

Unsupervised Opinion Summarization with Noising and Denoising



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ACL 2020

Opinion Summarization

You want to watch a movie



기생충

2019 봉준호 감독 작품 | 5월 30일 대개봉

You read reviews about the movie

... and more reviews

[Bong Joon-ho]'s work is as playful as it is

It's very rare a film makes a step-change

in what is going on and the dynamics of the characters, and makes that work as well it does here.

May 9, 2020 | [Full Review...](#)



Jim Ross
Cinetopia

A picture that audaciously devours the force of convention and transforms it into a feverish undercurrent, driving what can only be described as an engine through the odyssey of mayhem.

April 23, 2020 | Rating: 4/4 | [Full Review...](#)



David Keyes
Cinemaphile.org

If the movie is a Rorschach of who you identify as parasite and host, it's a test you're just as likely to fail; a filmgoing experience that refuses to fit into any box.

A miracle of a film. It feels like Bong Joon-ho's already extraordinary career has been building to this: a riotous social satire that's as gloriously entertaining as it is deeply sardonic.

February 3, 2020 | Rating: 5/5 | [Full Review...](#)



John Nugent
Empire Magazine
★ Top Critic

It isn't an easy ride, and as with life in the non-metaphorical world, the destination is uncertain. You'll see strange and wonderful things along the way.

December 11, 2019 | [Full Review...](#)



Leah Greenblatt
Entertainment Weekly
★ Top Critic

Settling in for a narrative about a family trying to keep it together by overpowering the capitalistic battle, Bong Joon-ho has constructed a low-key tragic comedy that insists on being more than just that.

May 20, 2020 | Rating: 3.5/5 | [Full Review...](#)



Varma
Films

... and 400 more reviews!

[View All Critic Reviews \(434\)](#)

...to decide whether to watch it or not



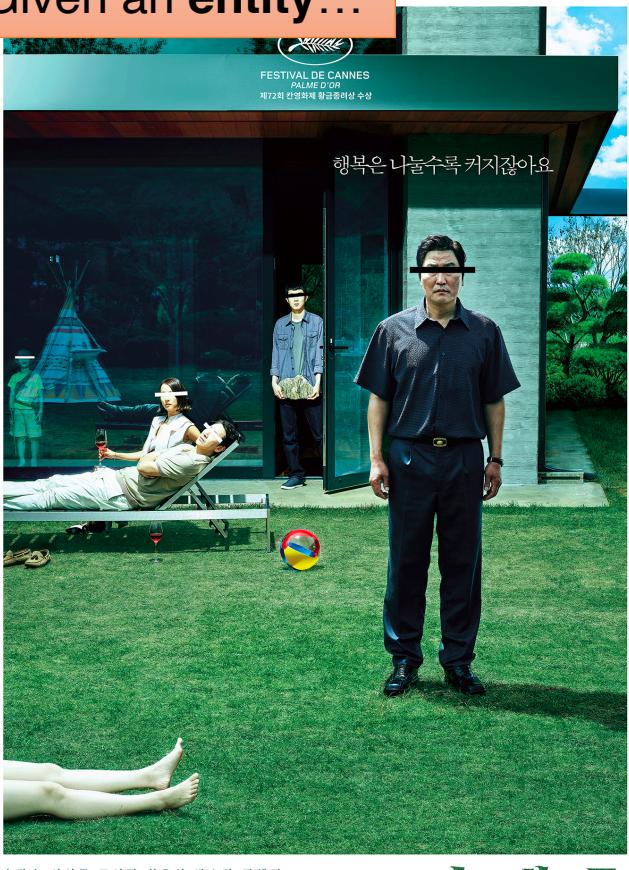
Let's watch!



Meh...

Opinion Summarization

Given an entity...



and a set of reviews as input...

[Bong Joon-ho]'s work is as playful as it is sincere and revelatory. He'll make you feel at home, and then rip the rug out from under you.

February 12, 2020 | Rating: 5/5 | [Full Review...](#)



Clarisse Loughrey
Independent (UK)
★ Top Critic

If the movie is a Rorschach of who you identify as parasite and host, it's a test you're just as likely to fail; a filmgoing experience that refuses to fit into any box, and forces viewers to breathe the dangerous air outside of it too.

December 11, 2019 | Rating: A- | [Full Review...](#)



Leah Greenblatt
Entertainment Weekly
★ Top Critic

A film that always has two thoughts in its head at once, a spectacular epic and tightly wound chamber piece, chickly sophisticated, brutal as a hammer.

February 5, 2020 | Rating: 5/5 | [Full Review...](#)



Danny Leigh
Financial Times
★ Top Critic

Settling in for a narrative about a family trying to keep it together by overpowering the capitalistic battle, Bong Joon-ho has constructed a low-key tragic comedy that insists on being more than just that.

May 20, 2020 | Rating: 3.5/5 | [Full Review...](#)



Shikhar Verma
High on Films

...director Bong is also working on other levels, not only making all of its characters relatable - the Parks are really quite sweet people, if a little lacking in self-awareness - but telling his story with a healthy dose of uproarious slapstick.

May 1, 2020 | [Full Review...](#)



Damon Wise
Uncut Magazine [UK]

Kudos go to Bong's sleight-of-hand narrative approach, as he seamlessly defying genres by alternating from drama to comedy to thriller and back again over the course of its 131-minute running time.

April 14, 2020 | Rating: 4/5 | [Full Review...](#)



Casey Chong
Casey's Movie Mania

...automatically produce an opinion summary

PARASITE (GISAENGCHUNG)

Critics Consensus

An urgent, brilliantly layered look at timely social themes, *Parasite* finds writer-director Bong Joon Ho in near-total command of his craft.

Let's watch!



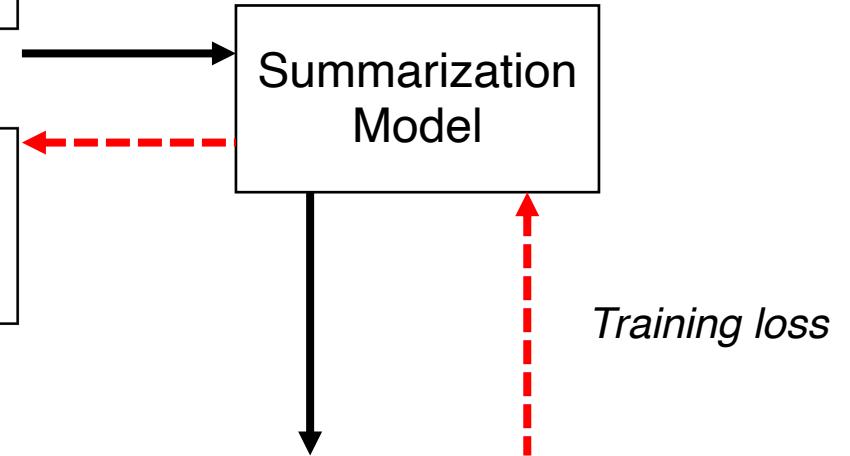
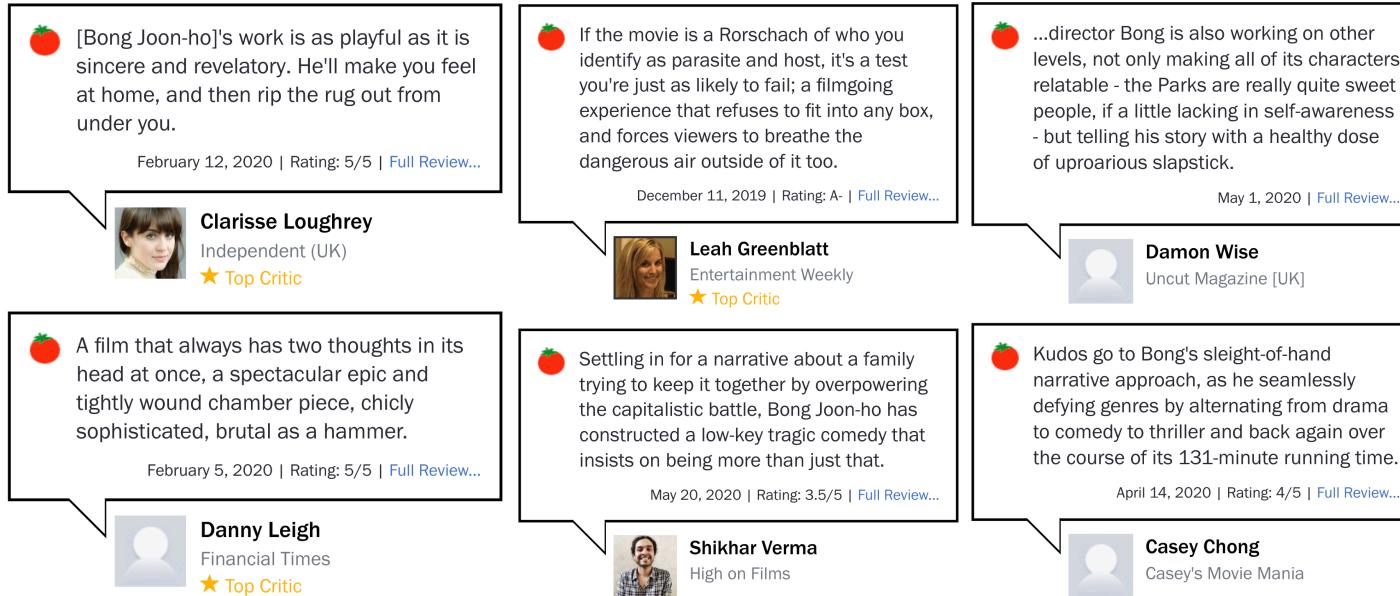
Meh...

so that people can make decisions

Supervised Opinion Summarization



Supervised Opinion Summarization



Summaries may
not be available at
training time!

???

Unsupervised Opinion Summarization

1. Extractive approaches

- Standard methods: LexRank (Erkan and Radev, 2004), Centroid (Radev et al., 2000), etc.

2. Abstractive approaches

- Template- and graph-based methods (Ganesan et al., 2010, Di Fabbrizio et al., 2014)
- **MeanSum** (Chu and Liu, 2019): neural-based method using an *autoencoder*
 - reconstructs the average of the review encodings as the summary
 - uses **weak decoders** (e.g., no attention and copy) to mitigate posterior collapse
- See also **Copycat** (Brazinskas et al., ACL 2020), which additionally uses randomly sampled reviews to enable attention and copy

This Work

- Neural-based, abstractive, and unsupervised
- Approach: **Noising and Denoising**
 - ✓ Enables the use of supervised learning!
 - ✓ Summarizer is not limited to weak decoders!
- Noising: Synthetic dataset creation
 - ✓ A backward simulation of how people write summaries
 - ✓ Introduces two linguistically motivated noising functions
- Denoising: Opinion summarization

Noising and Denoising: Motivation

Burgers here are very delicious,
but they were too expensive.

The waiter was rude to me. Too
bad since the food was great...

I did not like the food here, and
so are the staffs! Not recommend.

Great ambience and amazing food.
Will come back for sure.

Worst service ever! There is also
no parking and the location is bad.

Summarizer = denoiser



food

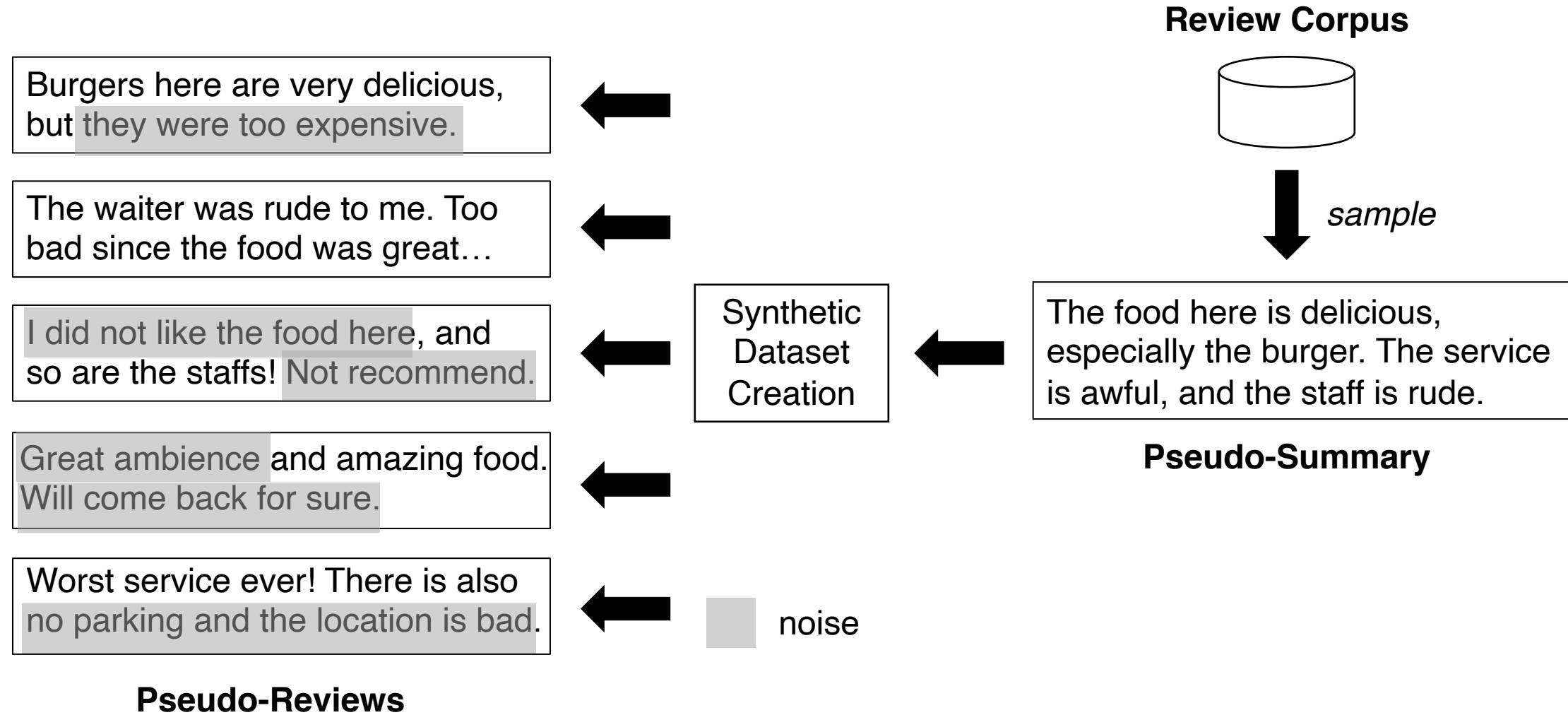


service



non-salient information = noise

Noising and Denoising: Motivation



Noising and Denoising: Motivation

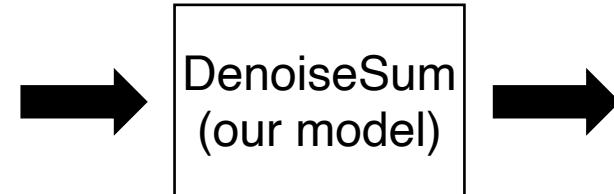
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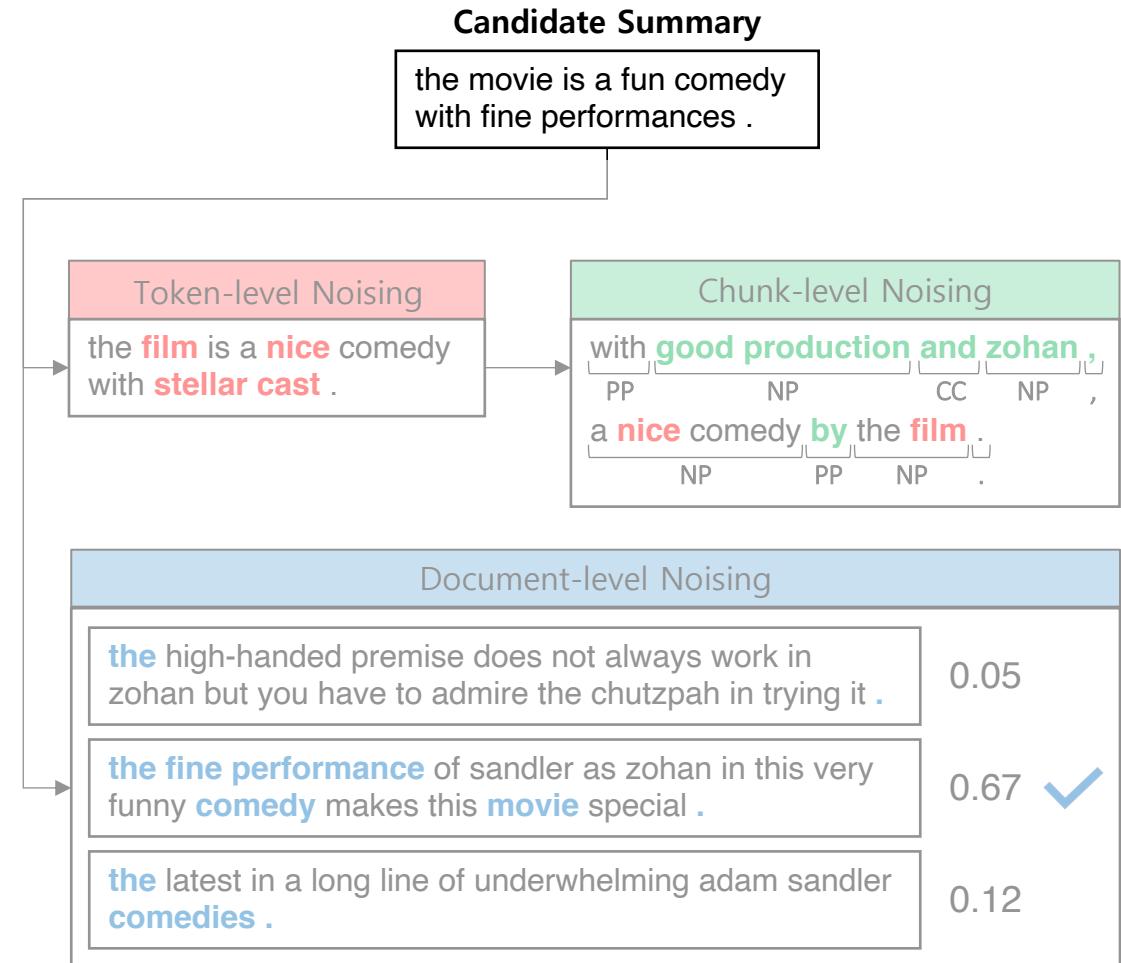
Summary

Reviews

Synthetic Dataset Creation

- **Summary Sampling**

- Filter out bad candidates using domain-specific constraints
- Reviews with first-person pronouns, unnecessary symbols, etc.



Synthetic Dataset Creation

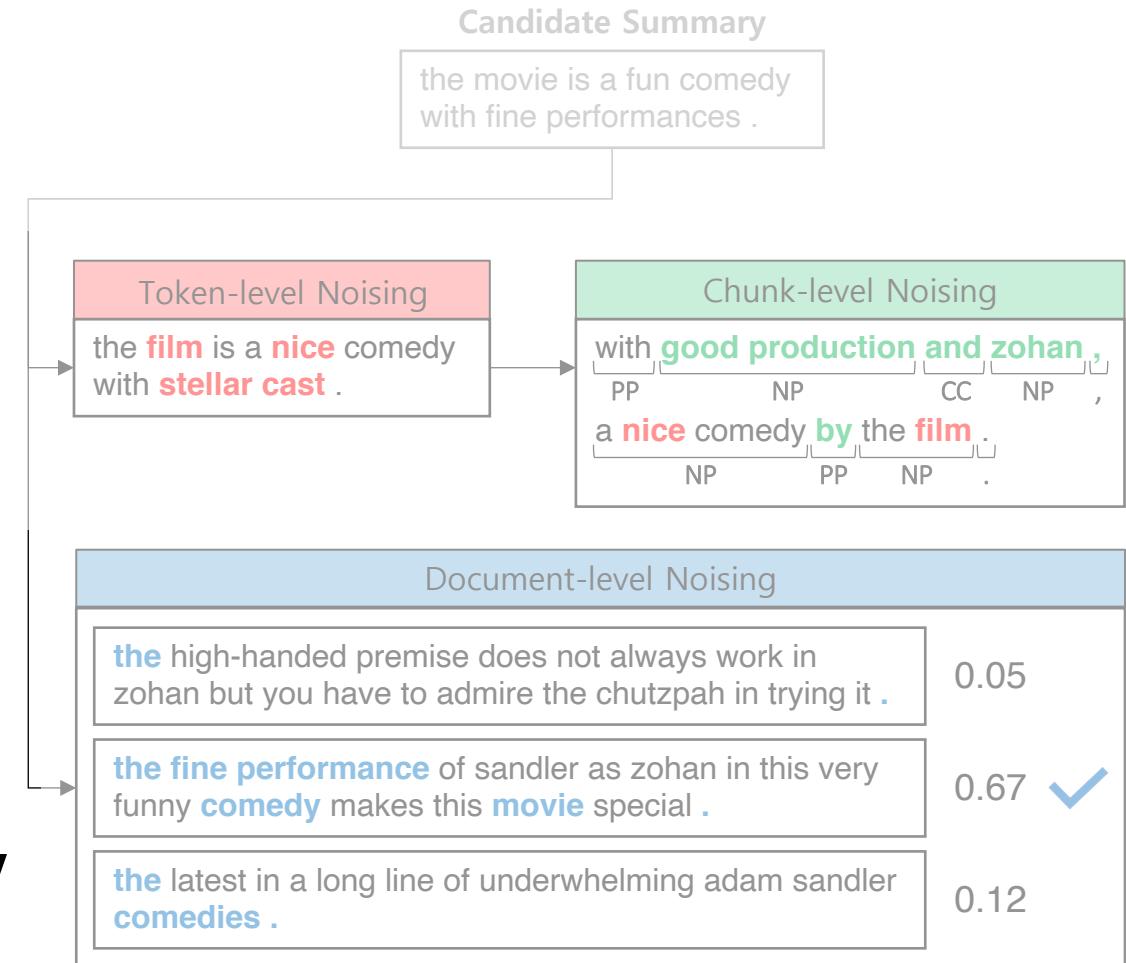
- **Segment Noising**

- To Creates reviews which words us may mention **aspects not** model
- Ch **found in the summary** inserts, and rearranges chunks using a syntactic template

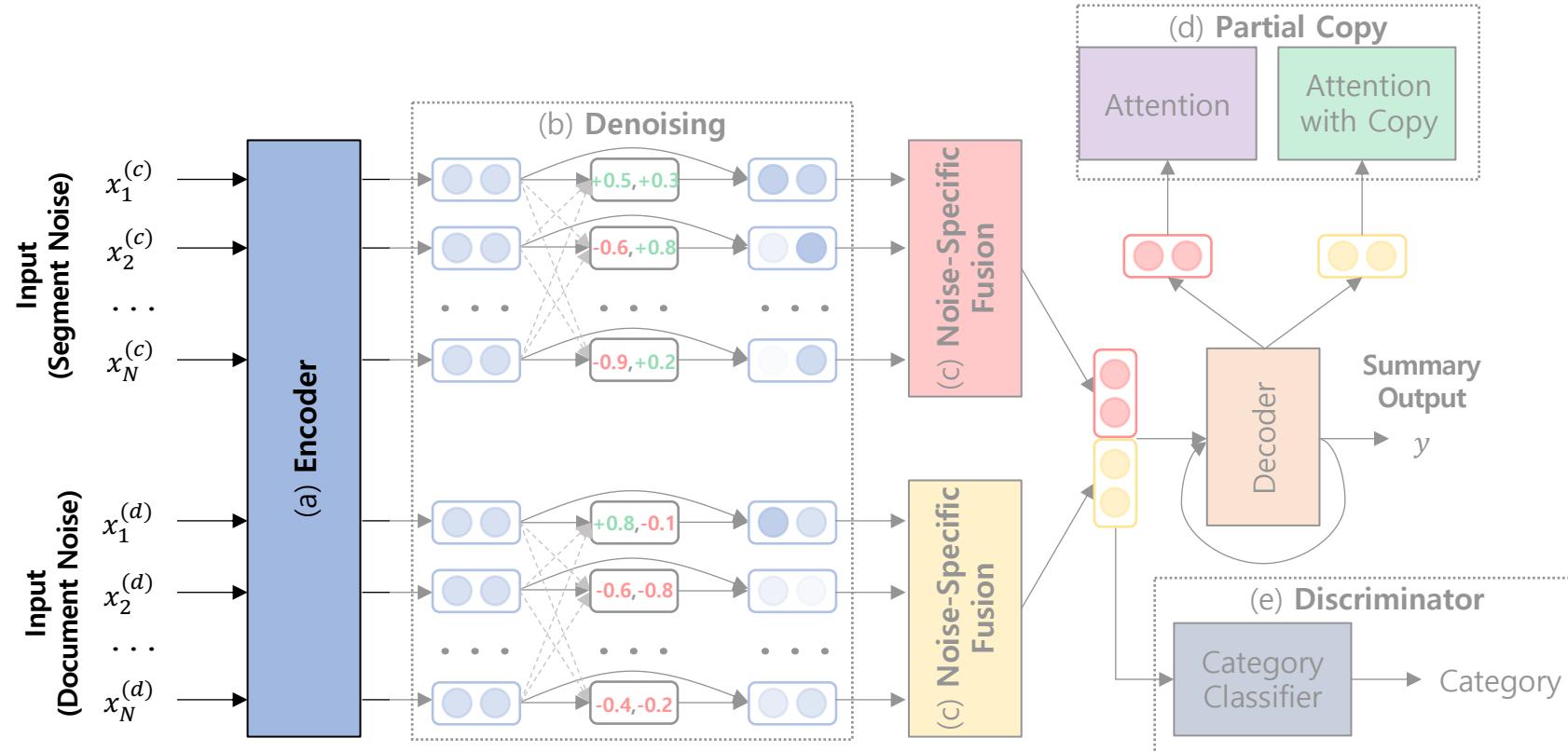
- **Document Noising**

- Se Creates reviews with s with the content **similar to the summary**

✓ Using both allows **aspect diversity** amongst pseudo-reviews

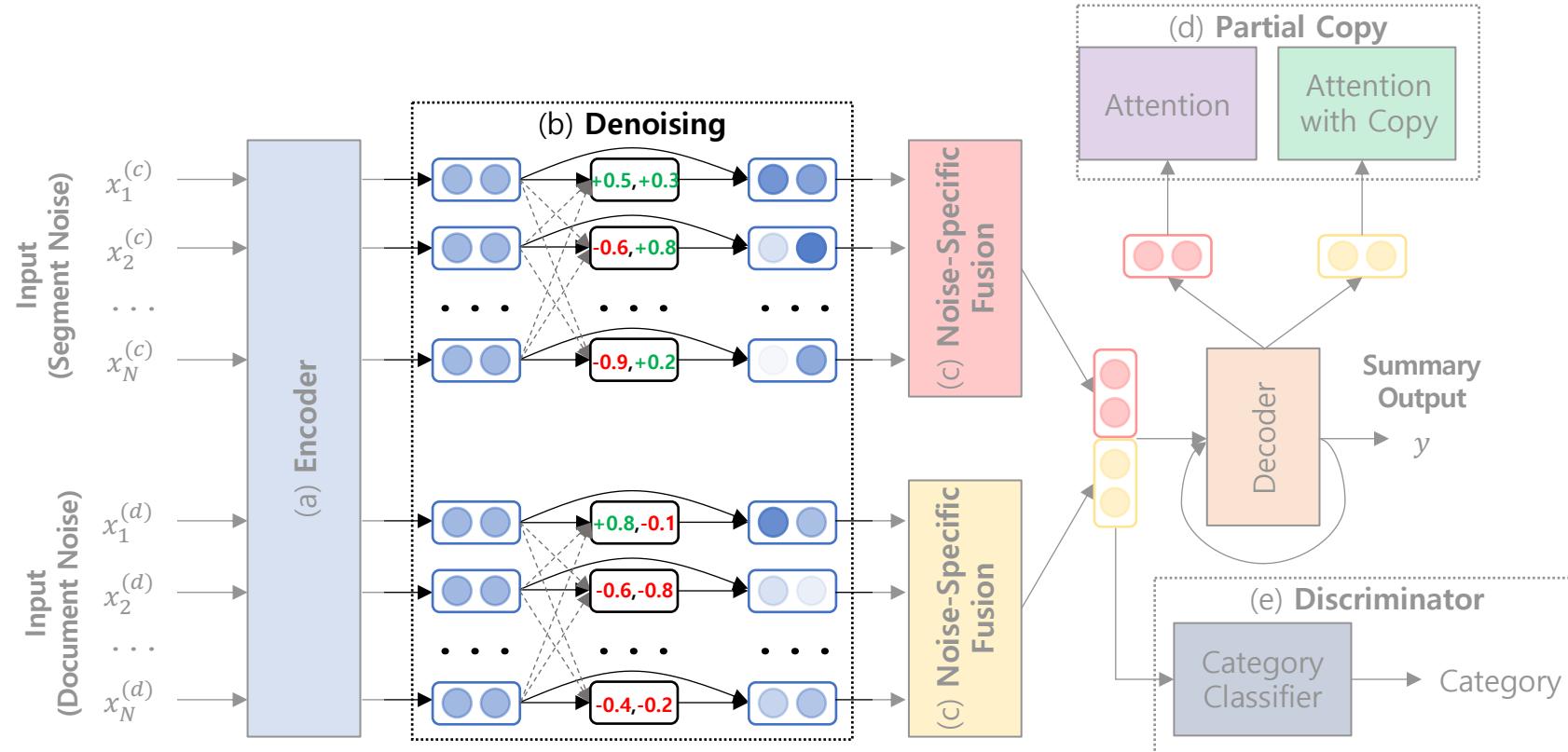


DenoiseSum: Denoising Summarization



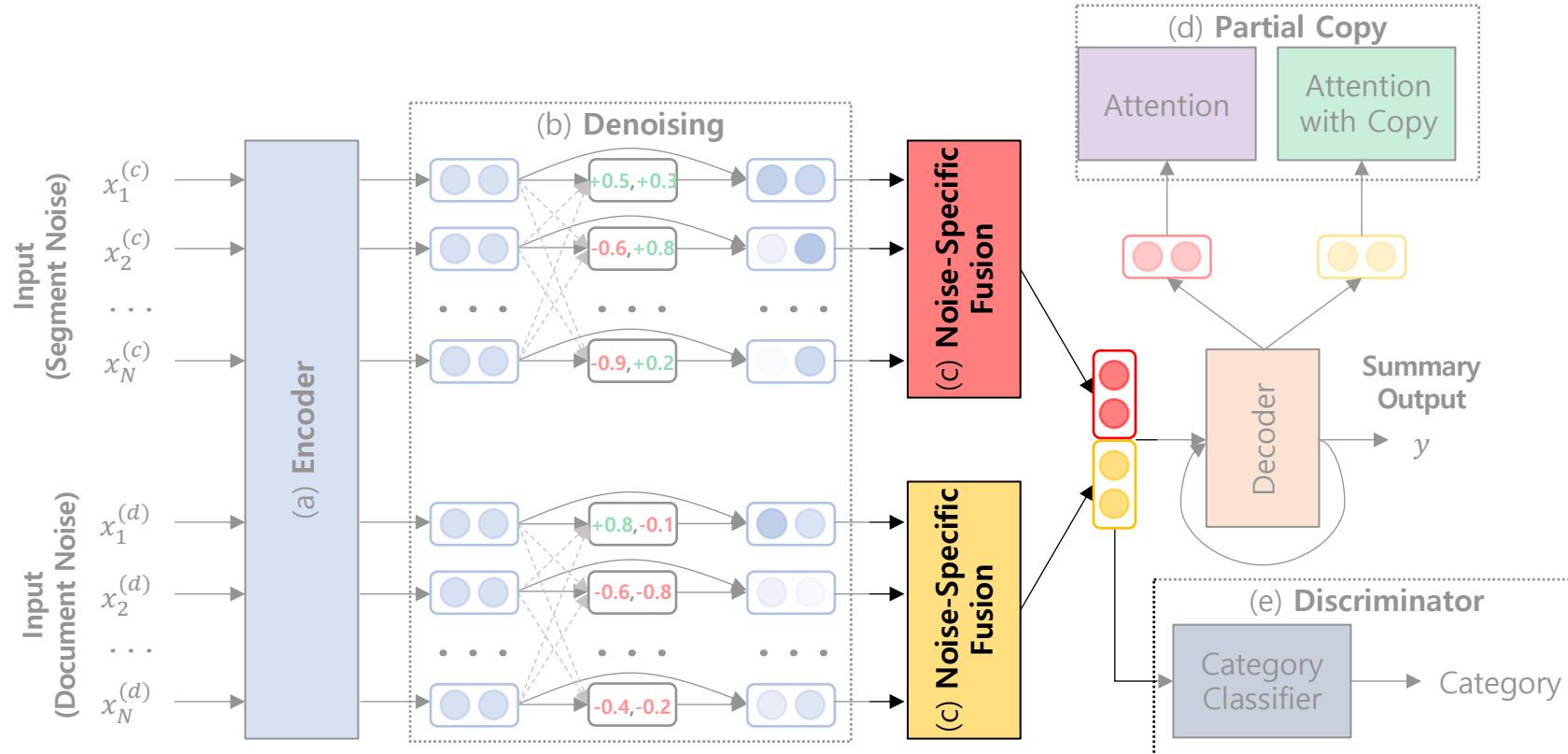
- **Multi-Source Encoder**
 - Encode each input review separately using BiLSTMs

DenoiseSum: Denoising Summarization



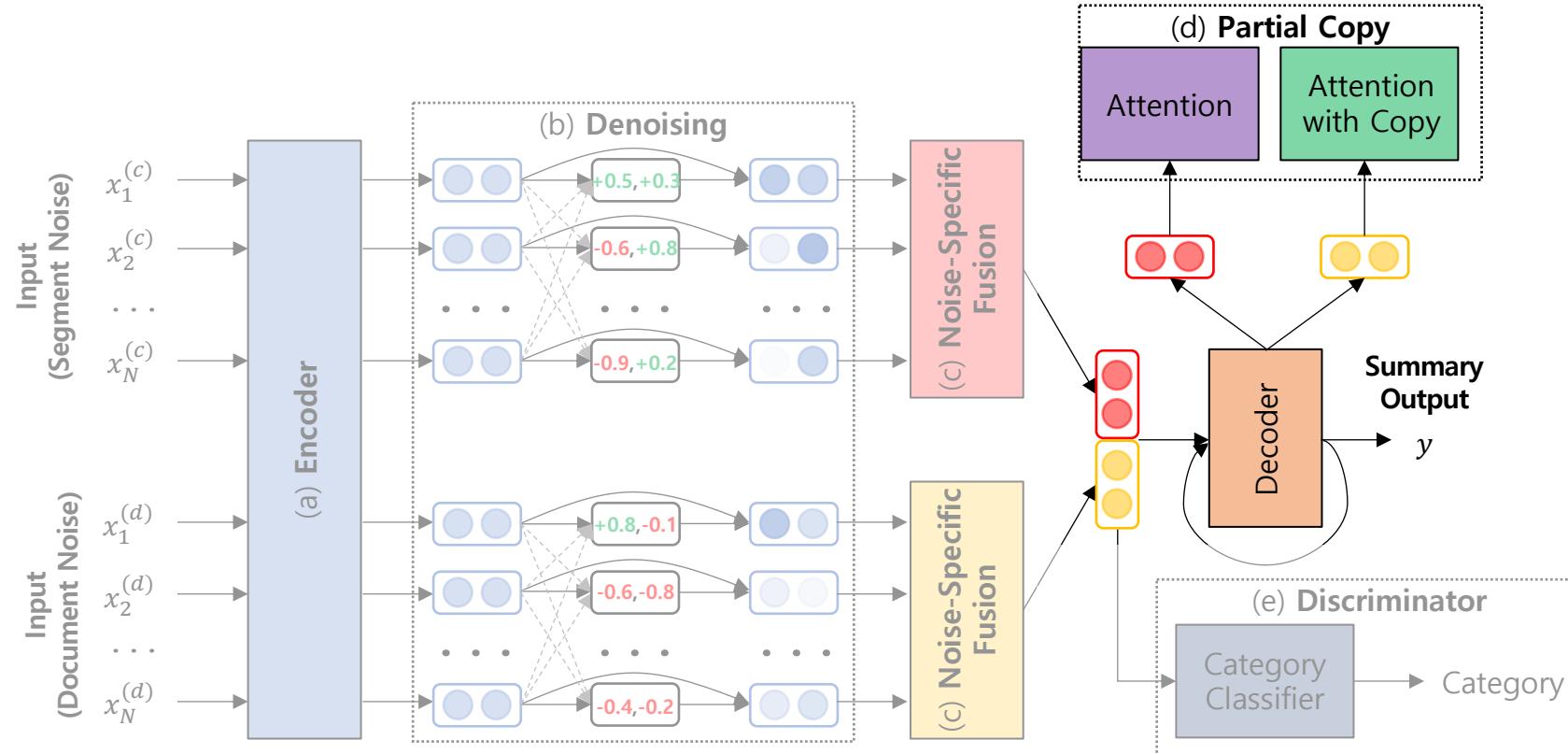
- **Explicit Denoising Module**
 - Remove noise by correcting/adjusting the weights of the review encodings

DenoiseSum: Denoising Summarization



- **Noise-Specific Fusion**
 - Fuse encodings by weight-summing encodings, specific to the type of noise

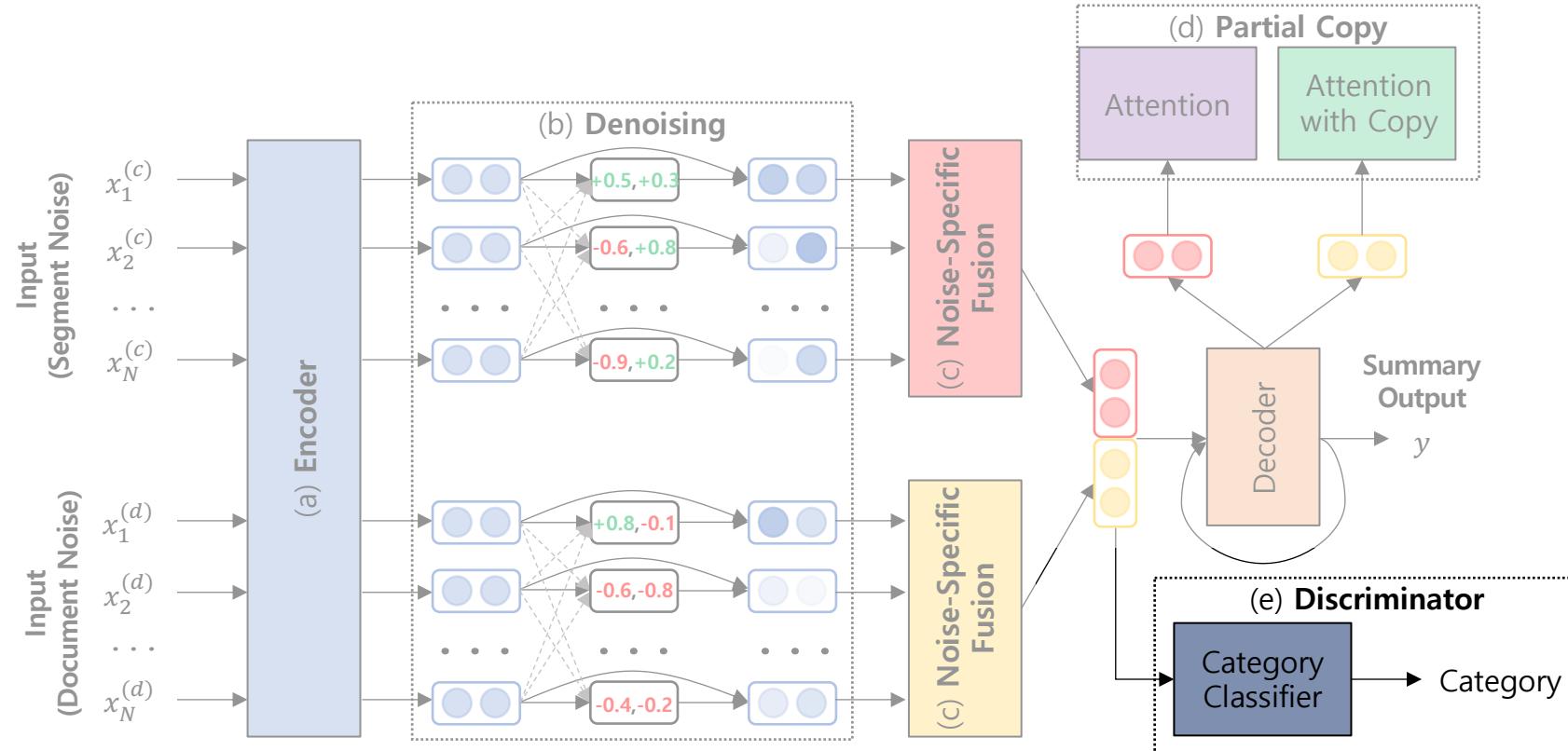
DenoiseSum: Denoising Summarization



- **Decoder with Partial Copy**

- Decode the summary using an LSTM with attention and copy, but do not copy from (ungrammatical) segment noisy inputs

DenoiseSum: Denoising Summarization



- **Training with Discriminative Loss**

- Directly optimize the denoising module by learning to classify the category of the summary

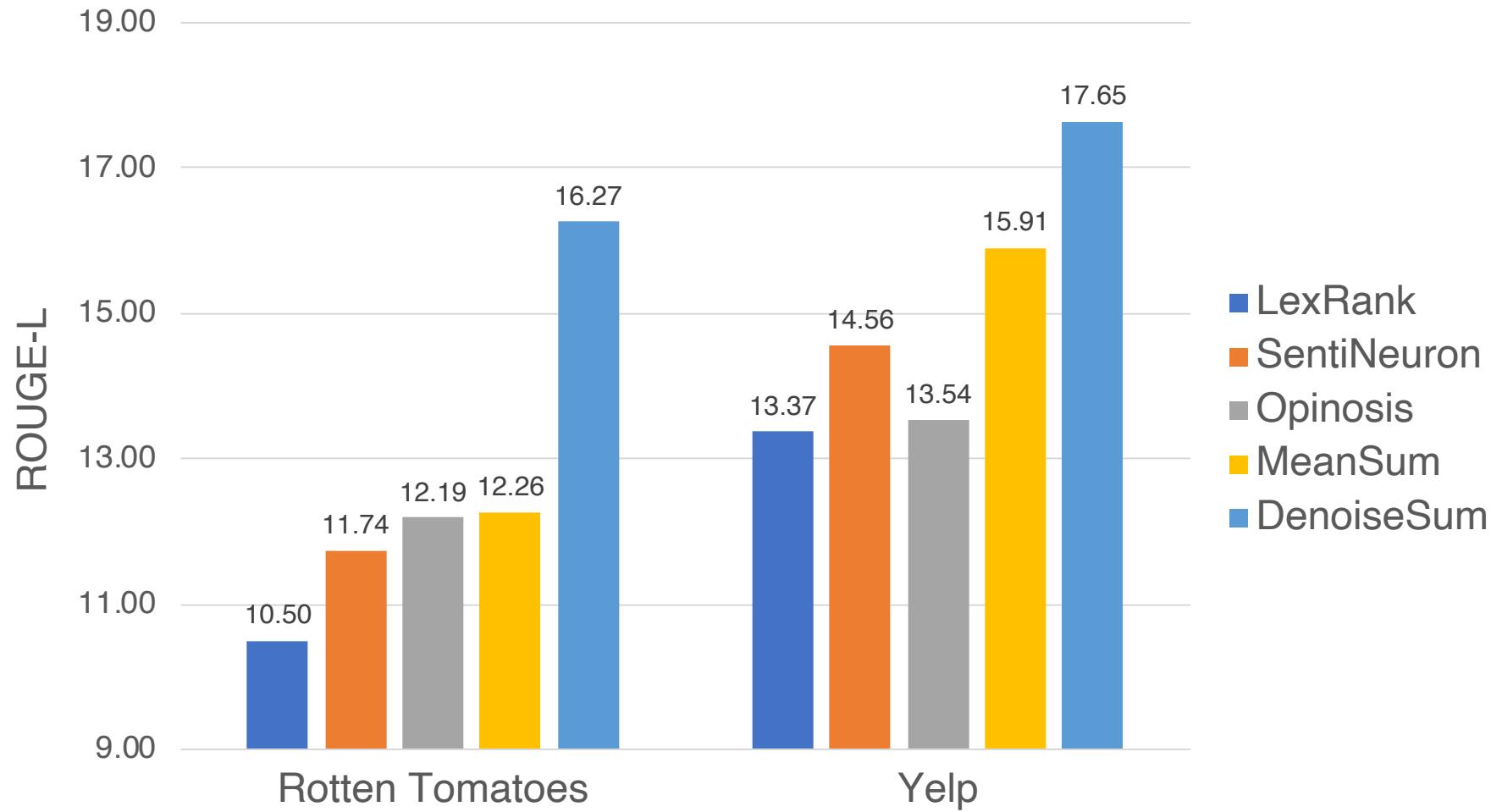
Experiments: Datasets

Dataset	Split	#entities	#reviews	#toks/entities	#toks/reviews
Rotten Tomatoes (movies)	No train				
	Dev	536	98.0	23.5	23.6
	Test	737	100.3	23.6	23.8
Yelp (businesses)	No train				
	Dev	100	8.0	70.3	70.9
	Test	100	8.0	67.8	67.3

Experiments: Datasets

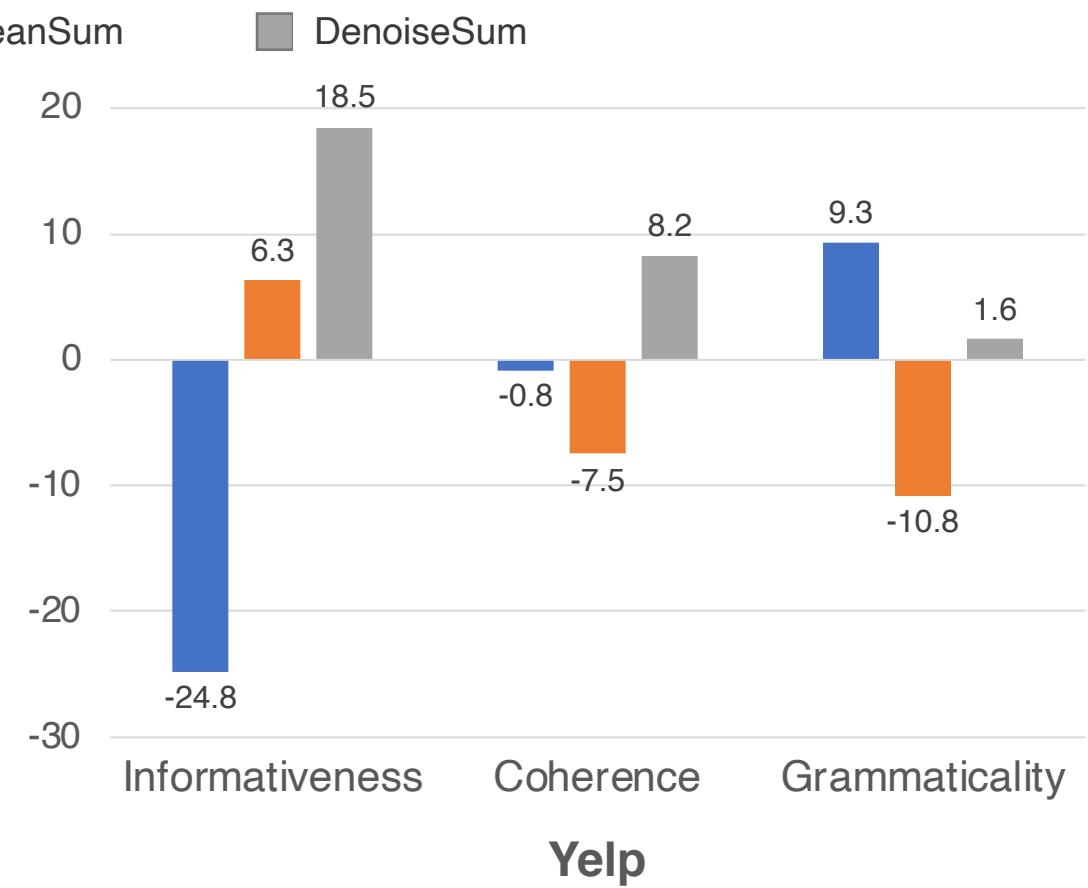
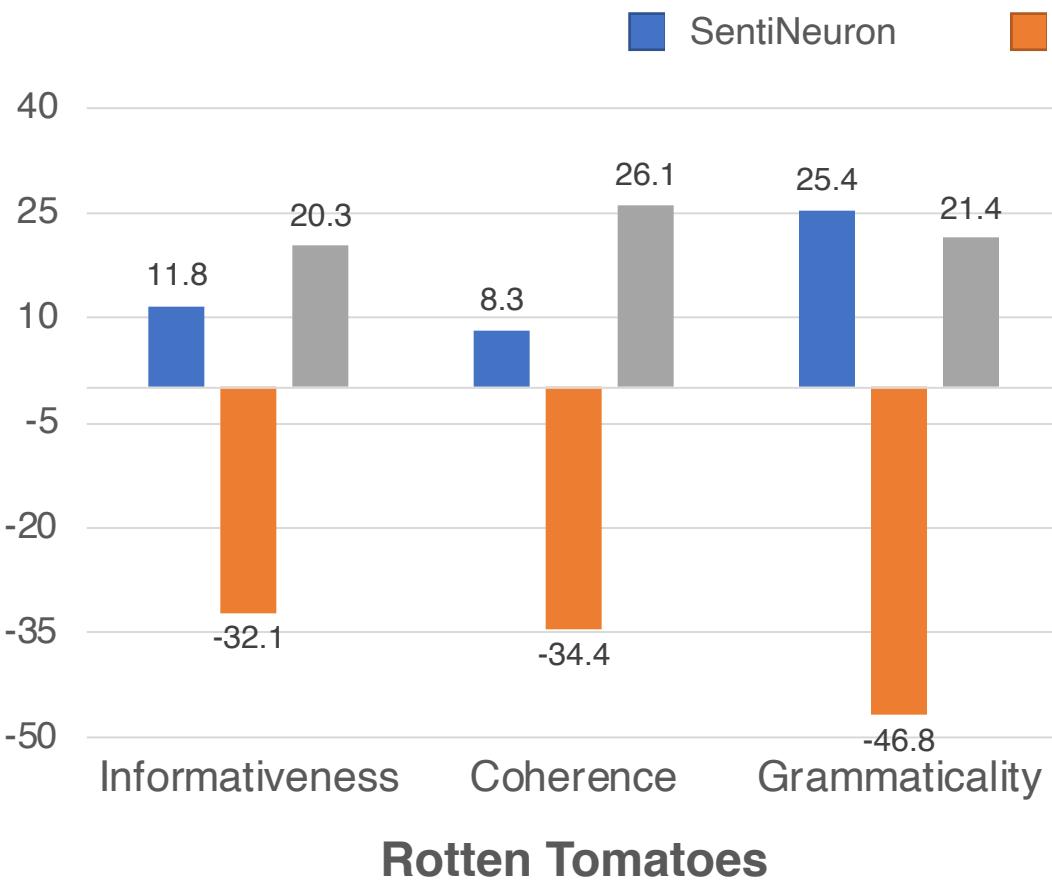
Dataset	Split	#entities	#reviews	#toks/entities	#toks/reviews
Rotten Tomatoes (movies)	Synthetic Train	25,000	40.0	28.4	22.7
	Dev	536	98.0	23.5	23.6
	Test	737	100.3	23.6	23.8
Yelp (businesses)	Synthetic Train	100,000	8.0	72.3	64.8
	Dev	100	8.0	70.3	70.9
	Test	100	8.0	67.8	67.3

Experiments: Automatic Evaluation



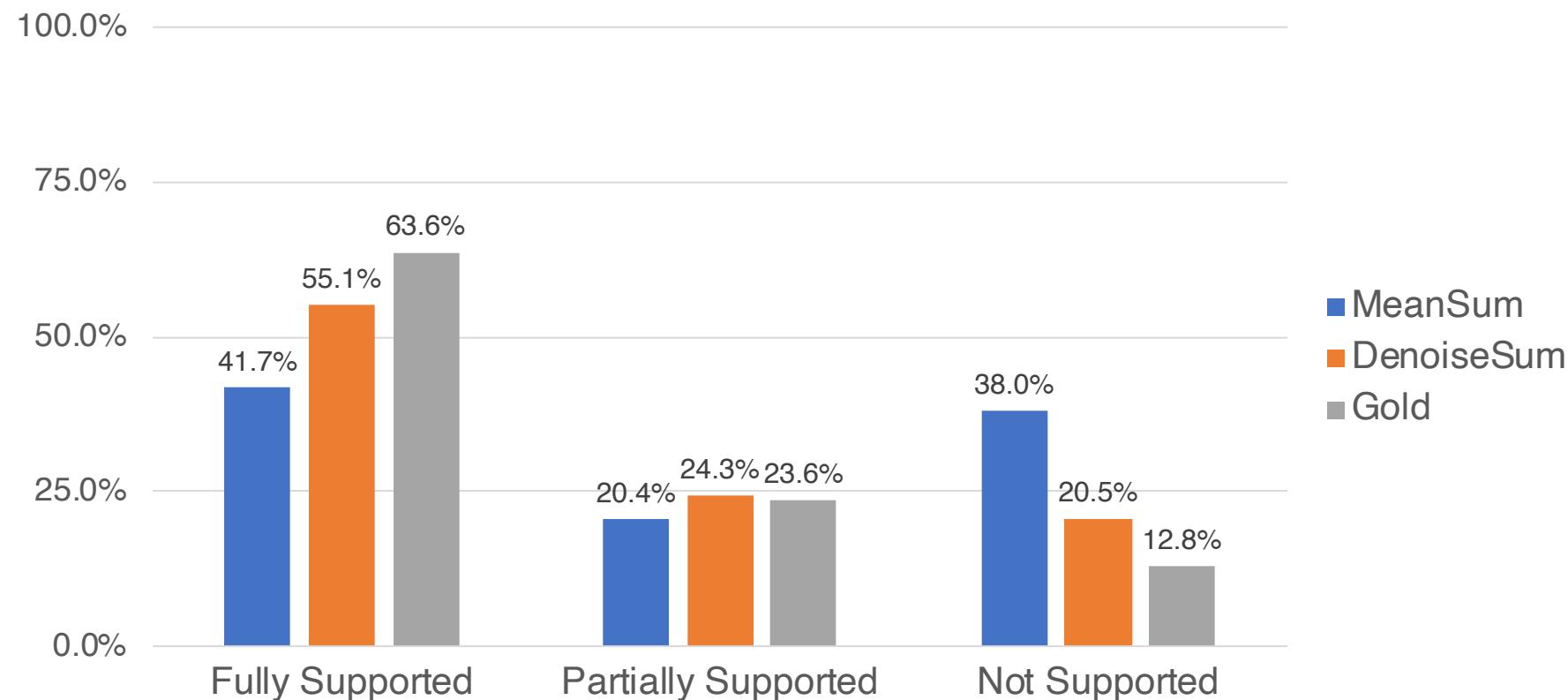
Experiments: Human Evaluation

Best-Worst Scaling (Louviere et al., 2015)



Experiments: Human Evaluation

Summary Veridicality: Check whether the facts mentioned in the summary are indeed discussed in the input reviews.



Example Outputs

Gold: It isn't quite the breath of fresh air that Iron Man was, but this sequel comes close with solid performances and an action-packed plot.

SentiNeuron: Flabby, disjointed, and eschewing conflict for extended scenes of improv clowning, it's the superheroic equivalent of a rat pack film.

MeanSum: The movie has too many twists in its own way, but it's a bit too busy.

DenoiseSum: Iron Man 2 isn't as good as the first movie, but it is a fun and fascinating film.



Example Outputs

Gold: A dark dramedy with exceptional performances from Jennifer Aniston and Jake Gyllenhaal, The Good Girl is a moving and astute look at the passions of two troubled souls in a small town.

SentiNeuron: Even during the most intense moments, it's hard to shake the impression that the conspicuously buff-and-polished Justine is only visiting this drab world, her miserable life an interesting career move.

MeanSum: Most of the time, the movie is a little too rare.

DenoiseSum: With good performances, direction and cast, The Good Girl is a provocative, intelligent and absorbing film.



Summary

- Unsupervised opinion summarization using supervised techniques
 - Create synthetic review-summary pairs using noise generation functions
 - Treat opinion summarization as denoising the reviews, removing non-salient information
- **DenoiseSum**: outperforms competitive systems by a wide margin

Thank you!

Code and dataset available:

<https://github.com/rktamplayo/DenoiseSum>