

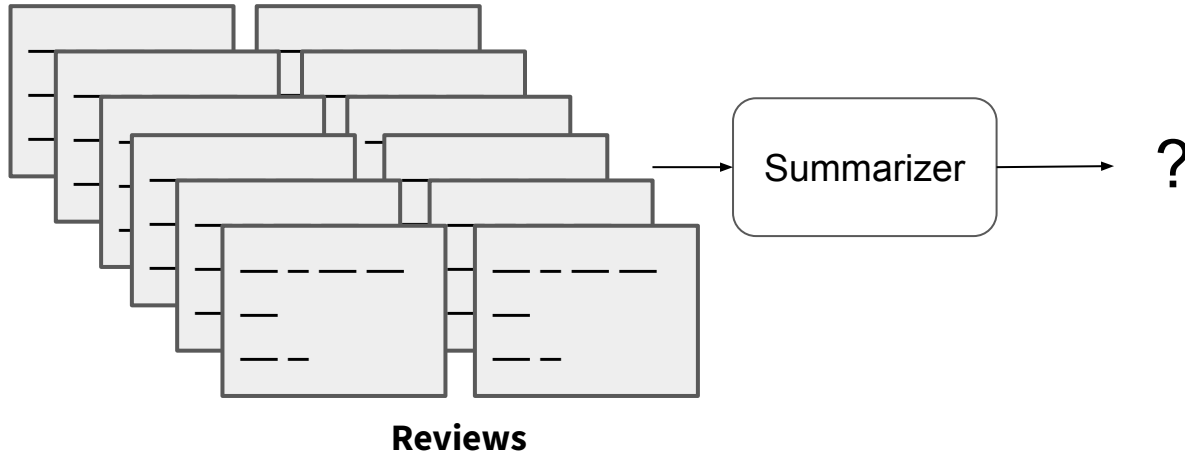
Challenges and Opportunities

Opinion Summarization: Challenges and Opportunities

- 1. Scalability
- 2. Faithfulness
- 3. Controllability
- 4. Multimodality

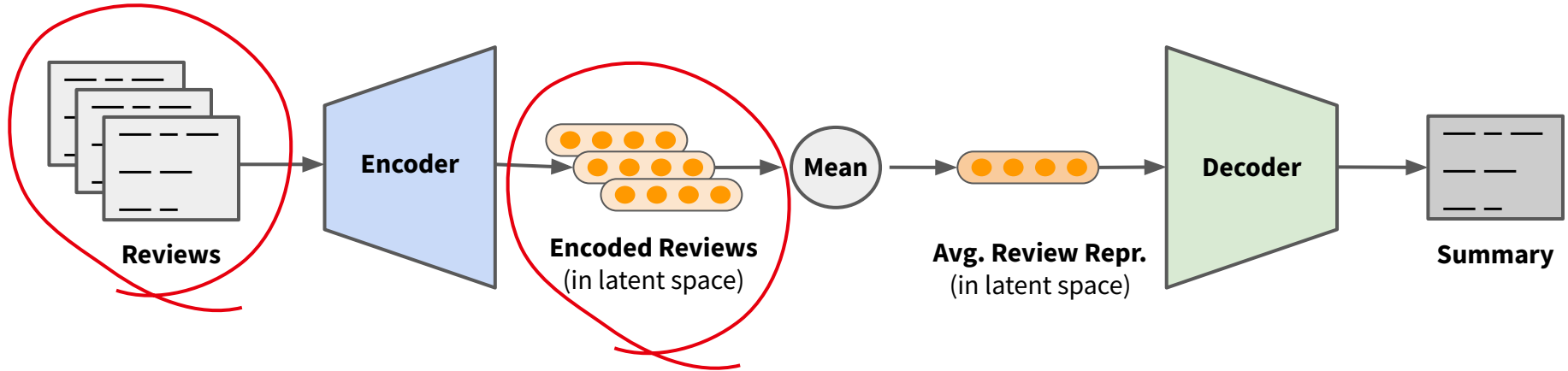
1. Scalability

- Can summarization models handle a large number of input reviews efficiently and effectively?



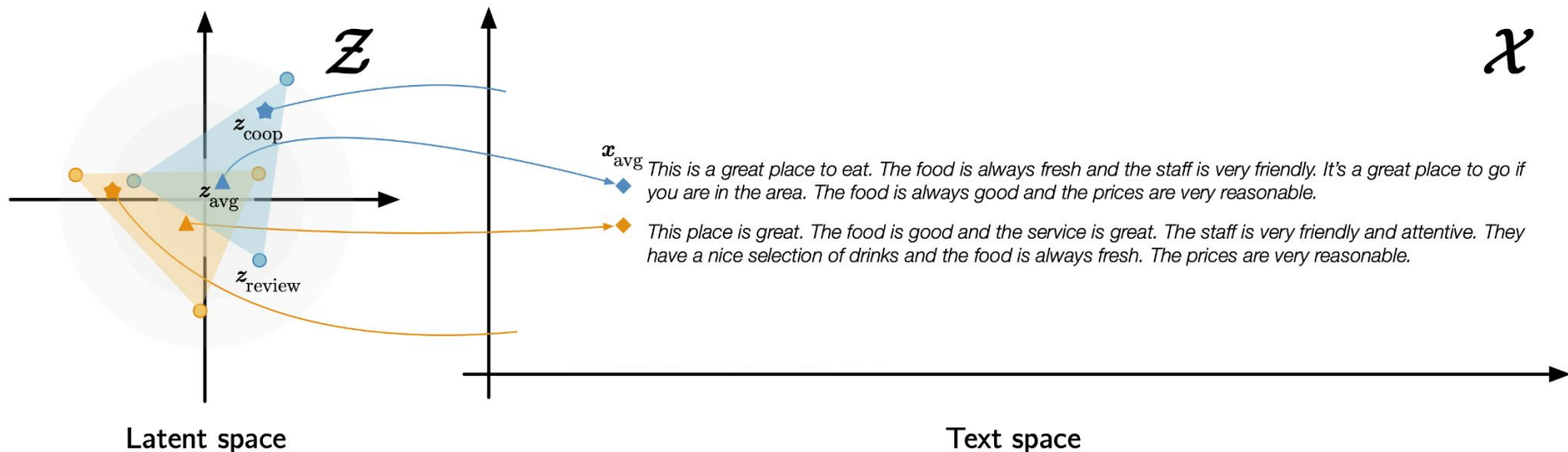
AE-based Models Can Handle Many Input Reviews

- AE-based models such as MeanSum are “scalable” as they can parallelly encode multiple reviews then aggregate into a single vector



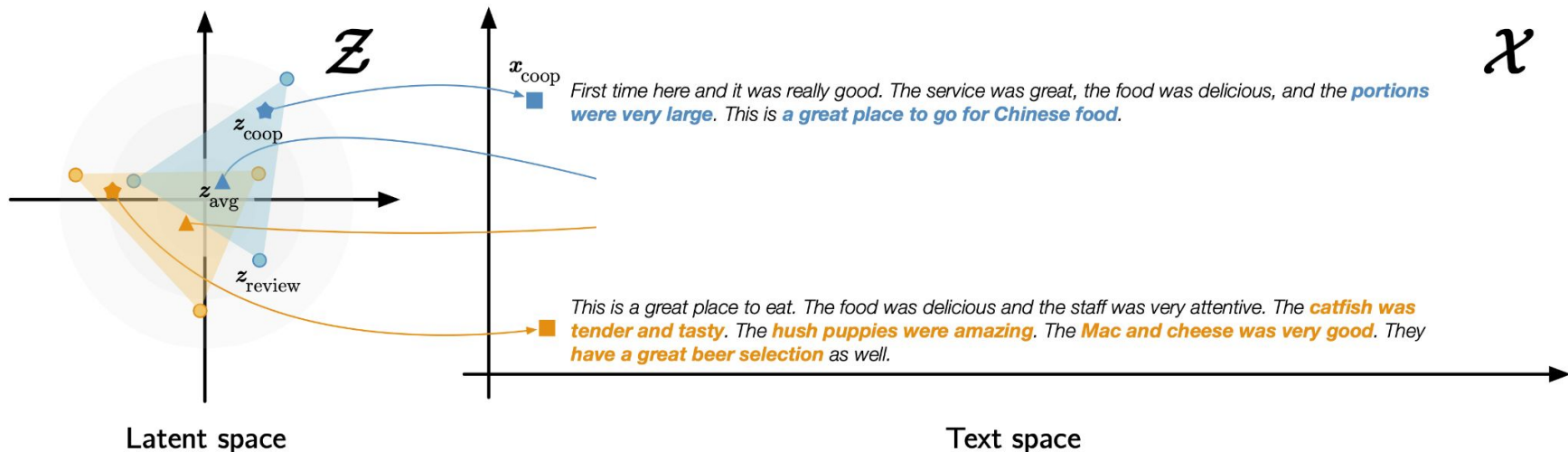
Latent Vector Degeneration [Iso et al. 2021]

- Averaging more latent vectors tend to result in generating **overly generic summaries**



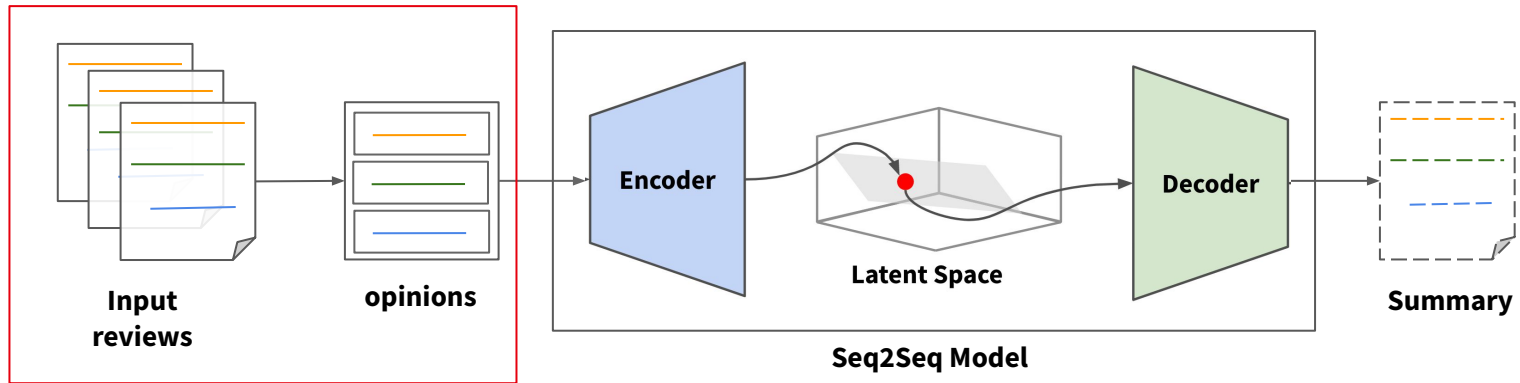
Latent Vector Degeneration [Iso et al. 2021]

- Averaging more latent vectors tend to result in generating **overly generic summaries**

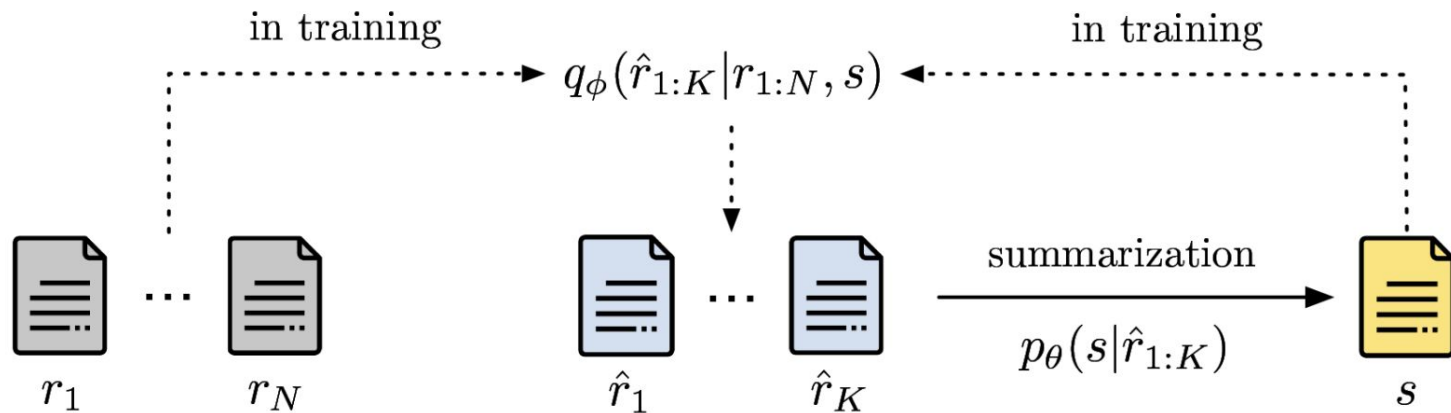


OpinionDigest

- The **text-to-data-to-text** approach has a less risk on the vector degeneration issue as the input review aggregation is conducted **before encoding**



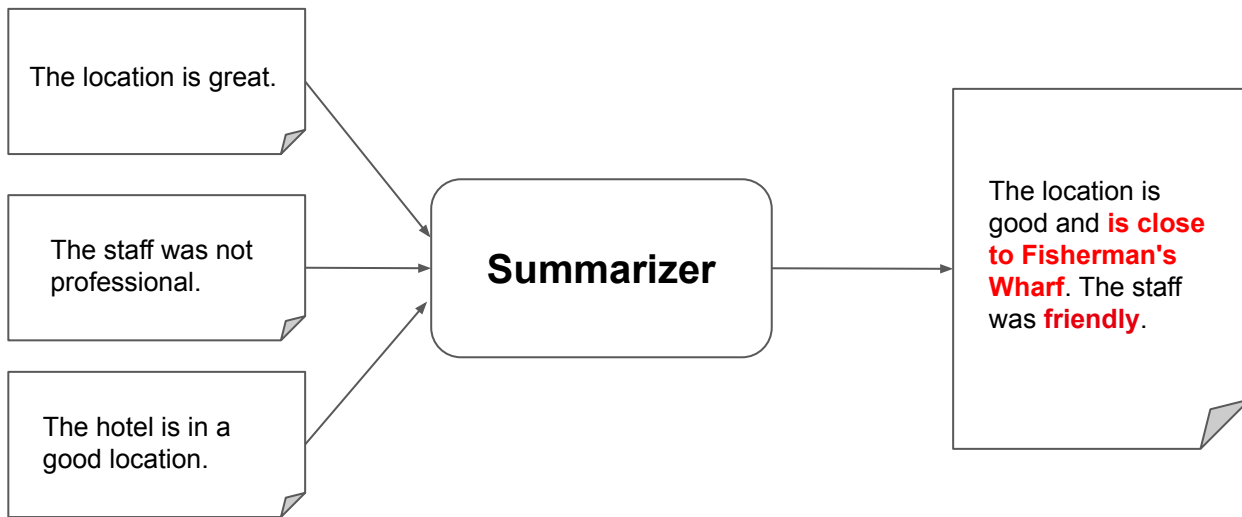
SelSum



An end-to-end model that performs review selection & summarization
~~N=8~~ → N=100

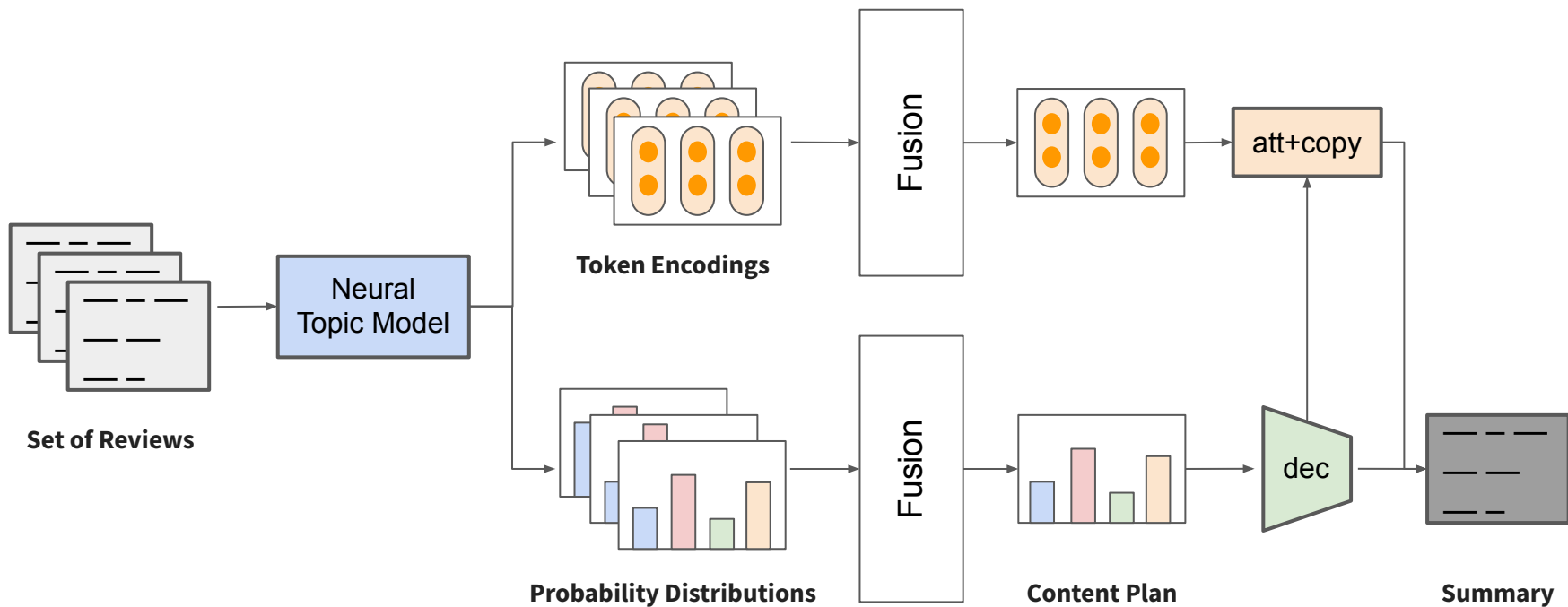
2. Faithfulness

- Summaries should be faithful to the input reviews
- Neural abstractive summarization models are known to “hallucinate” content :(



PlanSum

- Incorporate a **content planning** function into a summarization model



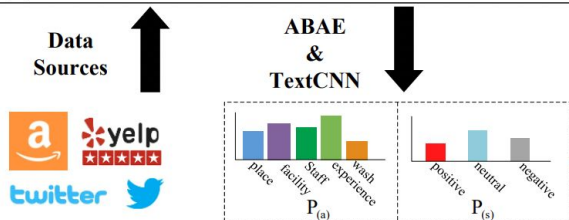
ConsistSum

- A more sophisticated synthetic training data creation

Stage 1: Aspect and Sentiment Mining

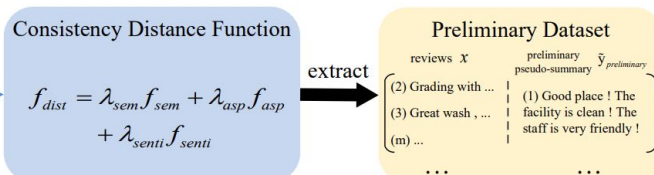
Raw Corpus

- (1) Good **place** ! The **facility** is clean ! The **staff** is very friendly !
- (2) Grading with a little bit of a curve for the **car wash business** but overall **experience** is always pleasant .
- (3) Great **wash** , friendly **staff** , can ' t beat the price . Get a quality **wash** for \$ 5 in 5 minutes .
- (n) ...

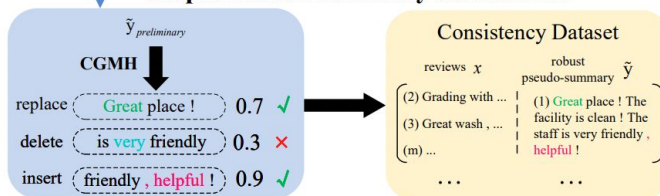


Stage 2: Consistency Synthetic Training Dataset Creation

Step1: Preliminary Dataset Extraction

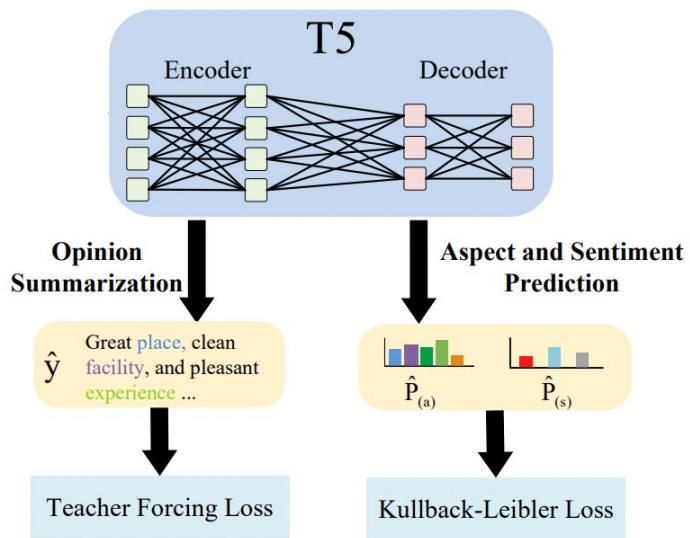


Step2: Pseudo-summary Refinement



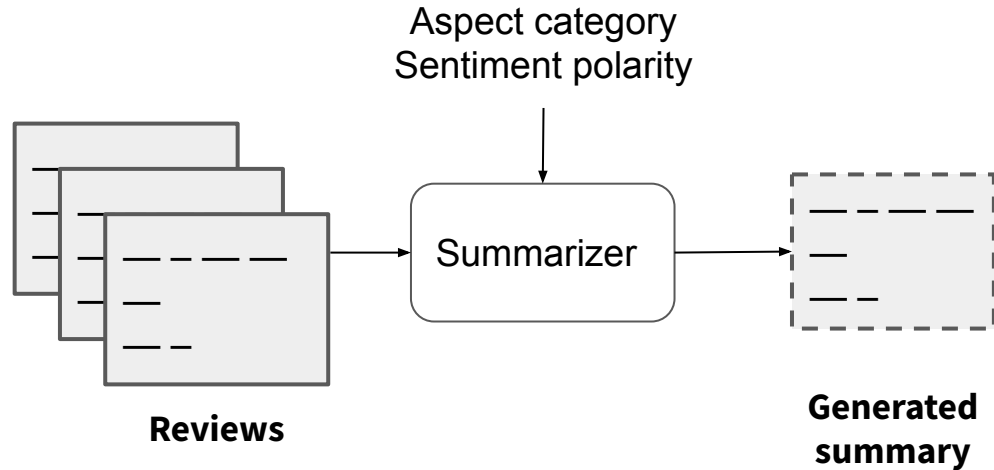
ConsistSum

Stage 3: Multi-task Opinion Summarization



3. Controllability

- Control summaries that focus on specific aspect categories (e.g., location) and/or sentiment polarity (e.g., positive, negative)



Controlled Opinion Summarization: Examples

This is a good little indian food place. The food is good and the chicken tikka masala is pretty good. They have a good variety of indian food. The chicken biryani is good but the chicken is a little dry.

(a). Summary of **positive** opinions

This place is disgusting. The food is mediocre at best. The service is always rude and the place is dirty and the employees are rude and rude. The food has been cold and the service has been horrible. The worst wings I've ever had in my entire life. The place has gone downhill since the last two times.

(b). Summary of **negative** opinions

Controlled Opinion Summarization: Examples

This is a good little indian food place. The food is good and the chicken tikka masala is pretty good. They have a good variety of indian food. The chicken biryani is good but the chicken is a little dry.

(a). Summary of **positive** opinions

I have been coming here for years and have never had a bad experience. **The staff is super professional and the service is great. The staff are super professional as well.** I would highly recommend this place to anyone.

(c). Summary of **staff-related** opinions

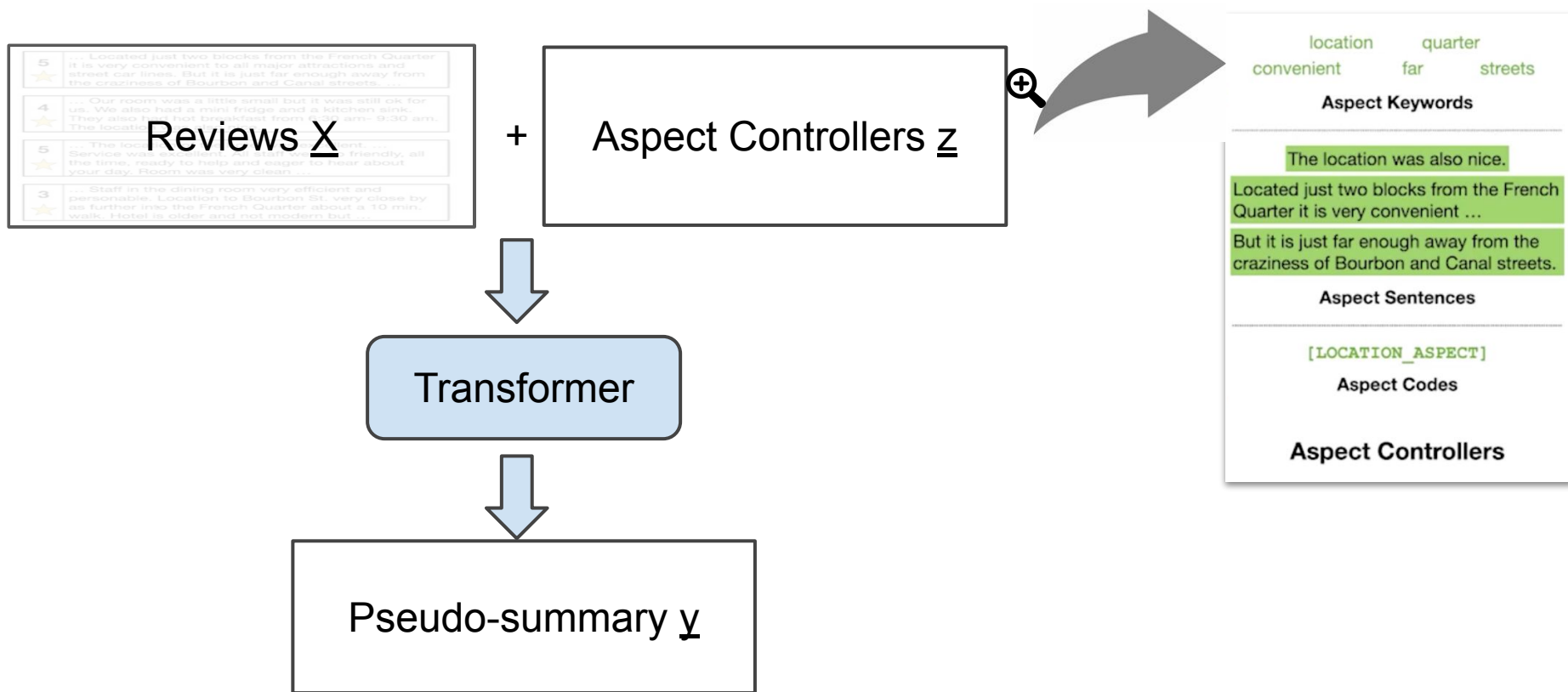
This place is disgusting. The food is mediocre at best. The service is always rude and the place is dirty and the employees are rude and rude. The food has been cold and the service has been horrible. The worst wings I've ever had in my entire life. The place has gone downhill since the last two times.

(b). Summary of **negative** opinions

This is my favorite Chinese food in the area. **The food is really good and the portions are great. I really like the orange chicken** and the crab puffs are the best I've had in a long time. **The food here is really good. The shrimp fried rice is really good,** and the rice is the best.

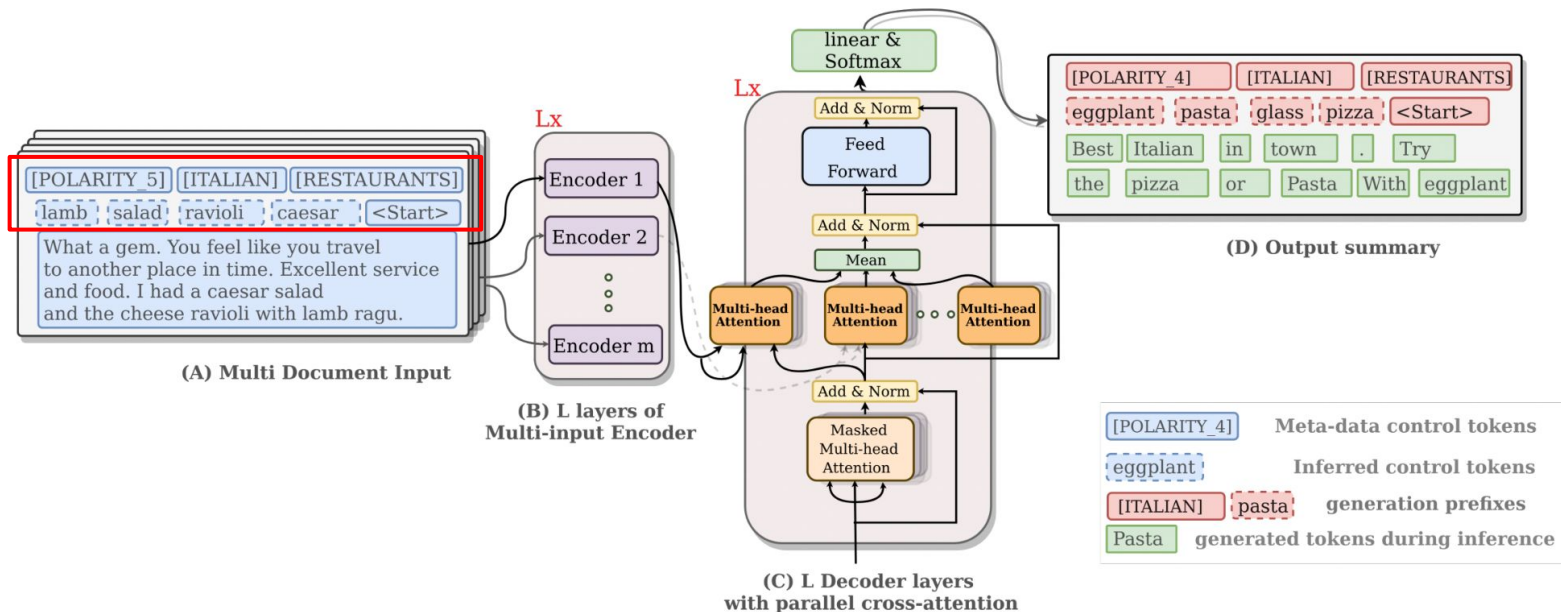
(d). Summary of **food-related** opinions

AceSum

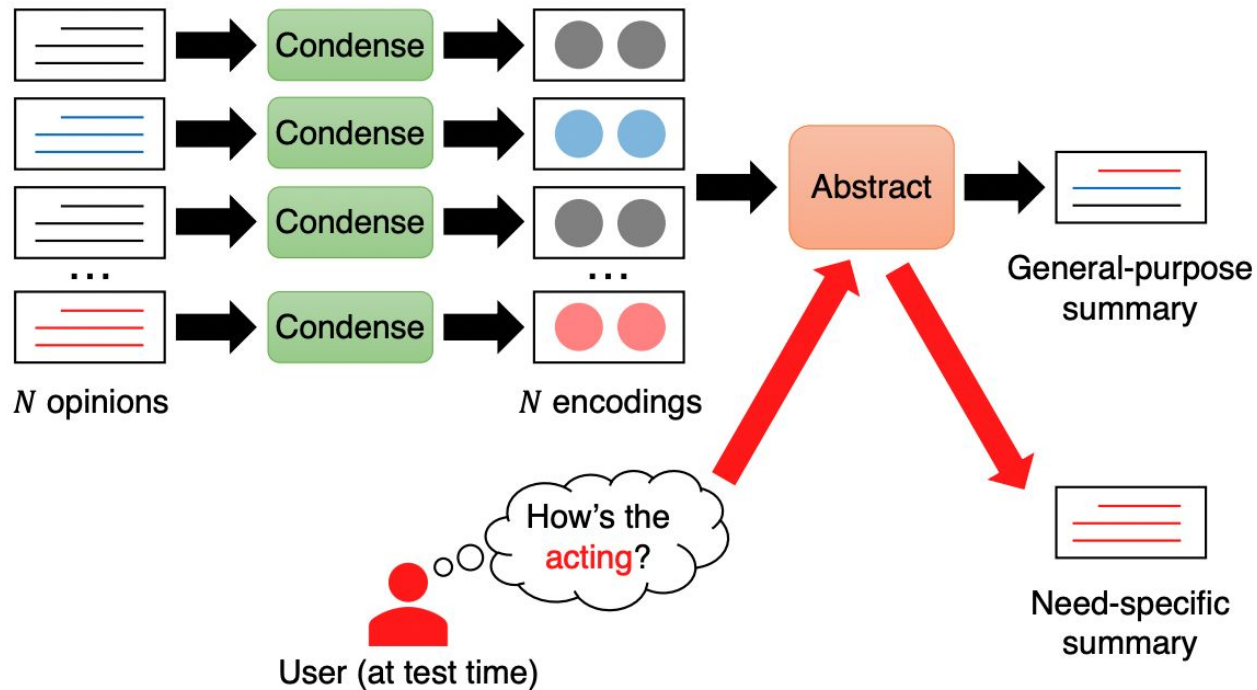


SelfSum (Elsahar EACL 21)

- Take control code as part of input

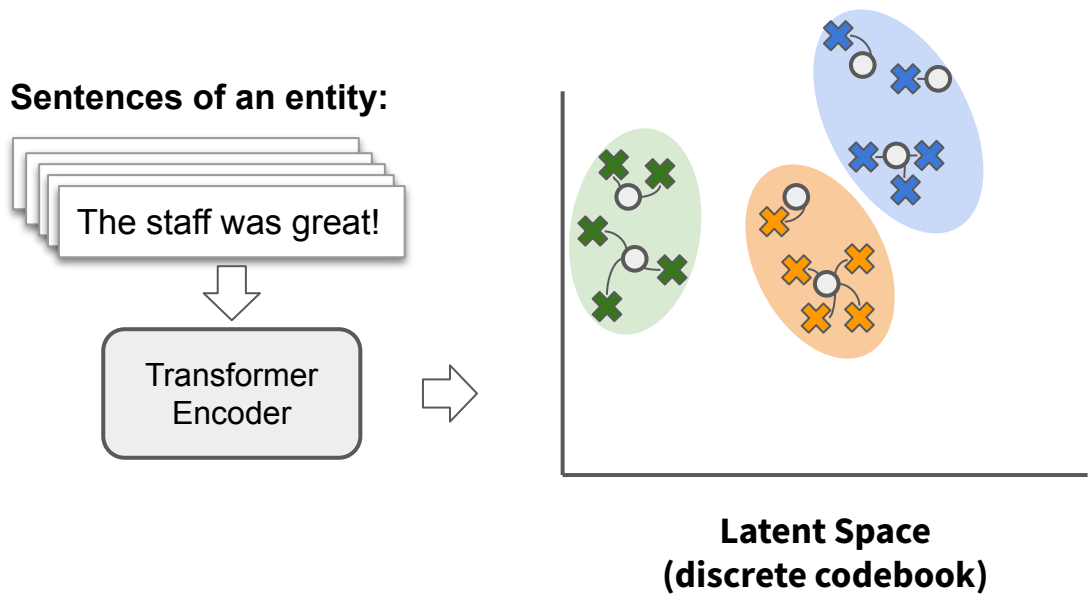


CondaSum



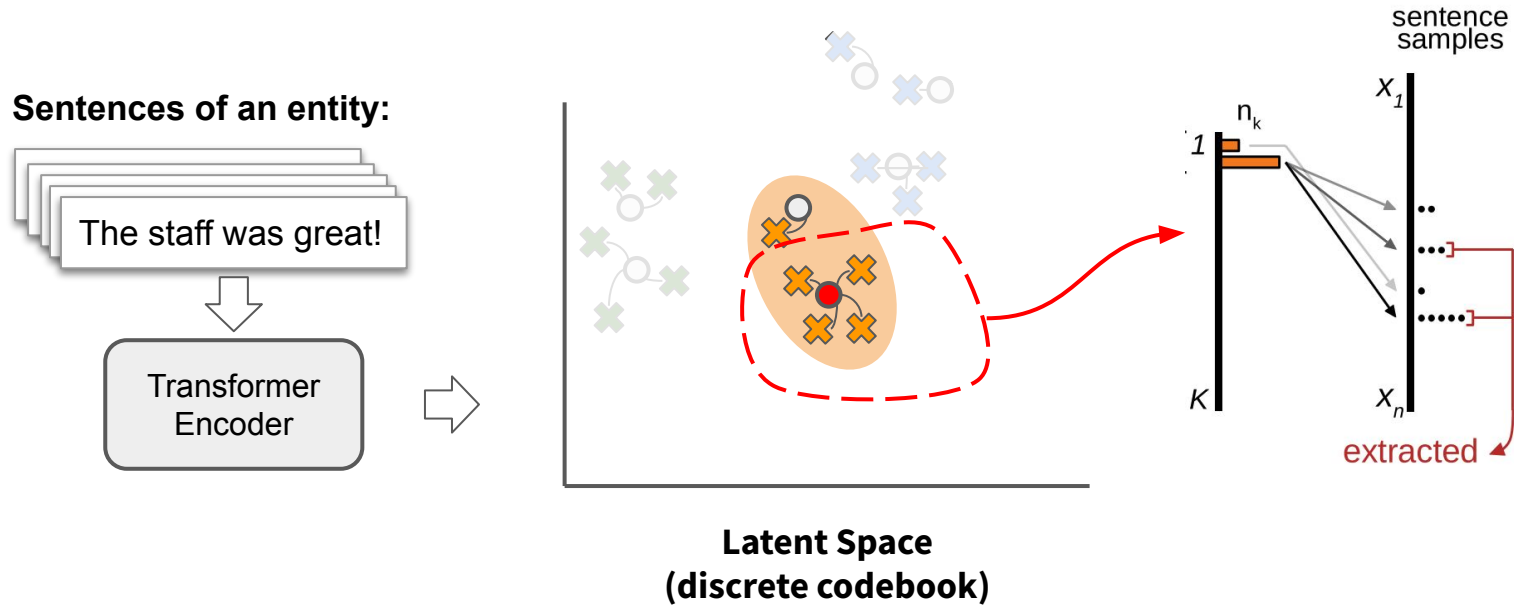
QT

Encode input sentences into different codes (= ~ aspects)



QT

Use **aspect-specific seed words** to select latent code for summarization



4. Multimodality

- Text is NOT everything
 - Photos in reviews often complement the textual information
 - Reviews assume the general information (e.g., location, restaurant types) of the entity

★★★★★ 9/20/2019

📷 3 photos


Niku moyashi miso is decadent. The thick noodles perfectly Al dente


I think shalala is better than any of the San Mateo ramen places. There is a flair to the broth here that gives it more depth


Also they have the best yaki onigiri hands down. Maybe a tie with the yaki onigiri at Dan down in San Jose. It is crunchy like a cracker but then you get to the soft rice inside. Delicious


Love their selection of Japanese beers. It's not just Sapporo or asahi here. You get other stuff like this Yona Yona ale

Also don't miss out on the chicken karaage

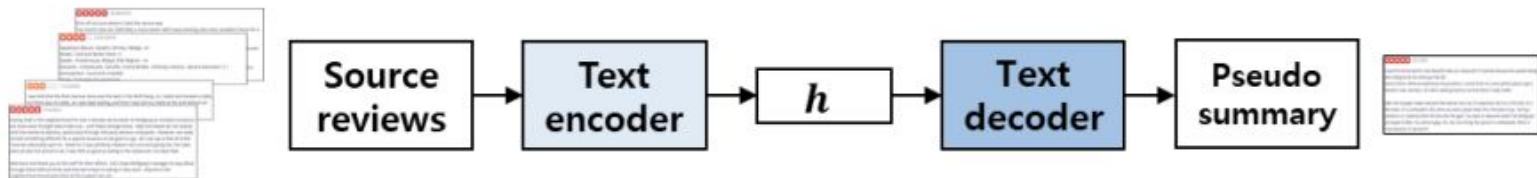


<http://www.shalalaramen.com> 

(650) 965-8001 

Get Directions
698 W Dana St Mountain View, CA 
94041

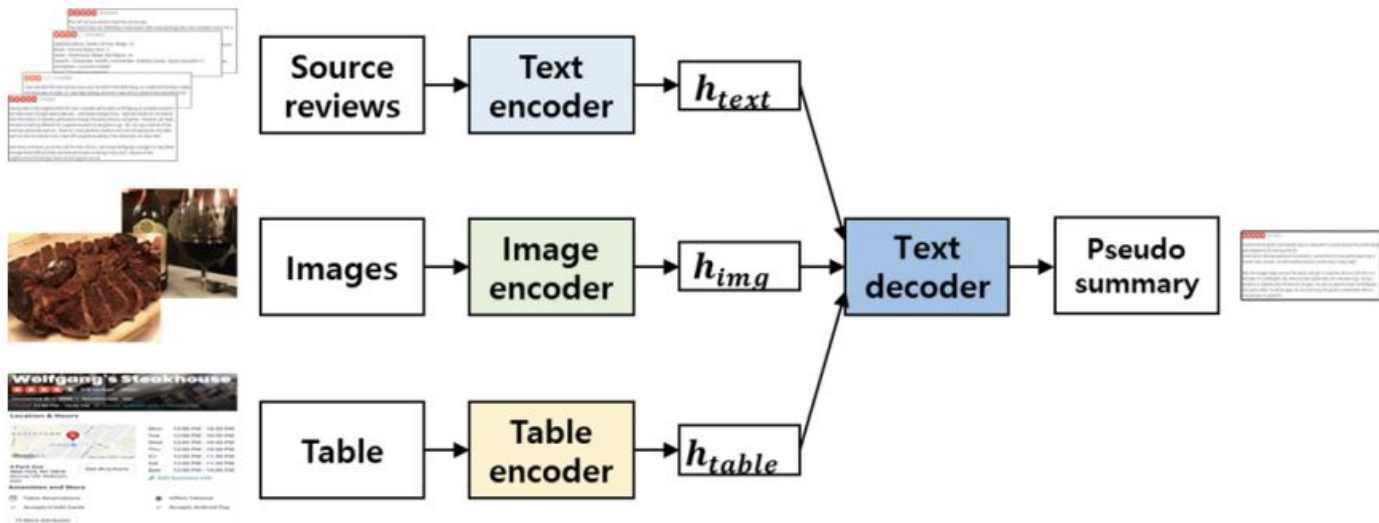
MultimodalSum



Motivation: existing models only consider Text-To-Text settings & take customer reviews as the only input

MultimodalSum

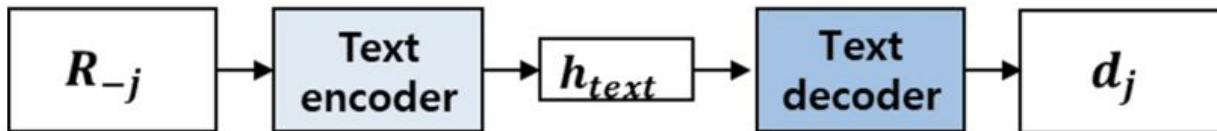
Consider additional non-textual information, e.g., images and tables, as part of the input



MultimodalSum

Step 1: Pre-training Step

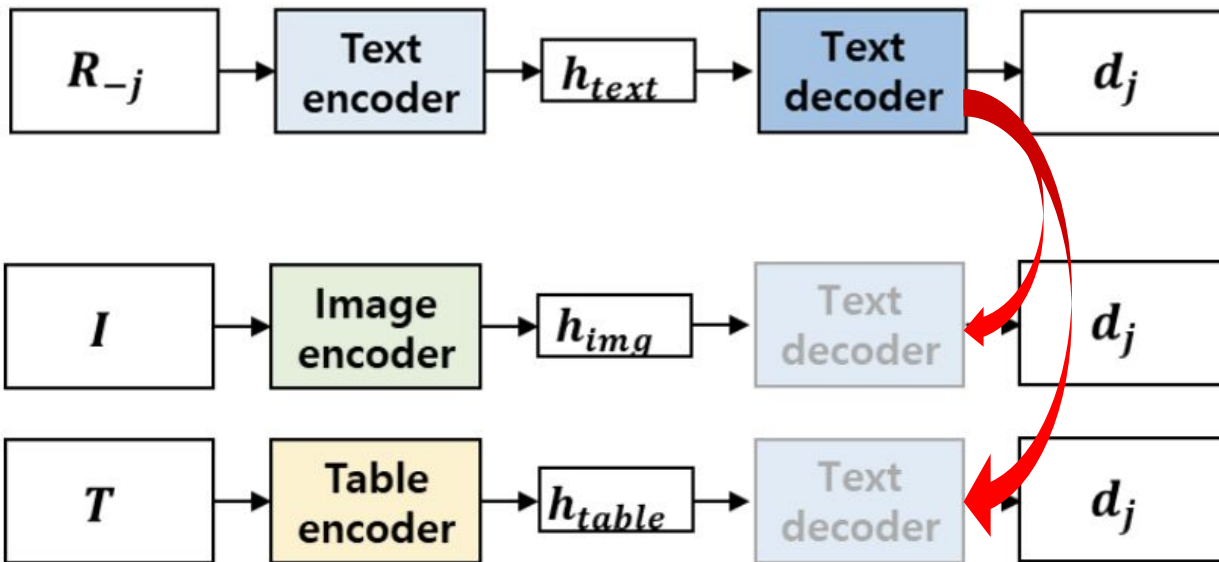
Pre-train a seq2seq model based on input reviews & pseudo summaries



MultimodalSum

Step 1: Pre-training Step

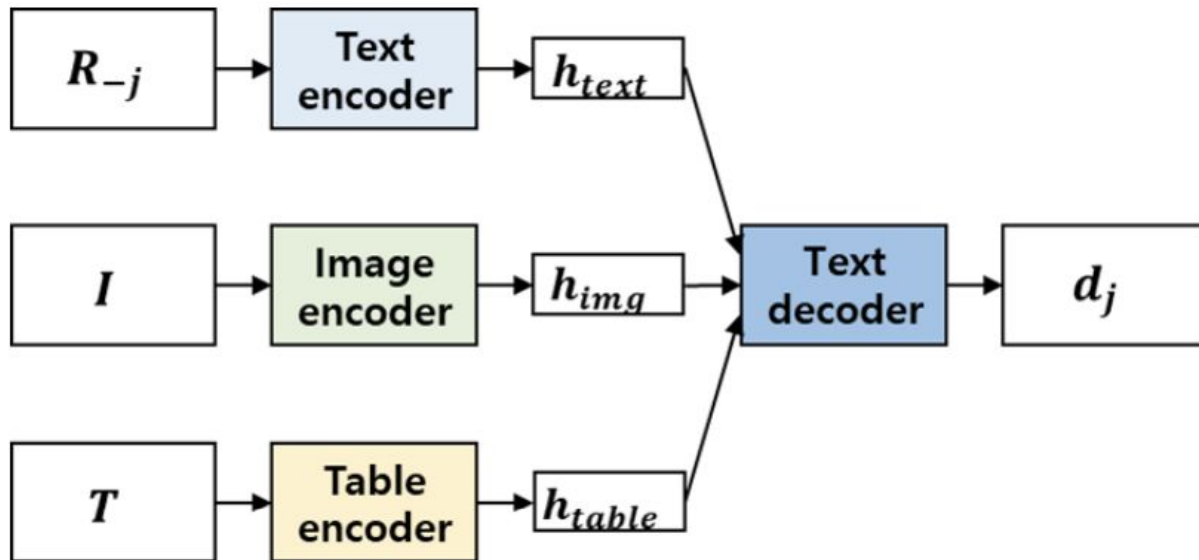
Pre-train a seq2seq model based on input reviews & pseudo summaries



Pre-train a Image/Table encoders based on input reviews & pseudo summaries

MultimodalSum

Step 2: Training for Multiple Modalities



More Challenges

- 5. Multilinguality
- 6. Personalization
- 7. Annotated Resources

5. Multilinguality

- We should also consider non-English languages
- Opinion summarization models that take into account cultural differences

Huile d'Olive

Histoire. La consommation alimentaire d'olives sauvages date de la période préhistorique des chasseurs-cueilleurs du Néolithique. L'oléiculture (culture d'oliviers, d'oliveiraie, et fabrication d'huile d'olive avec des moulins à huile) remonte à la période de l'invention de l'agriculture et de la culture de la vigne et du vin, il y a environ 8 000 ans, dans la région du croissant fertile du Levant au Proche-Orient et en Mésopotamie. L'huile d'olive est alors utilisée pour l'alimentation, la conservation des aliments, la cosmétique, la médecine, les lampes à huile... [...]. Durant la Renaissance du XVI^e siècle l'Italie devient le plus important producteur réputé d'huile d'olive du monde, avant d'être cultivée à ce jour par l'ensemble des pays du bassin méditerranéen en tant qu'un des fondements de la cuisine méditerranéenne. [...] **Utilisation.** L'huile d'olive est connue depuis la plus haute antiquité : les Grecs anciens, les Phéniciens, les Arabes, les Berbères et les Romains l'utilisaient déjà pour leur cuisine (à l'origine de la cuisine méditerranéenne) et pour leurs produits cosmétiques, ainsi que les Hébreux pour allumer leur chandelle. L'huile d'olive peut être utilisée aussi bien crue (dans des sauces pour salade ou à la place du beurre dans les pâtes par exemple) que cuite (pour la cuisson de viandes ou de légumes ou pour la friture). [...] L'huile d'olive peut également être utilisée pour le traitement du visage, comme le démaquillage des yeux, l'hydratant, l'apaisement des lèvres et la réparation des talons fissurés. Naturellement, l'huile d'olive regorge d'antioxydants anti-âge et de squalène hydratant, ce qui la rend superbe pour les cheveux, la peau et les ongles. Tout comme l'huile de noix de coco, c'est un élément essentiel de tout kit de beauté bricolage. L'huile d'olive est utilisée comme traitement capillaire depuis l'Antiquité égyptienne. [...] **Production.** L'obtention d'un litre d'huile nécessite 4 à 10 kg d'olives suivant la variété d'olive utilisée et son niveau de maturité. La méthode d'extraction utilisée a peu d'incidence. Cependant les moulins utilisant des presses ne peuvent pas utiliser des olives à très forte teneur en eau (à faible rendement en huile) à cause de la fluidité excessive de la pâte. Ceci peut laisser penser, à tort, que leurs rendements sont meilleurs. [...] **Santé.** Par rapport aux autres huiles contenant des acides gras insaturés, l'huile d'olive est assez stable à la cuisson et garde en ce cas ses effets bénéfiques relatifs sur le cholestérol. L'huile d'olive permet de lutter contre le cancer du sein. [...]

Olivenöl, auch Baumöl (von mittelhochdeutsch boumöl) und fachsprachlich Oleum olivarium genannt, ist ein Pflanzenöl aus dem Fruchtfleisch und aus dem Kern von Oliven, den Früchten des Ölbaums, das seit mindestens 8000 Jahren, ausgehend vom östlichen Mittelmeerraum, gewonnen wird.

De

L'**huile d'olive** est une variété d'huile alimentaire, à base de matière grasse végétale extraite des olives (fruits d'oliviers cultivés en oliveiraie d'oléiculture) lors de la trituration dans un moulin à huile. Elle est un des fondements de la cuisine méditerranéenne (et du paradoxe français) et peut être, sous certaines conditions, bénéfique pour la santé.

Fr

Olivový olej je rostlinný olej získaný z oliv (*Olea europaea*) lisováním či jinými mechanickými postupy. Je používán především při výrobě pokrmů, v kosmetickém a farmaceutickém průmyslu. Olivový olej je typickou součástí středomořské kuchyně. Konzumace olivového oleje je považována za zdraví prospěšnou, protože obsahuje mononenasyčené mastné kyseliny a vitamín E.

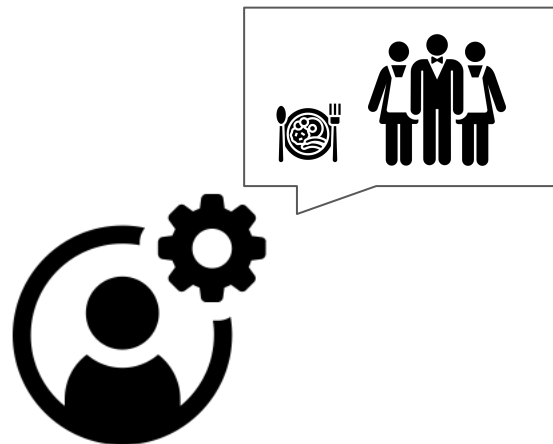
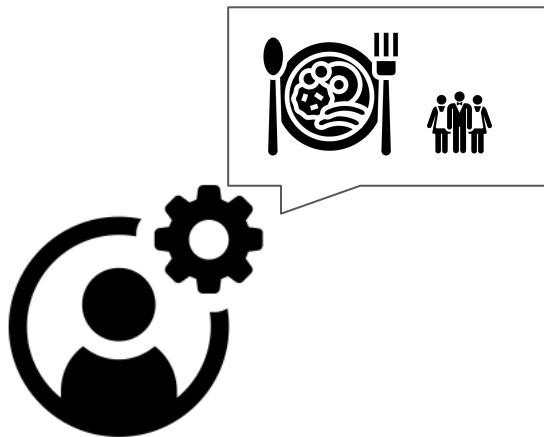
Cs

Olive oil is a liquid fat obtained from olives (the fruit of *Olea europaea*; family Oleaceae), a traditional tree crop of the Mediterranean Basin, produced by pressing whole olives and extracting the oil. It is commonly used in cooking, for frying foods or as a salad dressing. It is also used in cosmetics, pharmaceuticals, and soaps, and as a fuel for traditional oil lamps, and has additional uses in some religions. The olive is one of three core food plants in Mediterranean cuisine; the other two are wheat and grapes. Olive trees have been grown around the Mediterranean since the 8th millennium BC.

En

6. Personalization

- Existing opinion summarization models do not take **user profile** into account
 - e.g., Different users have different preferences/standard
- Beyond the **style transfer** and **controlled summarization**



7. Annotated Resources

- Annotated resources (for training and evaluation) are a major bottleneck of opinion summarization research
 - Resources in more domains, more modalities, and more languages are needed!

	# of ent.	# input reviews	# ref sum	Type	Review source
OpoSum	60	10	180	Extractive	Amazon
MeanSum	200	8	200	Abstractive	Yelp
CopyCat	60	8	180	Abstractive	Amazon, Yelp
FewSum	60	8	180	Abstractive	Amazon, Yelp
Space	50	100	1050	Abstractive + Aspect	TripAdvisor
AmaSum	31483	326	33324	Abstractive	Amazon

Concluding Remarks

Opinion Summarization: Beyond Opinion Mining

- Opinion summarization takes one step beyond existing efforts in opinion mining

Feature1: picture
Positive: 12

- The **pictures** coming out of this camera are amazing.
- Overall this is a good camera with a really good **picture** clarity.

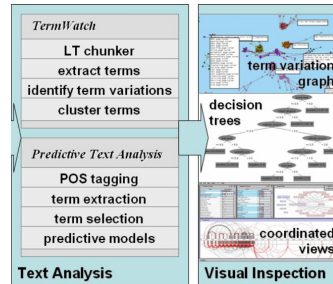
...

Negative: 2

- The **pictures** come out hazy if your hands shake even for a moment during the entire process of taking a picture.
- Focusing on a display rack about 20 feet away in a brightly lit room during day time, **pictures** produced by this camera were blurry and in a shade of orange.

Feature2: battery life
...

Opinion Mining



This is my favorite Chinese food in the area. **The food is really good** and **the portions are great**. **I really like the orange chicken** and the crab puffs are the best I've had in a long time. **The food here is really good**. **The shrimp fried rice is really good**, and the rice is the best.

Opinion Summarization

Opinion Summarization: State-of-the-Art

- Modern opinion summarization solutions address the following challenges:
 - Lack of annotated data
 - Modeling multiple reviews

- Existing approaches can be categorized into
 - Autoencoder-based models (Part 2)
 - Synthetic dataset creation methods (Part 3)
 - Low-resource learning models (Part 4)

Summarizing Customer Reviews for Decision-Making Assistance

Michael D wrote a review Apr 2020
1 contribution

●○○○○

Terrible service & Rude Attendants

"Absolutely horrible and embarrassing experience here due to the rude and aggressively argumentative front desk attendants. I live in the area and wished to celebrate my birthday as responsibly as possible with a private room for me and my partner. The attendants in the area were not displayed anywhere near of normalcy during what is a

Hotel reviews

Date of stay: April 2020

Helpful Share

JessieAFJ wrote a review Mar 2020
West Lothian, United Kingdom • 43 contributions • 1 helpful vote

●●●●○

Well located

Mary B. Los Angeles, CA
9 friends
4 reviews

★★★★★ 5/4/2020

This place is an amazing treasure for food lovers.

We grabbed x2 16oz New York Steak for take-out. The beef was totally fresh, s juicy, and delicious. But sauce -- this is a secret element, for sure. Freaking awesome.

I've read that the menu is special and not full (COVID-19, you know), but this OK for me. That's another reason to come back

Restaurant reviews

pick-up.

Anni San Ji
1: 1
2: 2
3: 3

Share review
Embed review

They are a bit pricey... \$20 for 2 drink equivalent and \$35 for 4... plus tip.

I was underwhelmed at first bc i thought the cocktails would be made fresh but they are pre-made and bottled into these small sealed bottles.

Doesn't look like much, but once i got home and added ice and let the drink sit for a bit and tried it, it was really good!

The drinks r strong and full of flavor. We had a nice Friday night feeling like we went out for drinks right in our home.

Note: for curbside pick up, u need to go to the back parking lot area,

Featured Review

Helpful (11)

TRADER JOE'S

"Great company to work at"

★★★★★ Former Employee - Crew Member

I worked at Trader Joe's full-time

Pros
Company cares about its employees.

Cons
Can't re.

Company reviews

Helpful (11)

May 5, 2020

TRADER JOE'S

"Carir"

★★★★★ Current Employee - Crew Member

Recommends Positive Outlook

I have been working at Trader Joe's part-time for more than a year

Pros
Flexible schedule Friendly atmosphere Very helpful team

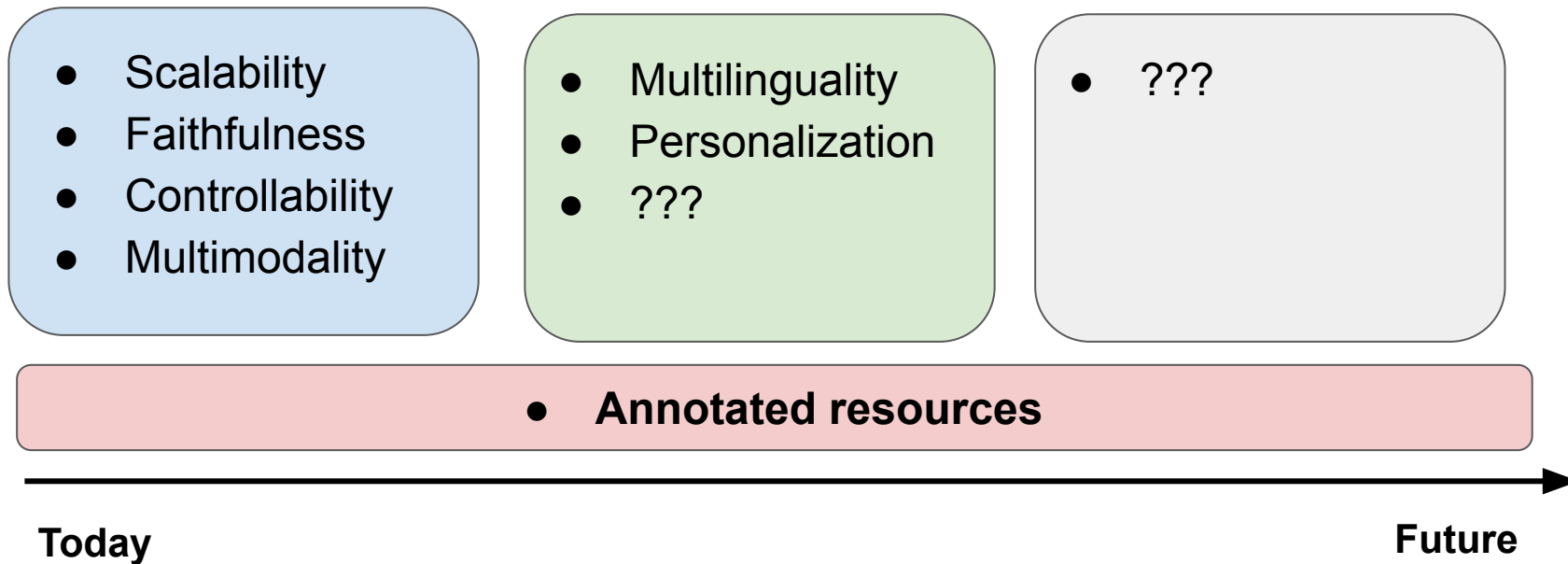
Cons
On your feet for long hours



Opinion summarization



Future of Opinion Summarization



What will “Beyond Opinion Summarization” look like?