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2019

## Adaptive Knowledge Networks: A Time Capsule

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# Adaptive Knowledge Networks : A Time Capsule

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## The 2019 CRA-W Grad Cohort for Women Workshop

### MOTIVATION

- ❖ Real world events are dynamic in nature  
Periodic events e.g. US Presidential Election  
Non-periodic events e.g. Cyclone Idai
- ❖ Need for real-time predictive analysis, trend analysis, spatio-temporal decision making, public opinion analysis for events.
- ❖ Current state-of-the-art curates dynamic knowledge graph from structured text.
- ❖ We propose creating an Adaptive Knowledge Network from incoming real-time multimodal spatio-temporally evolving data.

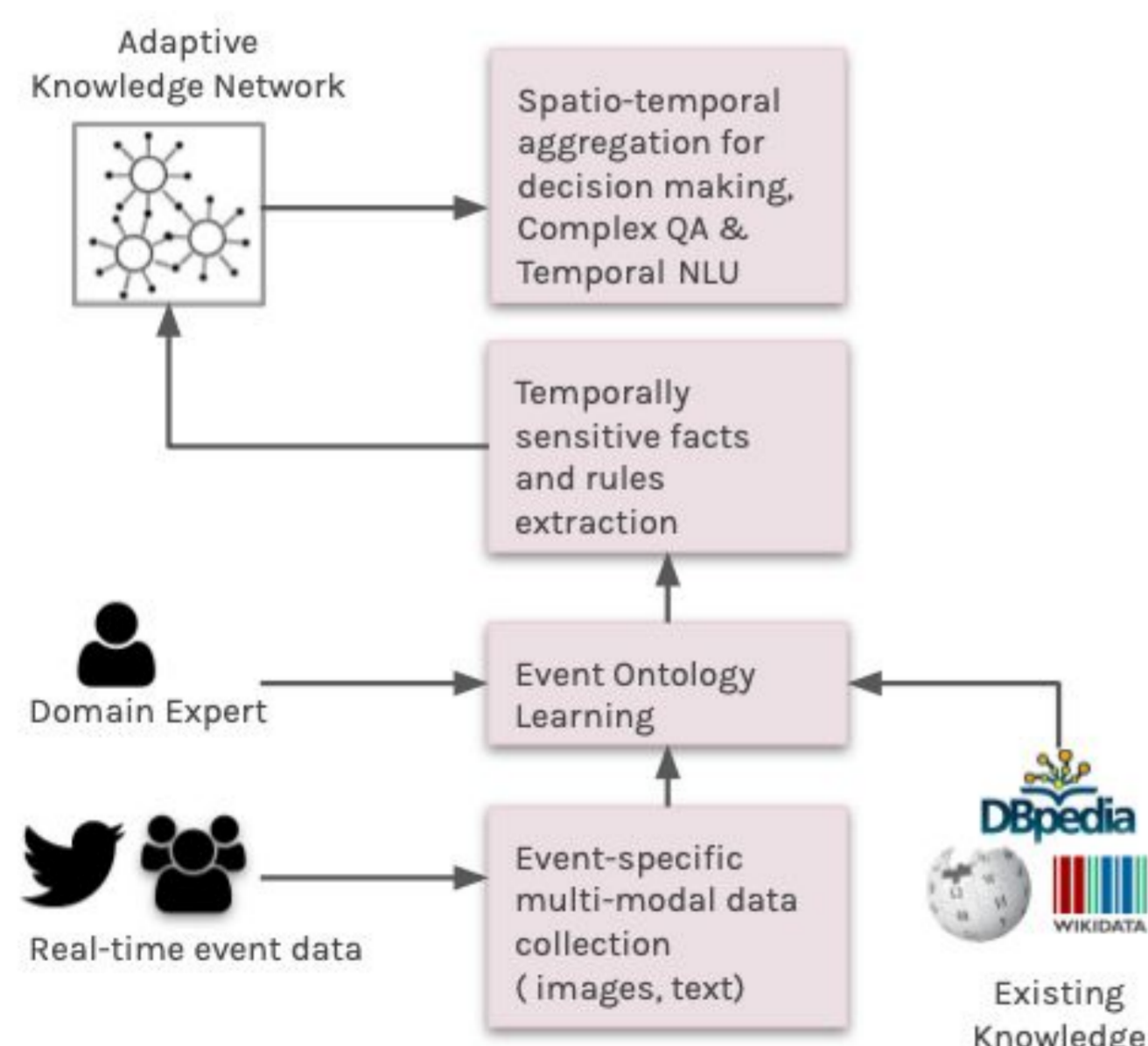
### HOW

We define two problems:

- (1) Automatically extracting and predicting patterns for a class of **periodic events** (e.g. US Presidential Election).
- (2) Inferring temporal information for **non-periodic events** (e.g. disasters) from real-time multimodal data to create an **Adaptive Knowledge Network**.

We rely on combining **text mining** approaches with **machine learning and neural networks** using **knowledge** from: (1) hierarchical and non-hierarchical relationships in KGs, (2) unstructured textual event-specific information, and (3) semi-structured collaborative KGs.

### OVERVIEW



### REFERENCES

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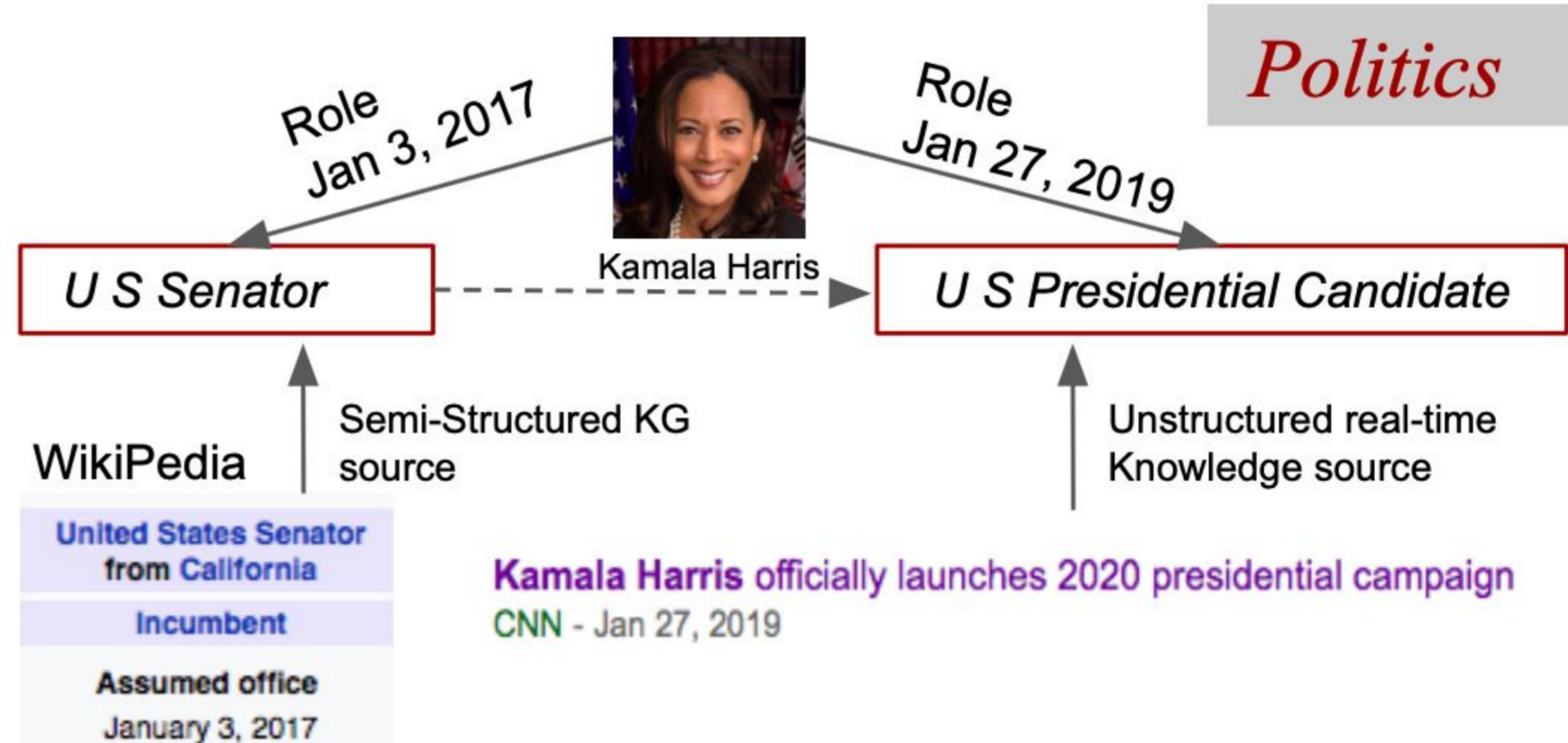
### WHY

- ❖ Search for event-relevant information on the web is prone to incorrect or incomplete or stale information.
- ❖ Inferring temporal information associated with events and related assertions can significantly improve the quality of Q/A on the Web.
- ❖ Hence, there is a need to **identify and maintain temporally changing information** to analyze **complex temporal dynamics** and **interactions of entities** during a series of evolving events.

### WHAT

- ❖ We rely on **reasoning** over unstructured and structured **Knowledge Graphs** (KGs).
- ❖ However, most traditional KGs capture static multi-relational data.
- ❖ Effectively **capturing the temporal dependencies across knowledge sources** can help improve the understanding of complex temporal dynamics of entities, relationships and their evolution over time.

### USE CASES



#### Temporal Knowledge Validity: (Periodic events)

Who will be the President of United States of America in May 2021?

Who will be the next President of United States of America?

The answer to these questions depend on the evolution and recurrence of the event "U S Presidential Election" which is due in 2020.

#### Disaster Decision Making: (Non-periodic events)

How can the stranded people be transported to the nearest shelter?

Is Flagler Avenue east of First Street blocked?

### ACKNOWLEDGEMENTS

We would like to acknowledge Dr.Pavan Kapanipathi and Dr.Sarasi Lalithsena for their invaluable guidance and support in this project.

We would also like to acknowledge partial support from the National Science Foundation (NSF) award: CNS-1513721: "Context-Aware Harassment Detection on Social Media", NSF award EAR-1520870 "Hazards SEES: Social and Physical Sensing Enabled Decision Support for Disaster Management and Response".