Aspect-Based Sentiment Analysis(ABSA)

-Ray

Agenda

1.What’s ABSA and Why it matters

2.Methods

- Bert Sentence Pair Classification
- Bert-Based Attention-Encoder Layer

3.Experiment and evaluation results

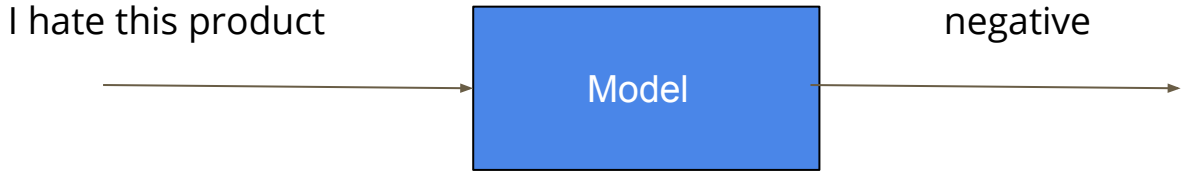
4.Instructions

5.Cast Study

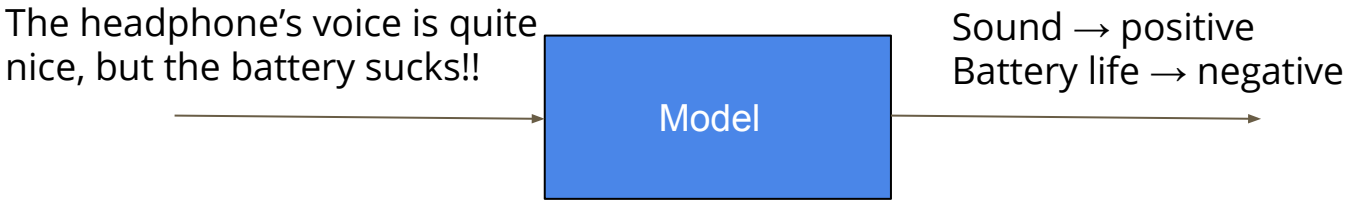
6.Next step

What's ABSA and Why it matters

I think we all know sentiment analysis



But



Methods

In this paper:
1.)Bert Sentence Pair Classification(Fine-tuning)

2.)Bert + AEN(Feature-based + downstream neural network architecture)

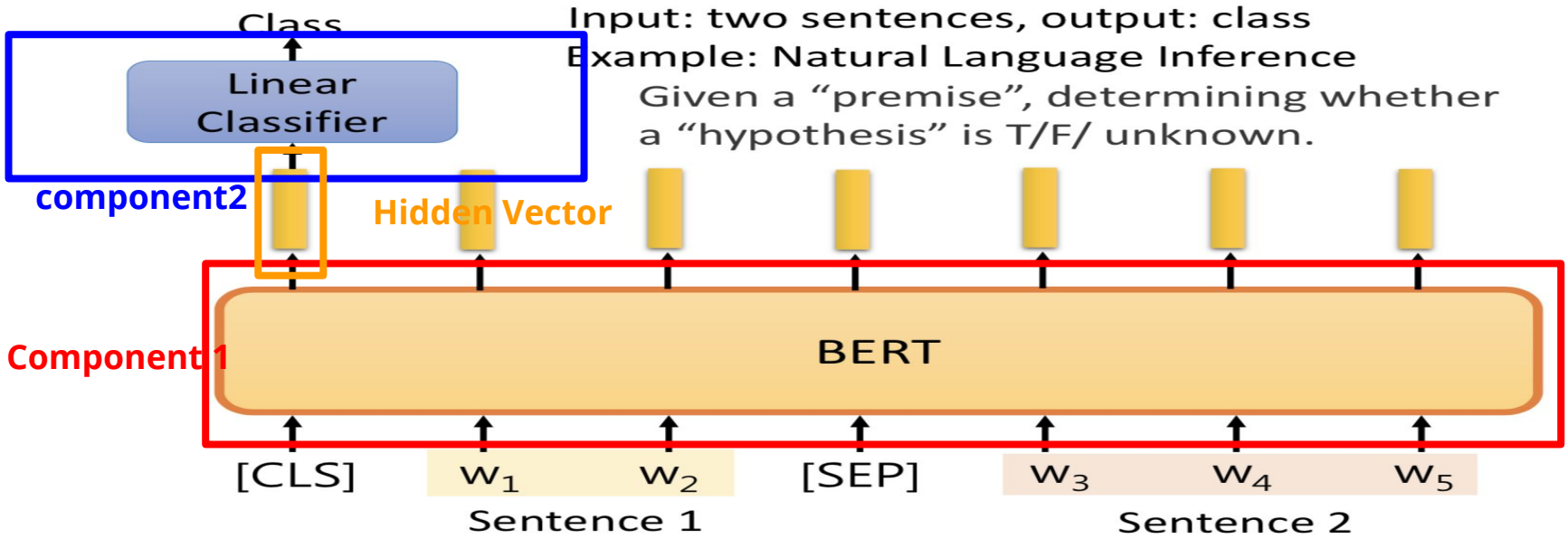
There are two existing strategies for applying pre-trained language representations to downstream tasks: *feature-based* and *fine-tuning*. The

What's BERT

1.BERT, which stands for Bidirectional Encoder Representation from Transformers.

2.pre-training language representations which obtains state-of-the-art results on a wide array of Natural Language Processing (NLP) tasks

Method (Bert Sentence Pair Classification)



Input:

Two sentence

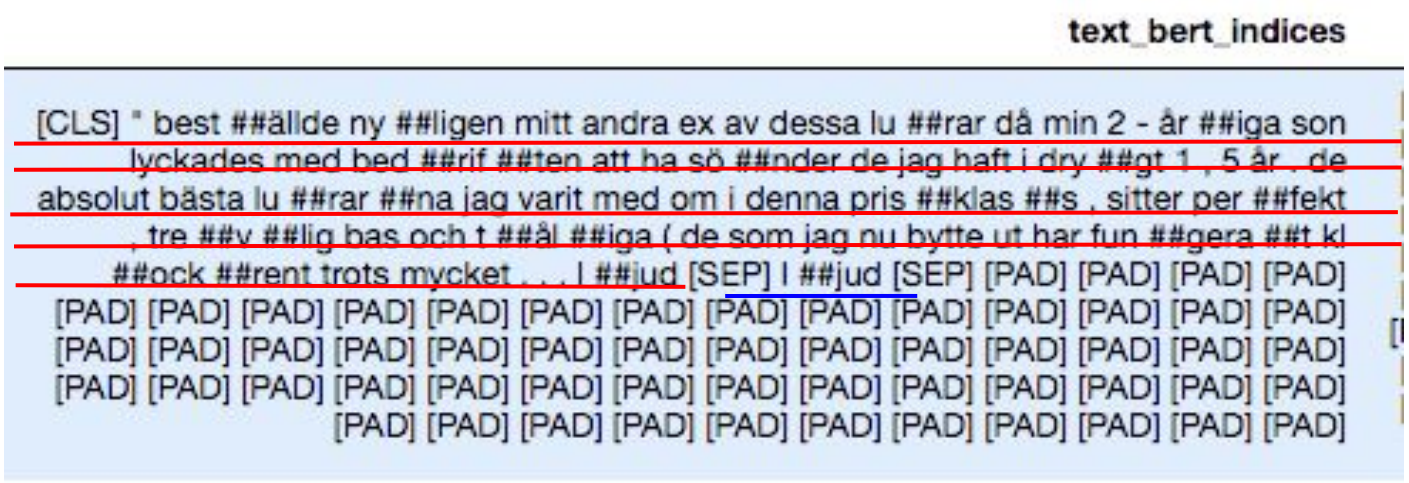
Output:

class(positive, neutral, or negative)

Method (Bert Sentence Pair Classification)

Example:

Red line : sentence1 represents context
Blue line : sentence 2 represents aspect



Experiments

5-Fold validating Accuracy	BERT-SPC	AEN-BERT
(B:16, L:2e-5)	0.8105	0.7965
(B:16, L:5e-5)	0.6882	0.6656
(B:16, L:1e-3)	0.6371	0.6371
(B:32, L:2e-5)	0.8231	0.7917
(B:32, L:5e-5)	0.7323	0.7589
(B:32, L:1e-3)	0.6371	0.6371
On average	0.7213	0.7144

1. BERT-SPC performs better than AEN-BERT on headphone dataset
2. Best parameter for BERT-SPC: Batch Size: 16, Learning Rate: 2e-5

Instructions

1.how to train model

```
make train-headphone-all
```

2.how to infer with trained model

```
python3 infer_example.py
```

Please see https://github.com/RedfieldAB/ABSA for more details

Instructions

Input:

```
    #     )
    t_probs = inf.evaluate(
        ['en mycket prisvärd produkt som varmt kan rekommenderas! gör löpningen tt
ill ett sant nöje'] * 3,
        aspects = ["product",'ljud','batteri'],
        input_cols = opt.inputs_cols
        )
```

sentences

Aspects

Output:

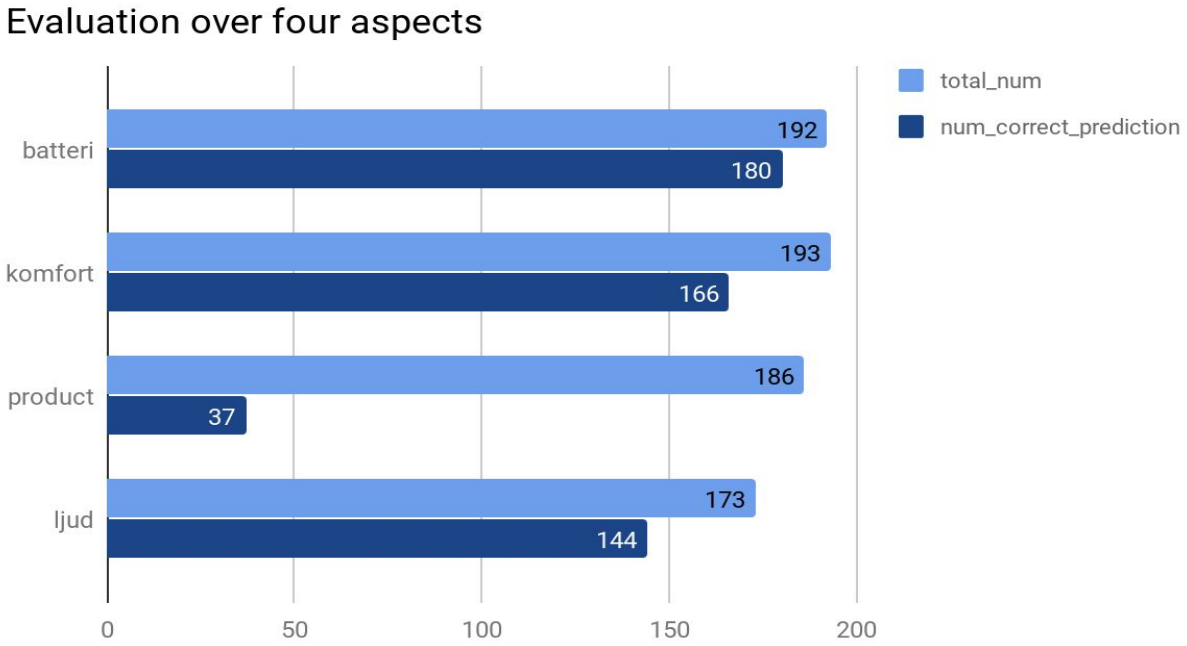
negative neutral positive

```
[[1.9399653e-03 4.7100913e-03 9.9334985e-01]
 [3.7764562e-03 9.9417746e-01 2.0460910e-03]
 [4.0746818e-04 9.9889487e-01 6.9774373e-04]]
[1 0 0]
['postive', 'neutral', 'neutral']
```

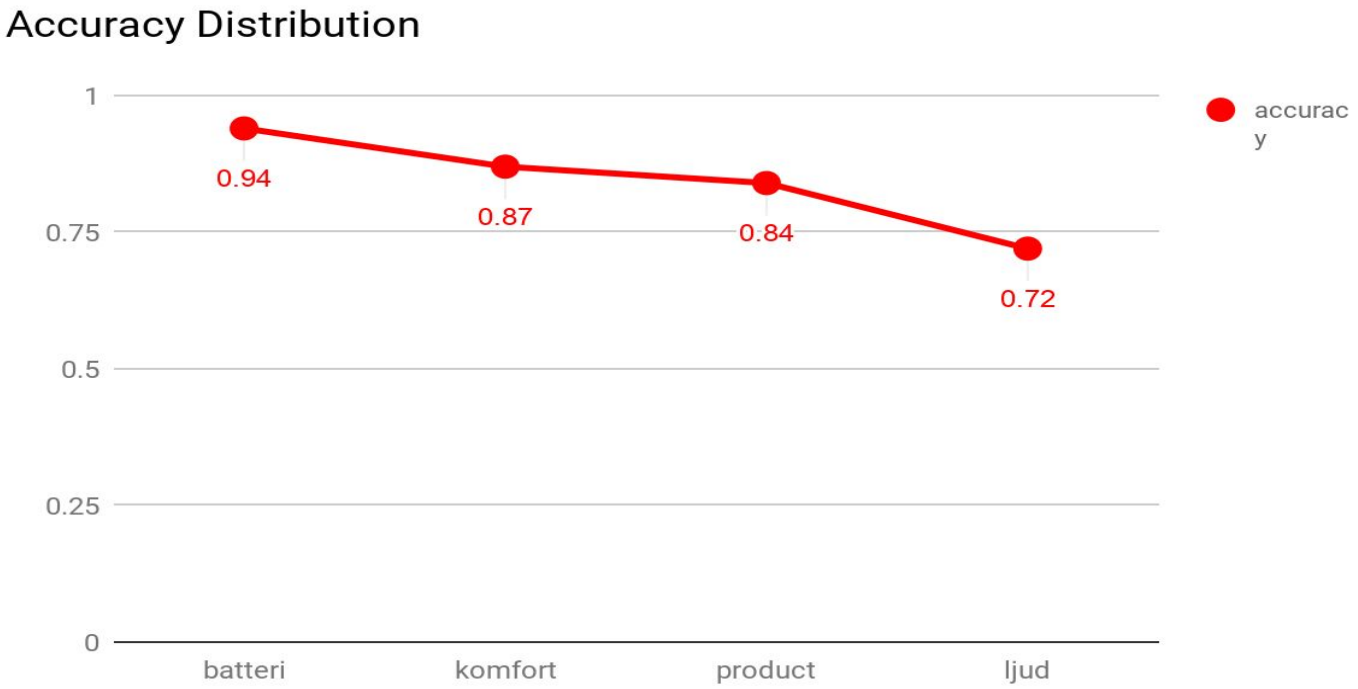
predictions

Evaluation

1.On average, we have 0.84 accuracy
2.Right below figure is evaluation over 4 aspects:
    -batteri
    -komfort
    -product
    -ljud



Evaluation


Accuracy Distribution
1
0.75
0.5
0.25
0
0.94
0.87
0.84
0.72
batteri
komfort
product
ljud
accurac
y

Case Study

Case1: Consider sentiment polarity to the oppose.

- Case 1.1: Think of positive label as negative
- Case 1.2: Think of negative label as positive

Case2: Consider neutral polarity to negative

-Case 2.1: Think of neutral label as negative(It’s worse)

-Case 2.2: Think of neutral label as positive(Not that worse)

Case Study(Examples)

Case 1.1

```
test_df[(test_df.polarity == "postive") & (test_df.predictions == "negative")].iloc[3:4]
```

	comment	aspect	polarity	pred_prob_distribution	predictions
360	jag köpte dena vara för inte så länge sedan å den funkar väldigt bra det tar dock tid att vänja sig med dom men man glömmer bort det senare	product	postive	[0.7067444920539856, 0.13540838658809662, 0.15784713625907898]	negative

Case 1.2

```
test_df[(test_df.polarity == "negative") & (test_df.predictions == "postive")].iloc[-2:-1]
```

	comment	aspect	polarity	pred_prob_distribution	predictions
587	jag va jättenöjd med dessa lurar, bra passform i öronen, bra "trasselfri" sladd, bra ljud och felfri mick, men så för nån dag sedan så blev volymen i högra snäckan väldigt väldigt nedsatt...	ljud	negative	[0.0007207603193819523, 0.010727920569479465, 0.9885513186454773]	postive

Case Study(Examples)

Case 2.1

```
test_df[(test_df.polarity == "neutral") & (test_df.predictions == "negative")].iloc[-3:-2]
```

	comment	aspect	polarity	pred_prob_distribution	predictions
653	helt värdelösa lurar helt enkelt. lyssna inte på dem som recenserat innan, verkar inte ha någon koll alls på ljud eller någonting överhuvudtaget. de värsta med lurarna är att dem inte sitter bra alls... känns som att dem inte ens sitter på huvudet, bra tänker du då?	ljud	neutral	[0.8531381487846375, 0.11018291115760803, 0.03667890280485153]	negative

Case 2.2

```
test_df[(test_df.polarity == "neutral") & (test_df.predictions == "postive")].iloc[1:2]
```

	comment	aspect	polarity	pred_prob_distribution	predictions
30	väldigt bra ljud, sitter mycket skönt, har bra räckvidd och sjuk batteritid! klockrent!	batteri	neutral	[0.0004165410646237433, 0.032194361090660095, 0.9673891067504883]	postive

Next step for improving this project

1. To figure out why model made mistakes from those cases
2. Design algorithm to improve.
    a. The logic of putting aspect in the sentence.
3. Deploy ?

Recommendation using LightFM

Data:

1.) Collaborative user-item interaction data
2.) Content data(meta data)

Reference

Bert:https://arxiv.org/pdf/1810.04805.pdf

Paper link:https://arxiv.org/pdf/1902.09314v2.pdf

How we prepare training data

1. What label we need ?
    a. sentiment polarity(positive, negative, neutral)
    b. Aspect:
        i. Case1: Aspect is in the comment(text)
        ii. Case2: Aspect is not in the comment

2. Method 1:

    Step1: Consider NaN as neutral polarity.

    Step2: Consider Generell as Product aspect.