



An Entity-Driven Framework for Abstractive Summarization

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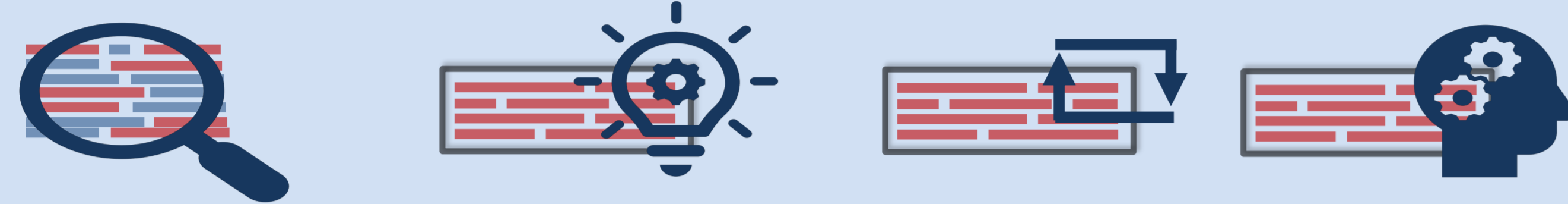
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SENECA

a novel System for ENtity-drivEn Coherent Abstractive summarization framework aimed at improving



Two-step Approach

- an entity-aware content selection module identifies salient sentences from input
- an abstract generation module conducts cross-sentence information compression and abstraction trained to promote coherence, conciseness, and clarity.
- two components further connected using reinforcement learning

What do the existing summarization systems need?

Input document interpretability

Models rely on positional information in the input, are fooled by adversarial content.

Coherence summary generation

Coherence is harder to model and evaluate for abstractive summarization systems

Improve linguistic qualities of the generated summary

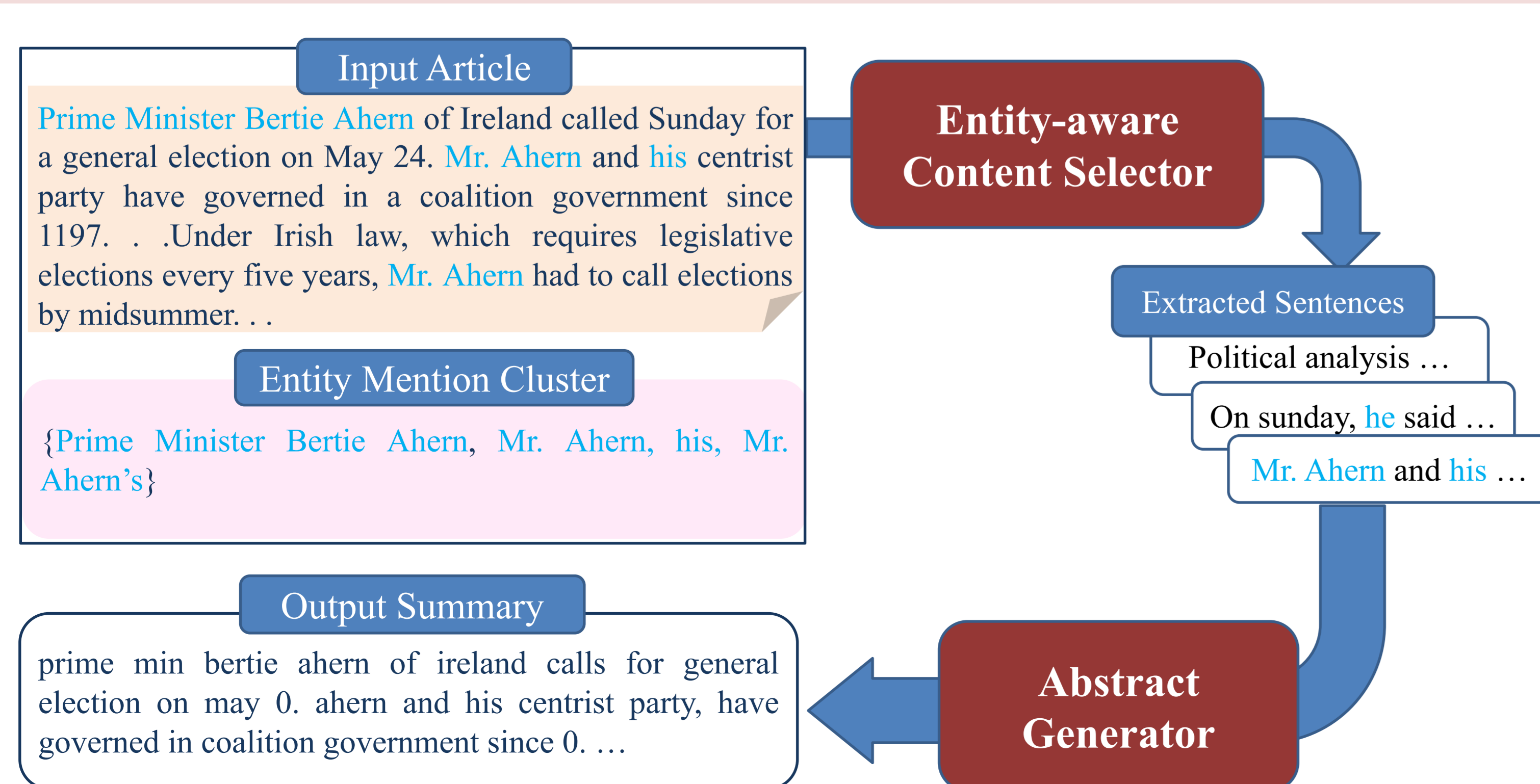
Current systems don't model or evaluate linguistic qualities for summary

How can entities help?

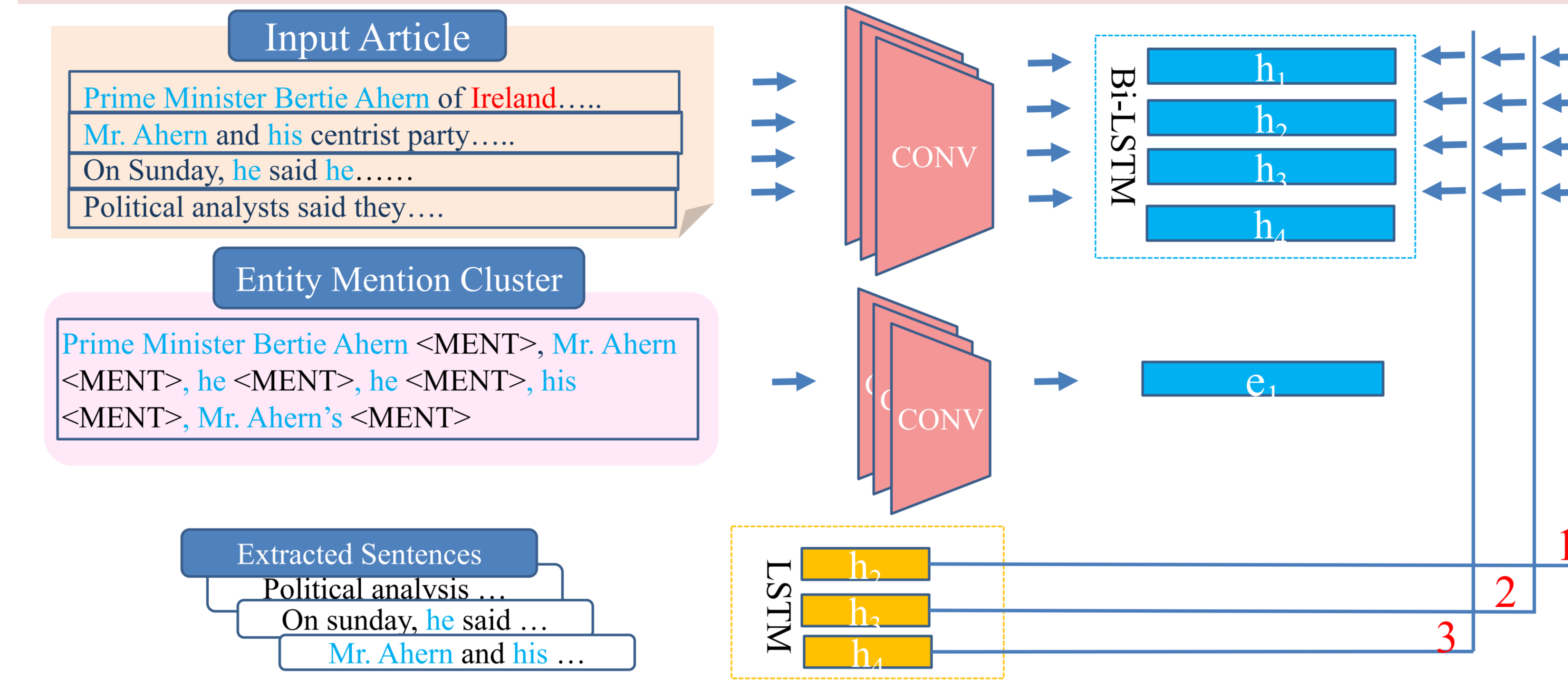
Entities in a text carry useful contextual information

Entity mentions connecting sentences can help identify non-adjacent yet coherent sentences

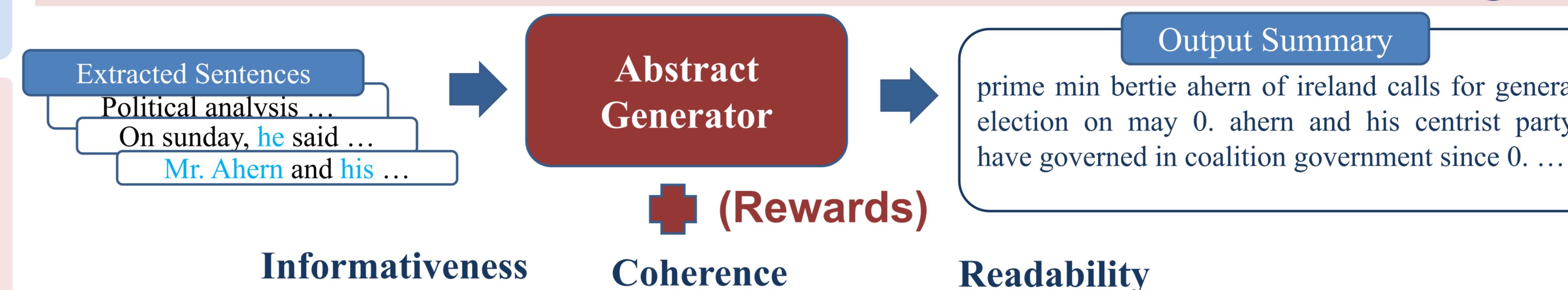
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Entity-aware Content Selector



Abstract Generator (with Reinforcement Learning - self-critical training)



- Reward R_{Rouge} : Rouge based Reward**
Average of Rouge-L F1 and Rouge-2 F1.
- Reward R_{Coh} : Entity-Based Coherence Reward**
Using a separately trained coherence model to score summaries capturing entity distribution patterns and topical continuity.
- Reward R_{Ref} : Pronominal Referential Clarity**
Penalize use of 3rd person pronoun or possessive pronoun before any noun phrase occurs.
- Reward R_{App} : Apposition (Conciseness)**
Penalize presence of non-restrictive appositives and relative clauses.

Automatic Summary Evaluation New York Times Dataset

System	R-1	R-2	R-L	Coherence
Human	-	-	-	0.79
Lead-3	32.59	16.49	29.17	-
PointGen+Cov	41.06	25.71	37.28	0.63
SentRewrite	42.19	25.42	38.74	0.32
DeepReinforce	47.03	30.72	43.10	0.59
BottomUp	47.38	31.23	41.81	0.56
DCA	48.08	31.19	42.33	-
SENECA	47.94	31.77	44.34	0.73
w/o entity	47.04	30.94	43.64	0.06
+ R_{Coh}	47.57	31.28	44.03	0.75
+ R_{Ref}	47.57	31.22	43.92	0.70
+ R_{App}	48.05	31.71	44.60	0.69
+ $R_{Coh} + R_{Ref} + R_{App}$	47.52	31.25	44.01	0.76

Linguistic Quality Evaluation

New York Times Dataset

% of system summaries improperly using referential pronouns, or containing relative clauses or appositives. Lower values are better.

System	Referential Pronouns	Relative Clauses	Appositives
Human	0.11	6.67	4.83
PointGen+Cov	0.15	1.92	1.26
SentRewrite	0.13	0.75	0.68
DeepReinforce	0.18	0.40	0.50
BottomUp	0.12	0.62	0.54
SENECA	0.13	1.15	0.68
w/o entity	0.21	1.24	0.70
+ R_{Coh}	0.12	1.15	0.71
+ R_{Ref}	0.10	1.20	0.72
+ R_{App}	0.13	0.65	0.42
+ $R_{Coh} + R_{Ref}$	0.12	0.94	0.59
+ R_{App}			

Significantly better ROUGE scores as well as higher coherence than previous state-of-the-art.

Generated summaries not only contain more salient information but are also more coherent.

Entity guidance is crucial during content selection as well as abstract generation.

Generated summaries have reduced usage of non-restrictive appositives which reduces noncritical information in the summary and improves summary conciseness.

Generated summaries make less mistakes with referential pronouns which improves readability.

Human evaluation shows that our model generated summaries are more informative and coherent than those of comparisons.

Results on CNN/Daily Mail dataset are in the paper.

SENECA

a System for ENtity-drivEn Coherent Abstractive summarization framework aimed at improving

leveraging co-referred entities for

Global content Modelling

Semantic Understanding of input

Discourse-aware text planning