

Aspect Based Sentiment Analysis

using LSTM and BERT

DSGA 1011 Project Team 12

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1 Motivation & Introduction to ABSA



Overwhelmed by countless reviews?

 Jeannette, PA
1 friend
4 reviews
9 photos

★★★★★ 11/17/2020

What a great addition to Hell's Kitchen! My friend and I had the Massaman curry and the pad kee mao, which were both phenomenal and so flavorful. Our waitress, Pauline was SUPER attentive and sweet she also was super communicative about the specials. Not to mention, the outdoor seating is so cozy and very COVID safe. We will definitely be returning often!

Useful 1 Funny Cool

 Manhattan, NY
220 friends
291 reviews
3903 photos
Elite '2020

★★★★★ 11/21/2020
3 photos

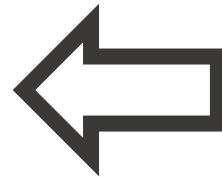
New favorite Thai spot in Hell's Kitchen! Some pretty unique dishes here. Reminded me of a smaller (and no wait) Thai Villa.

Everything we ordered was really good:
- Miang Salmon which is crispy salmon bites you wrap in lettuce leaves along with a mix of condiments like cashew, basil, lime, ginger, onion,

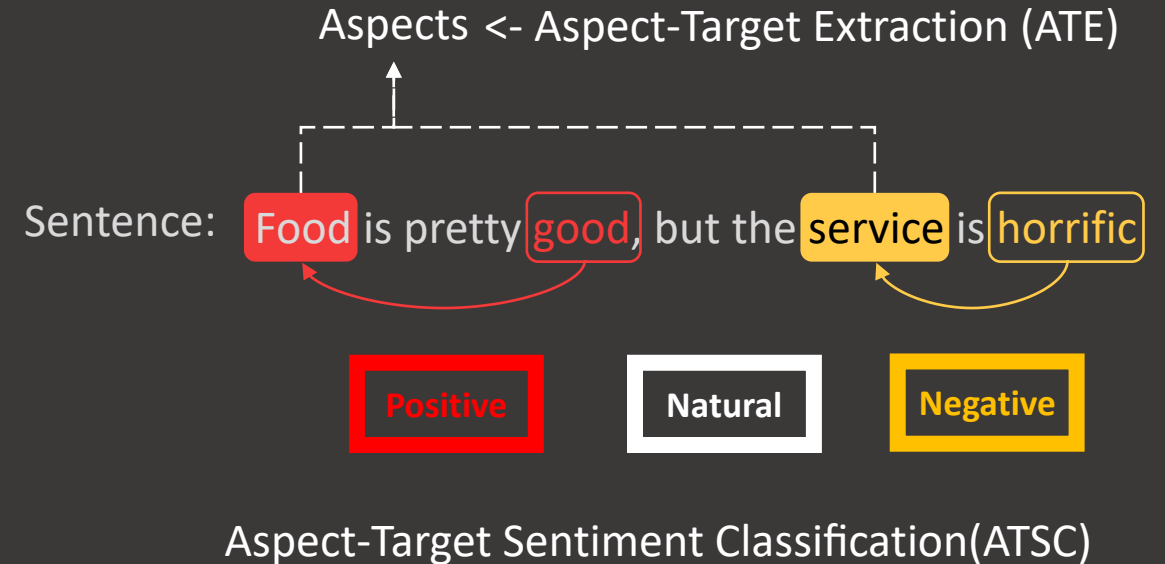


Extracted useful information !

Food: ★★★★★ - Positive
Service: ★☆☆☆☆ - Negative



Aspect Based Sentiment Analysis (ABSA)



2 Related Work

2.1 Traditional Aspect Based Sentiment Analysis

- ABSA – fine-grained textual classification task
- Previously, manually-designed lexicon-based features
- Bag-of-words and sentiment lexicons

2.2 Aspect-based Sentiment Analysis with Neural Networks

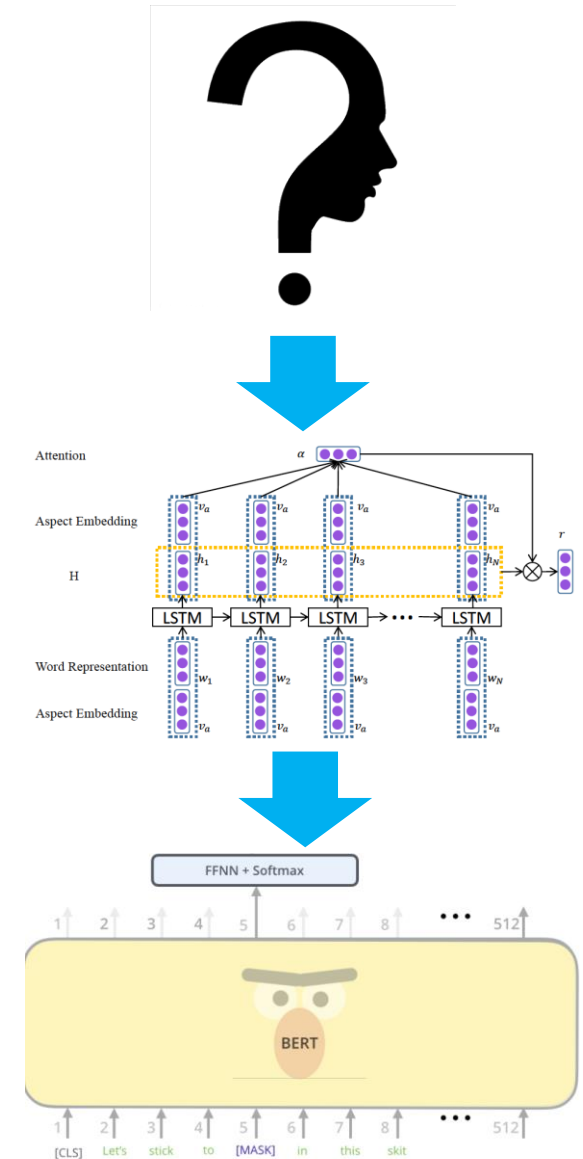
- Automatic learning of textual representation
- Attention-based LSTM with Aspect Embedding (ATAE-LSTM)
- Transformer and BERT based method
- Finetune the pre-trained BERT architecture weights on a domain-specific corpus

SemEval Dataset

- Only one aspect or multiple aspects with the same sentiment polarity

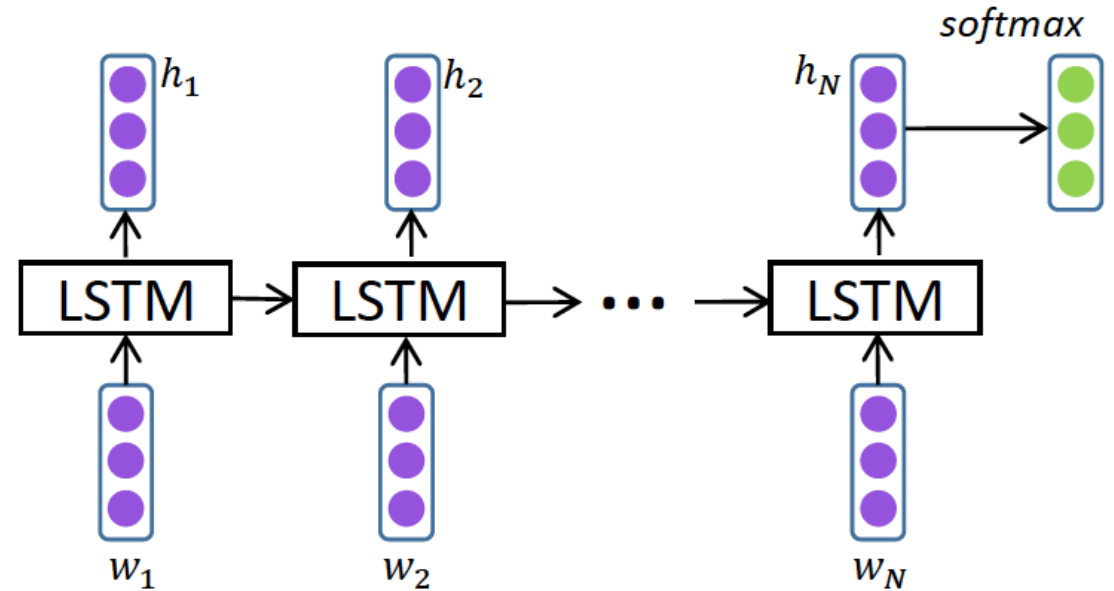
Multi-Aspect Multi-Sentiment (MAMS) Dataset

- More challenging

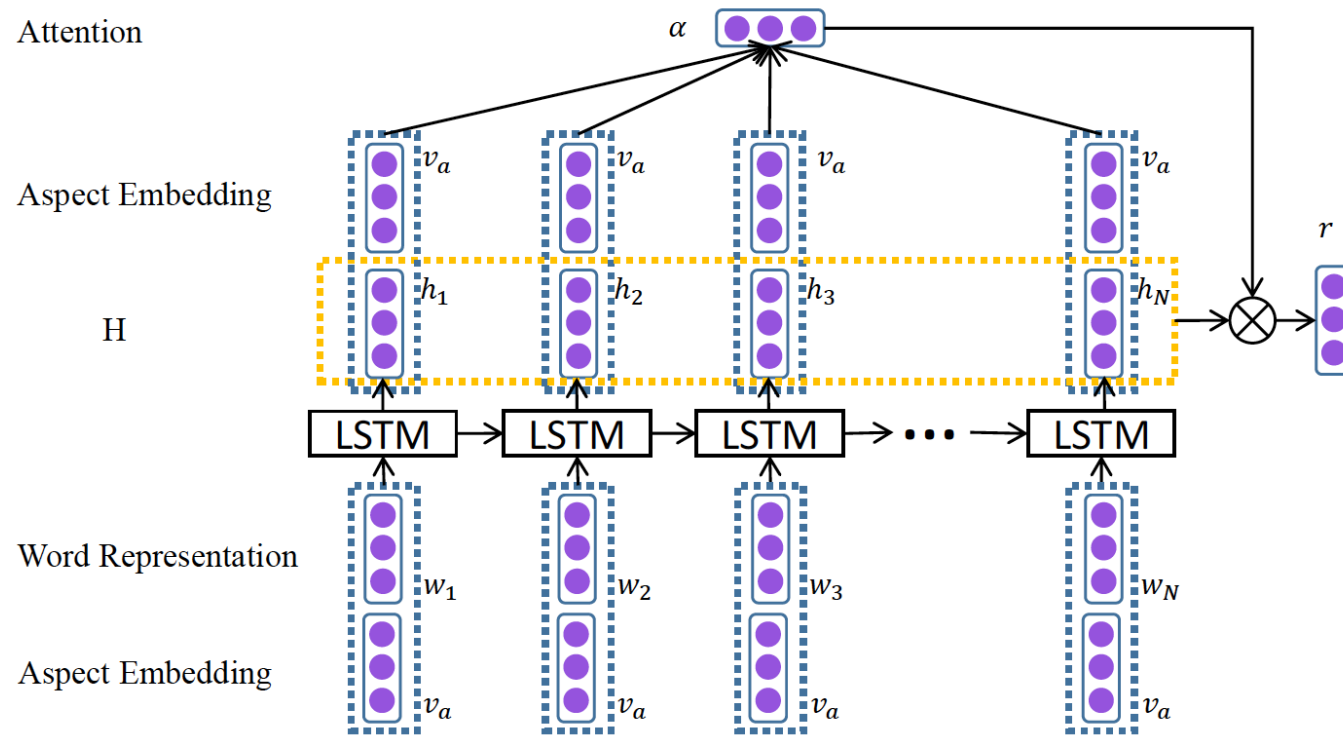


3.1 Long Short-term Memory(LSTM)

- Able to solve the vanishing gradient problem
- Using h_N , the last hidden state as sentence representation
- No aspect information -> sentence level sentiment classification

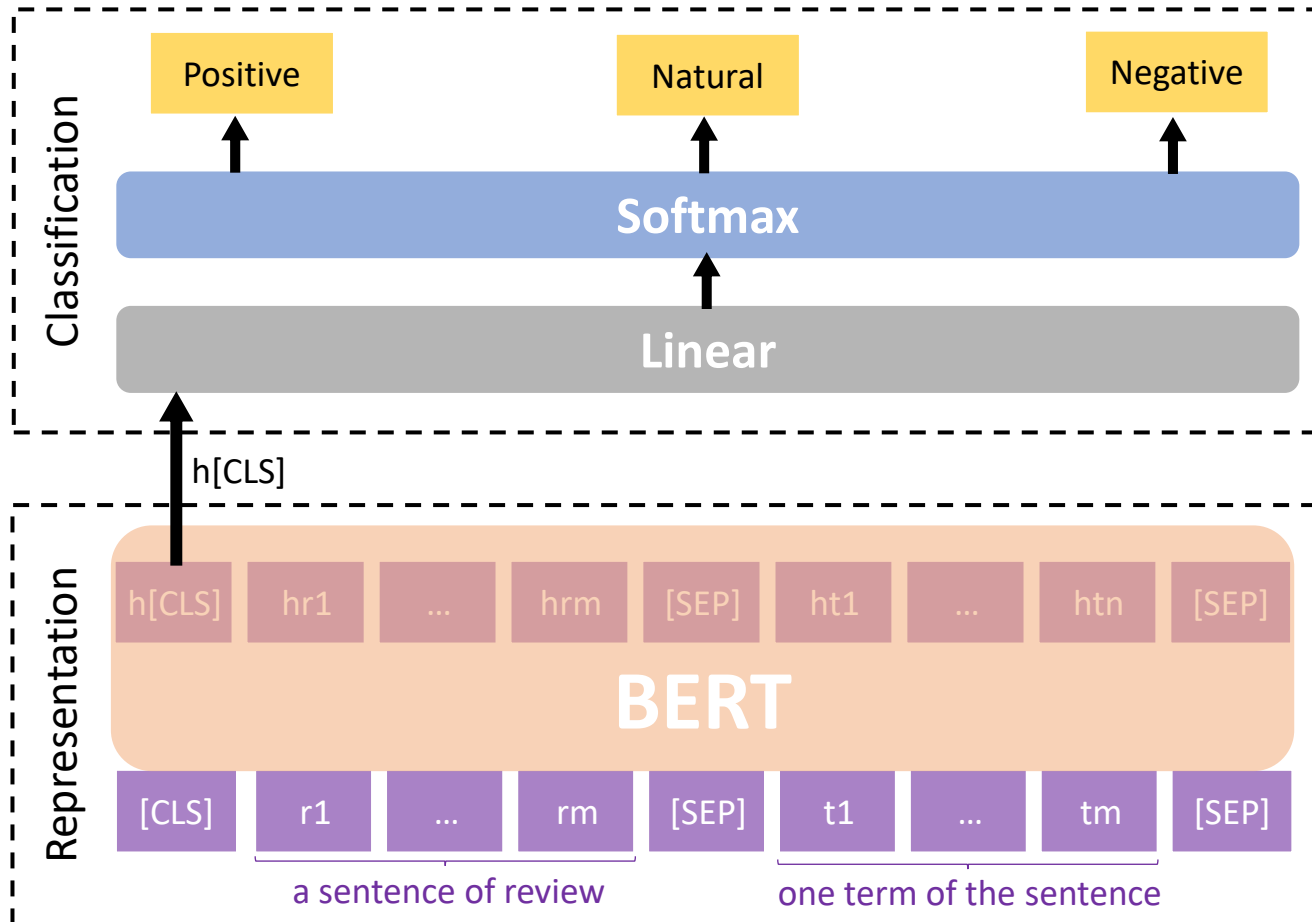


3.2 Attention-based LSTM with Aspect Embedding (ATAE-LSTM)



- Aspect embedding
- Attention between aspect and hidden states
- Able to capture the inter-dependence between words and the input aspect

3.3 BERT-base and BERT-ADA



1 **BERT-base:** Pre-train BERT

2 **BERT-ADA:** Post-train BERT with domain corpus

- Corpus: Yelp Dataset Challenge reviews
- Post-train methodology:
 - masked language model(MLM)
 - next-sentence prediction(NSP)

4 Experiments

Models		SemEval-14		MAMS	
		Accuracy	F1-score	Accuracy	F1-score
GloVe	LSTM	0.7268	0.5301	0.5122	0.3712
	ATAE-LSTM	0.7491	0.6033	0.7028	0.5259
	CapsNet	0.8079	-	0.7978	-
	CapsNet-BERT	0.8593	-	0.8339	-
BERT	BERT	0.8492	0.7693	0.8406	0.8356
	BERT Rest	0.8714	0.8005	0.8473	0.8419

Table 1: Results on SemEval-14 and MAMS Dataset.

- All models perform better on the SemEval-14 Restaurant Review dataset than MAMS dataset.
- Domain-trained BERT-Rest outperforms all other models and achieves the best performance.

Thank you!