraction: LLM few-shot prompting to get the main timelines and event labels for each document
- Narrative Matching: Find connected components by using HDSCAN on the timelines
- Synthesis: Generate labels for all clusters and narrative relationships

Narrative Prototypes

Example of a narrative prototype and its query processor:

- NP: David vs. Goliath
- (I) Event pattern: $\text{conflict}(\text{super type})$
- (II) Refinements: $\text{is_underdog}(\text{X}, \text{conflict}) \wedge \text{role}(\text{X}, \text{conflict}) = \text{"winner"}$
 $\wedge \text{is_aggressor}(\text{Y}, \text{conflict}) \wedge \text{X} \neq \text{Y}$

Query Processor connects Knowledge Graph and Document Collection.

Publications

1. F. Plötzky and W.-T. Balke: "It's the Same Old Story! Enriching Event-Centric Knowledge Graphs by Narrative Aspects", 14th ACM Web Science Conference (WebSci), Barcelona, Spain, 2022.
2. F. Plötzky, N. Kiehne, and W.-T. Balke: "Lost in Recursion: Mining Rich Event Semantics in Knowledge Graphs", 16th ACM Web Science Conference (WebSci), Stuttgart, Germany, 2024.

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Literature

- Hermann Kroll, Denis Nagel, and Wolf-Tilo Balke (2020): *Modeling Narrative Structures in Logical Overlays on top of Knowledge Repositories*. Int. Conf. on Conceptual Modeling (ER). Springer.
- Hermann Kroll, Florian Plötzky, Jan Pirklbauer, and Wolf-Tilo Balke (2022). *What a Publication Tells You – Benefits of Narrative Information Access in Digital Libraries*. ACM/IEEE Joint Conf. on Digital Libraries (JCDL). ACM.
- Florian Plötzky and Wolf-Tilo Balke (2022): *It's the Same Old Story! Enriching Event-Centric Knowledge Graphs by Narrative Aspects*. Web Science Conf. (WebSci). ACM.
- Florian Plötzky, Niklas Kiehne, and Wolf-Tilo Balke (2024): *Lost in Recursion: Mining Rich Event Semantics in Knowledge Graphs*. Web Science Conf. (WebConf). ACM.