Explainable AI Components for Narrative Map Extraction

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Research Problem

- Narrative extraction systems are becoming increasingly complex.
- Users need to understand why and how AI systems make decisions.
- Trust – in the broad sense of reliability, predictability, and efficiency – requires explanations at multiple levels of abstraction.

Motivation

- Complex AI-based narrative extraction systems appear as "black boxes" to users.
- Analysts need to understand and trust why specific narrative connections were made.
- Effective explanations must connect text details with the overall narrative structure.
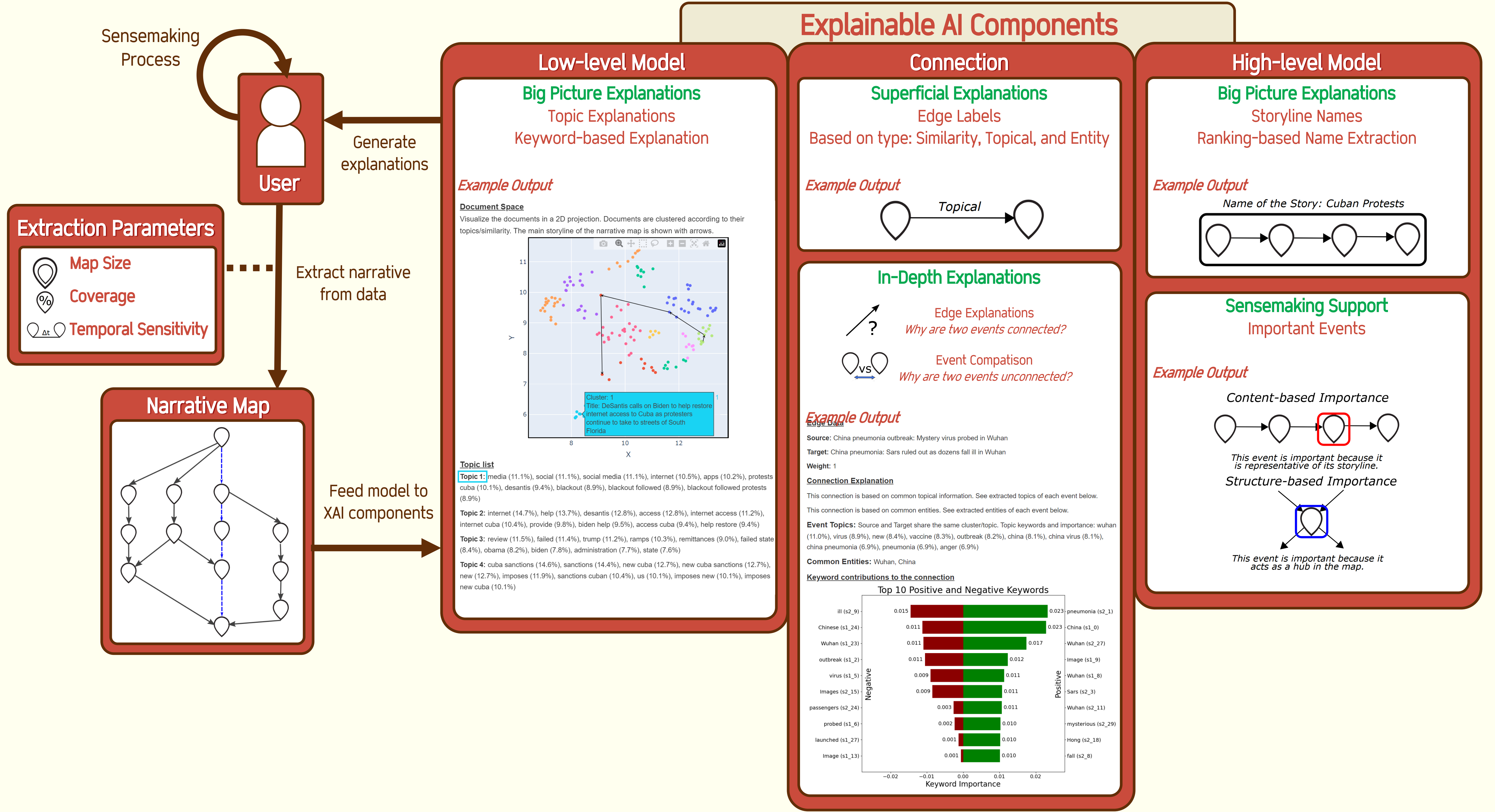
Overview of XAI System for Narrative Maps

Low-level Space Explanations
- Topical clusters using HDBSCAN clustering.
- Keyword-based explanations with modified TF-IDF.
- Interactive 2D visualization with UMAP projection.

Connection Explanations
- Classification of connections: similarity-based, entity-based, topical.
- SHAP value analysis to identify influential terms.
- Event comparison to explain both connected and unconnected events.

High-level Structure Explanations
- Automated storyline naming through noun phrase extraction.
- Important event detection using:
  - Content importance (similarity to storyline centroid).
  - Structural importance (degree centrality in narrative graph).

Evaluation Results

- User study with 10 participants analyzing 2021 Cuban protests narrative.
- Overall explanations increased user trust (M = 4.5/5).
- Important event detection was considered highly relevant (M = 4.3/5).
- Storyline naming showed mixed results (correctness: M = 3.0/5).

Responses (5-point Likert Scale)
1 ("Strongly Disagree") to 5 ("Strongly Agree")

(a) Overall Explanations

	1	2	3	4	5	Mean	SD
Trust	0	0	1	3	6	**4.50**	0.71
Usefulness	0	0	1	5	4	**4.30**	0.67

(b) Important Events

	1	2	3	4	5	Mean	SD
Relevance	0	0	1	5	4	**4.30**	0.67
Usefulness	0	0	2	4	4	**4.20**	0.79

(c) Storyline Names

	1	2	3	4	5	Mean	SD
Correctness	1	4	1	2	2	**3.00**	1.41
Relevance	1	0	4	1	4	**3.70**	1.34
Usefulness	0	1	2	5	2	**3.80**	0.92

(d) Connections

	1	2	3	4	5	Mean	SD
Label Correctness	0	0	2	6	2	**4.00**	0.67
Label Usefulness	0	1	3	5	1	**3.60**	0.84
Explanation Usefulness	0	0	1	7	2	**4.10**	0.57
Comparison Usefulness	0	0	4	4	2	**3.80**	0.79

Key Contributions

- Multi-level explanation approach bridges document space and narrative structure.
- Connection explanations and important event detection build user confidence.
- System helps users develop appropriate trust in narrative extraction.
- **Available on GitHub:** https://github.com/briankeithn/narrative-maps.

Future Directions

- More sophisticated temporal and causal explanation strategies.
- Adaptive explanations based on user expertise.
- Improving scalability for larger narrative collections.
- Better alignment between the model and explanations.

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