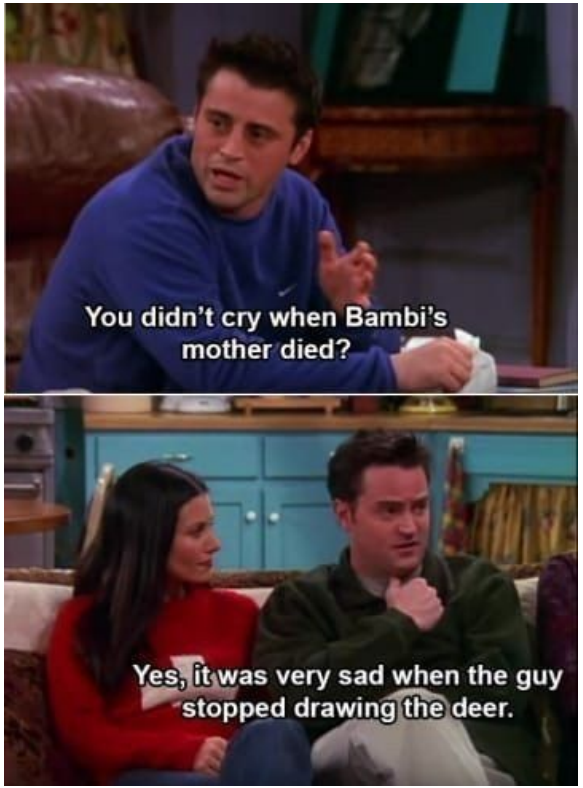
You didn't cry when Bambi's mother died?
Yes, it was very sad when the guy stopped drawing the deer.

Context Based Sarcasm Detection on News Headline Dataset

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Introduction

- Sarcasm is a convoluted form of expression.
- It is important in understanding sentiments and opinions.
- Applications:
  - Sentiment Analysis
  - Q&A - Identifying rhetorics
  - Dialogue systems, Chatbots, Voice assistants

Problem Statement

Sarcastic intent of a sentence is dependent on the context in which it is said.

Therefore, a model that considers both a sentence and its context should perform better than one that doesn’t.

Our goal was to test this hypothesis on different models to find if this reasoning was consistent.

Dataset

- News Headlines Dataset For Sarcasm Detection obtained from Kaggle.
- Consists of 28619 datapoints of news headlines, labels and article links.
- 14985 Sarcastic and 13634 non-sarcastic headlines.


```
{
    "is_sarcastic": 1,
    "headline": "new carpet cleaner safe for pets that were meant to go on living",
    "article_link": "https://www.theonion.com/new-carpet-cleaner-safe-for-pets-that-were-meant-to-go-1819577073"
}
{
    "is_sarcastic": 0,
    "headline": "the dangers behind teen texting and driving",
    "article_link": "https://www.huffingtonpost.com/entry/what-does-it-take-for-teen-texting-and-driving_b_5596555.html"
}
```

Augmented Dataset

index	is_sarcastic	headline	article_link	article_text
1	0	dem rep. totally nails why congress is falling short on gender, racial equality	https://www.huffingtonpost.com/entry/donna-edwards-inequality_us_57455f7fe4b055bb1170b207	"We are neither post-racial nor post-gender," Rep. Donna Edwards (D-Md.) proclaims in a new essay taking on Congress for not addressing inequality. "Can we pass equal pay laws and give women control of their own health-care decisions when women represent just 20 percent of Congress?" she says. Even when women get elected to office, men still hold the large majority of leadership positions, The New York Times pointed out last year.Edwards, who lost a Senate primary race to Rep. Chris Van Hollen (D-Md.), specifically criticized Democrats for not being inclusive of the voters who have traditionally been loyal to them.
2	0	eat your veggies: 9 deliciously different recipes	https://www.huffingtonpost.com/entry/eat-your-veggies-9-delici_b_8899742.html	Vegetables don't have to be boring or relegated to a side dish. From roasted broccoli with chipotle honey butter to balsamic glazed roasted beets, these recipes are so flavorful and satisfying, they could carry an entire meal. In this recipe, broccoli florets are tossed in a sweet, spicy and smoky chipotle-honey butter before roasting. It's as delicious as it sounds, and the broccoli has enough flavor to carry an entire meal. Serve it as a main course with rice or as a side dish to simply grilled fish or meat. GET THE RECIPEWant to get your family to love cauliflower? Try roasting it and tossing it with cheese. It worked for me. GET THE RECIPE
3	1	inclement weather prevents liar from getting to work	https://local.theonion.com/inclement-weather-prevents-liar-from-getting-to-work-1819576031	PROVIDENCE, RI—In spite of his best efforts to brave the ongoing winter storm and freezing temperatures, the inclement weather currently affecting the Northeast has left Providence-area liar Tim Carlson unable to commute to his office, the habitual deceiver reported to his colleagues today. "They haven't been able to plow my street yet and the snow drifts have to be two feet high in some places, so I don't really think there's any way for me to make it in," said an email sent from the man who spent 45 minutes attempting to dislodge his car from a snowbank and who routinely fabricates stories. "On top of that, the buses don't seem to be running in my area, or else I definitely would have been in by now. This is really a mess. I'm so sorry, everyone. Wish I could be there." Carlson also confirmed that the weather had left his apartment's electricity somewhat spotty, preventing the unrepentant phony from doing any work from home.

Approach

Two approaches:

1. Headlines (Baseline)

2. Headlines + Article text
   The two texts were concatenated to use as input for the model

Models

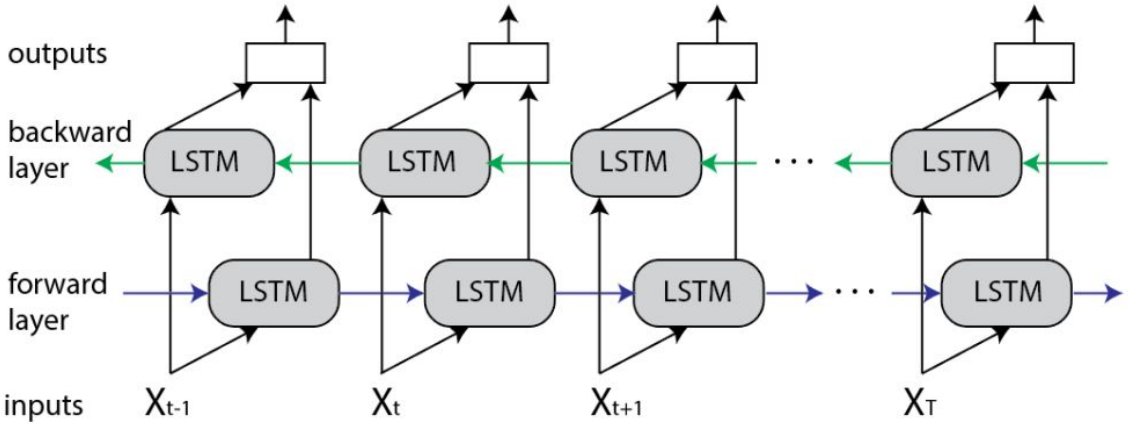
Applying both the approaches on two different models:

1. Bi-LSTM with GloVe Embeddings

2. RoBERTa using transfer learning

Model 1: LSTM

- GloVe Embeddings (Common Crawl)
- Bidirectional LSTM



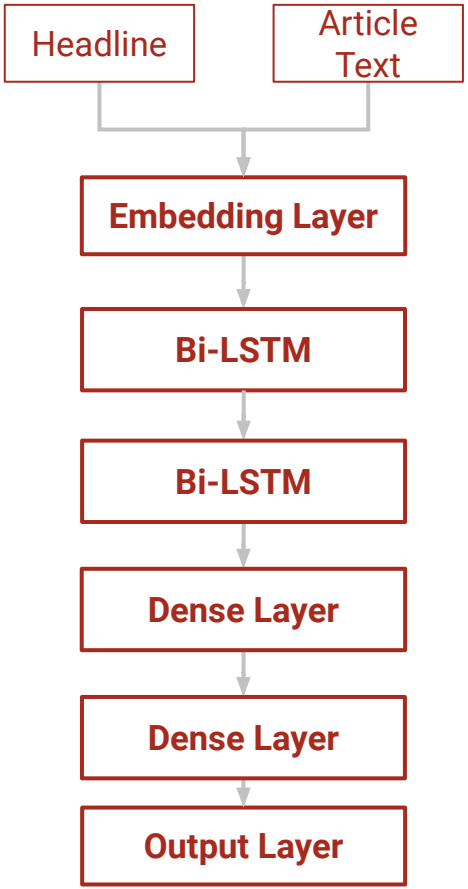
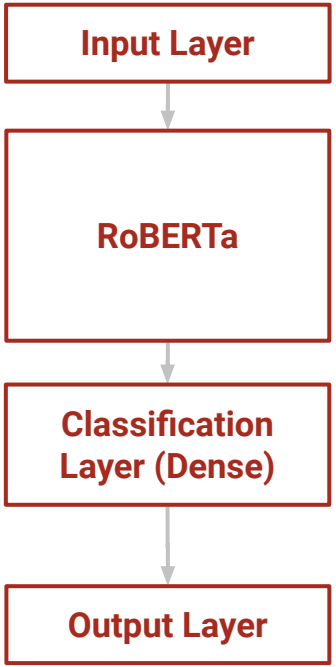


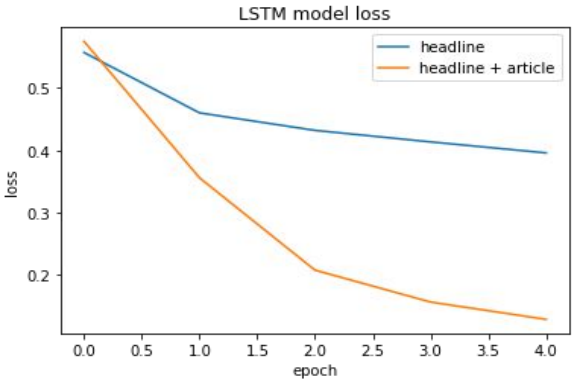
image: https://www.baeldung.com/cs/bidirectional-vs-unidirectional-lstm

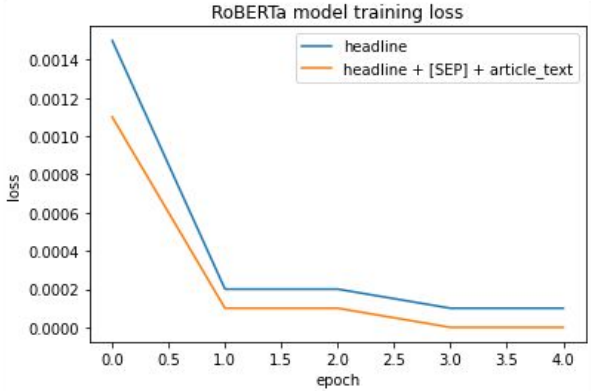
Model 2: RoBERTa

- RoBERTa: a transformer based-model
  - BERT-based architecture
- Inputs:
  - Headline
  - Headline + “[SEP]” + Article Text
- Training parameters:
  - Num of epochs: 5
  - Batch size: 32
  - Maximum sequence length: 256



Results





- In LSTM, both the texts are concatenated, but for RoBERTa model, two texts were separated by a separator token [SEP].
- Initial training loss of LSTM is much higher than that of RoBERTa model.
- Final loss is almost similar after training for 5 epochs.

Results

Model	Input Format	Precision	Recall	F-1 score	Accuracy
LSTM	**Headline**	0.8134	0.8167	0.8078	0.8079
LSTM	**Headline + article_text**	0.9592	0.9631	0.9607	0.9611
RoBERTa	**Headline**	0.9438	0.9359	0.9389	0.9402
RoBERTa	**Headline [SEP] article_text**	0.9984	0.9983	0.9983	0.9983

- When the context is given, 16% increase in performance can be seen in LSTM model.
- Around 5% of performance increase in RoBERTa model with the context.

Conclusion

- Model considering both the context and the headline is performing better than the model with only the headlines.
- Our hypothesis holds true.

- Future Work:
  - Testing the approach on other diverse datasets
  - Applying to conversational text

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Thank You