Twitter Sentiment and Intrinsic Attention with Fastai

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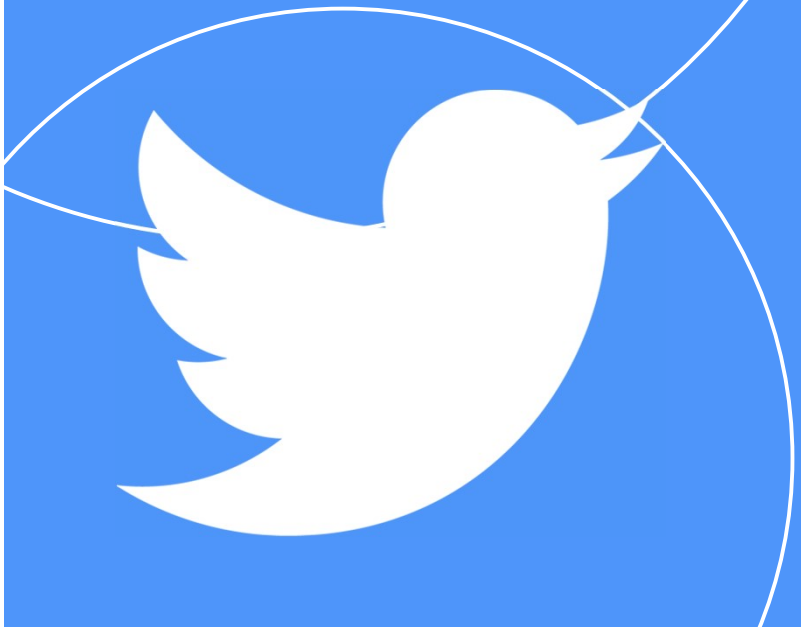


INTRODUCTION - Sentiment Understanding

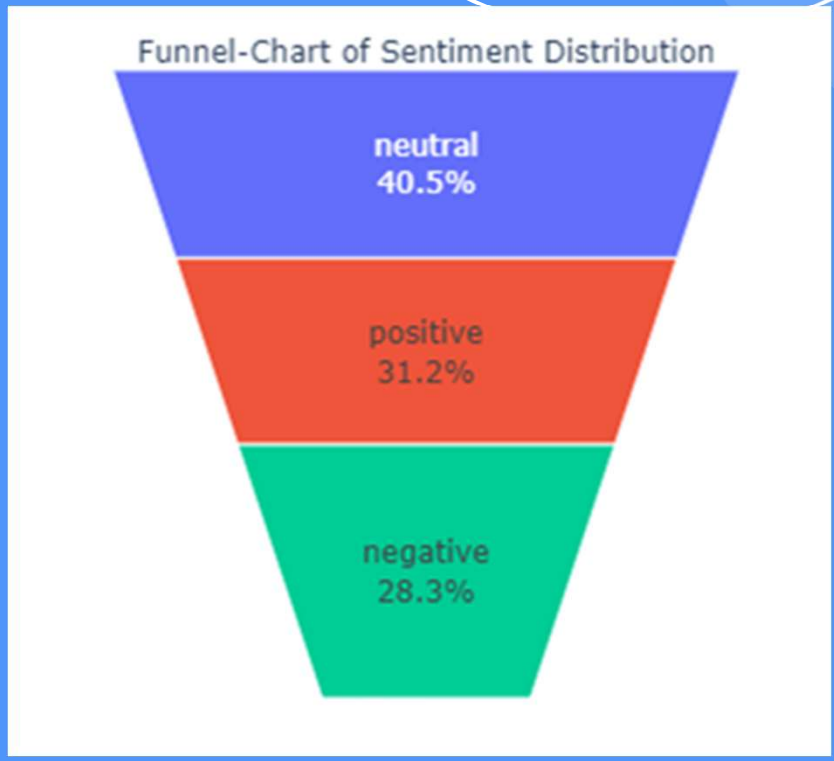
- Customer Service
  - Brand Monitoring
  - Product Analysis
- Legal Documents
  - So many documents so little time to read
- Voice of your Employees
  - Understand employees' needs
- Natural Language Processing (NLP) Market to Exhibit 32.4% CAGR; Increasing Technological Advancement to Drive Growth: Fortune Business Insights™

01 THE DATA

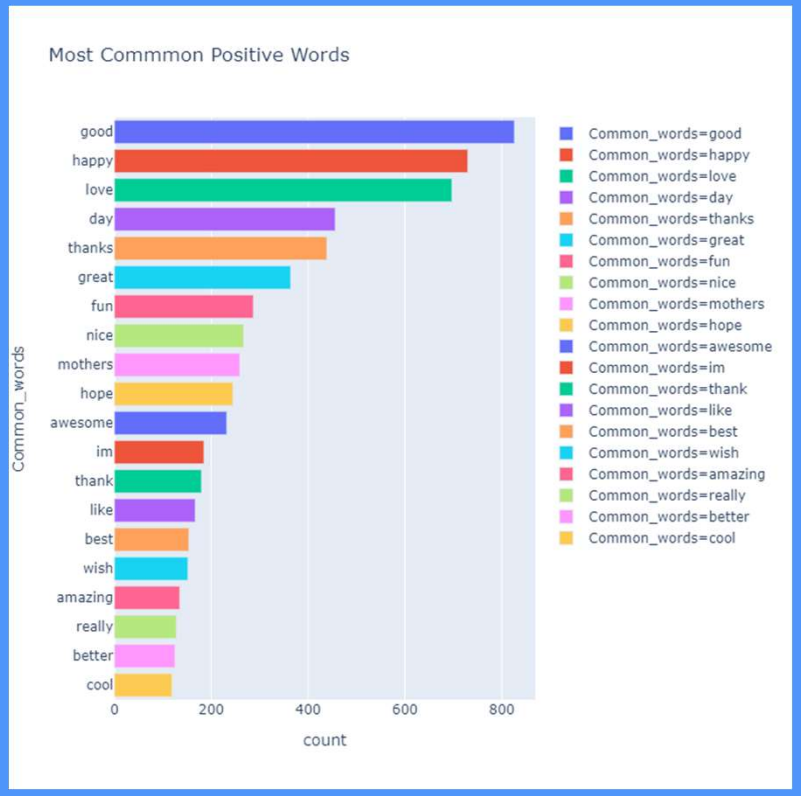
Overview and Insights

Distribution of Data

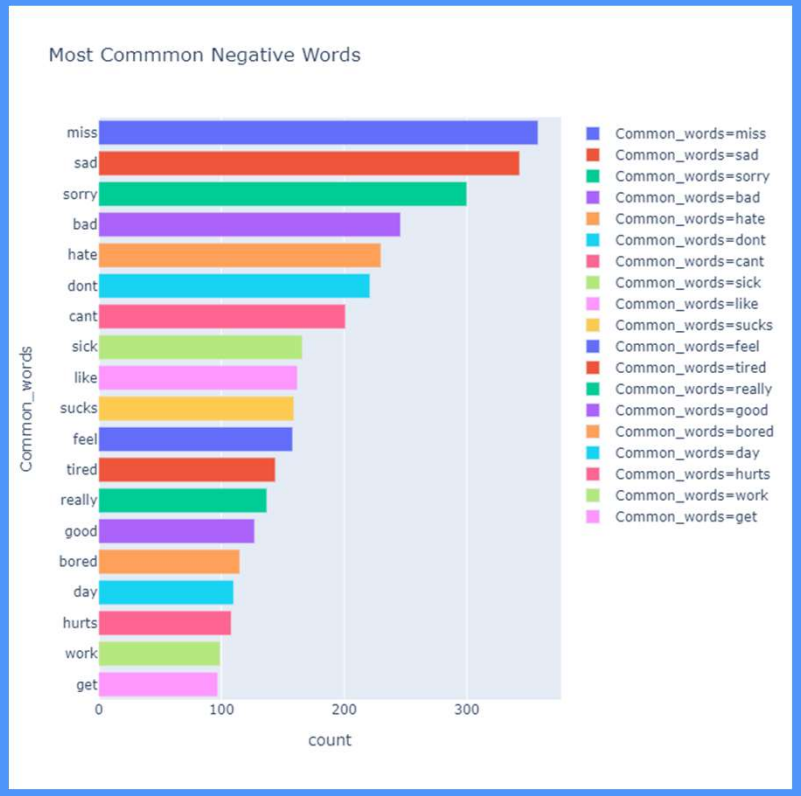
Data set containing ~30k Tweets

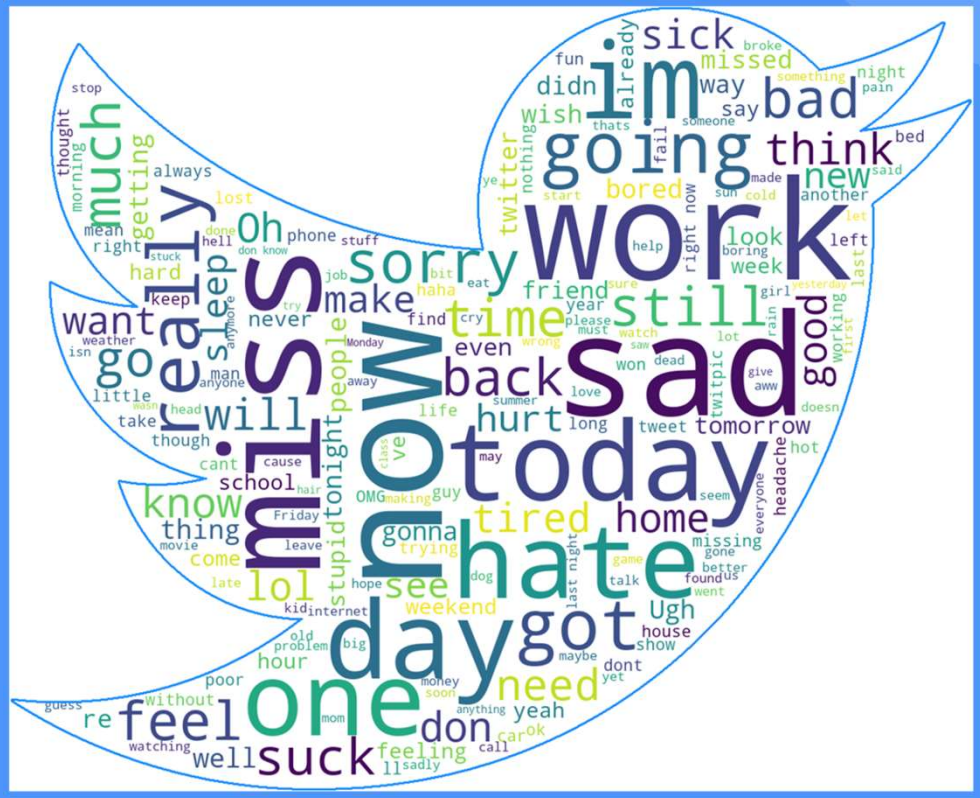


Common words associated with positive tweets

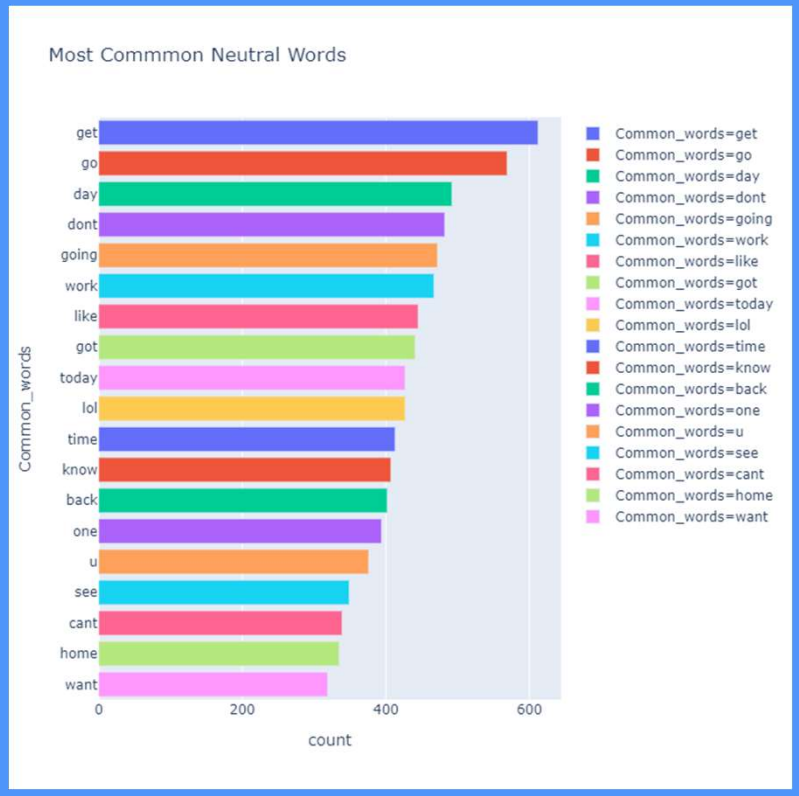


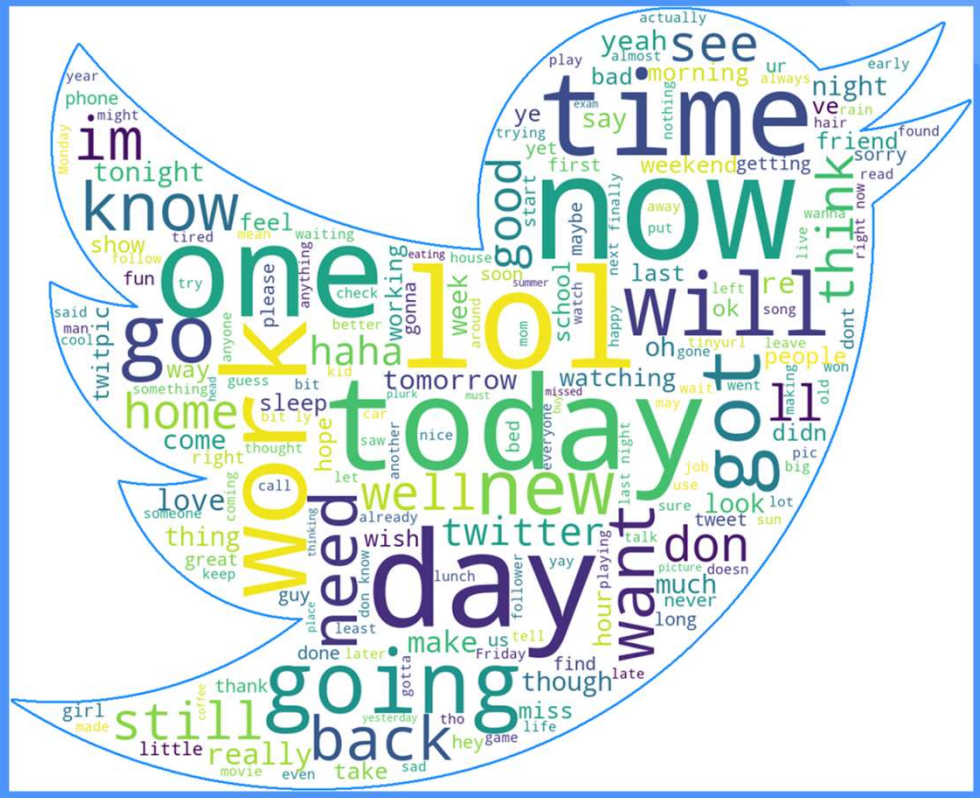
Common words associated with negative tweets





Common words associated with neutral tweets





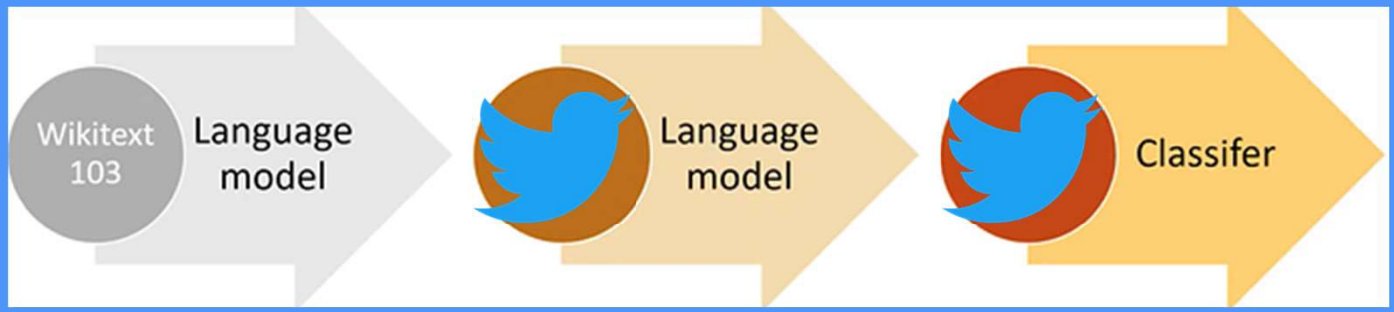
02 METHODOLOGY

Neural Nets and NLP with Fastai

METHODS

fast.ai + colab

ULMFiT - Universal Language Model Fine Tuning



Our Tweet based language model

```
[ ]  learn.predict('I really', n_words=7)

     'I really want to go see hannah montana'
```

Intrinsic Attention - What is it?

- Essentially a ranking of words based upon significance to its classification
- Allows quick, at a glance, identification of keywords

Our Kaggle Dilemma and Intrinsic Attention

	textID	text	selected_text	sentiment
0	cb774db0d1	I`d have responded, if I were going	I`d have responded, if I were going	neutral
1	549e992a42	Sooo SAD I will miss you here in San Diego!!!	Sooo SAD	negative
2	088c60f138	my boss is bullying me...	bullying me	negative
3	9642c003ef	what interview! leave me alone	leave me alone	negative

Fastai's built-in Intrinsic Attention method

```
[ ]  text_interp.show_intrinsic_attention(train_df['text'][1])
```

```
xxbos xxmaj sooo xxup sad i will miss you here in xxmaj san xxmaj diego ! ! !
time: 235 ms
```

Obtaining Selected Text using Intrinsic Attention

	textID	text	selected_text	sentiment
0	cb774db0d1	I`d have responded, if I were going	I`d have responded, if I were going	neutral
1	549e992a42	Sooo SAD I will miss you here in San Diego!!!	Sooo SAD	negative
2	088c60f138	my boss is bullying me...	bullying me	negative
3	9642c003ef	what interview! leave me alone	leave me alone	negative

```
selected_text_grabber(text_interp.intrinsic_attention(train_df['text'][1]))
```

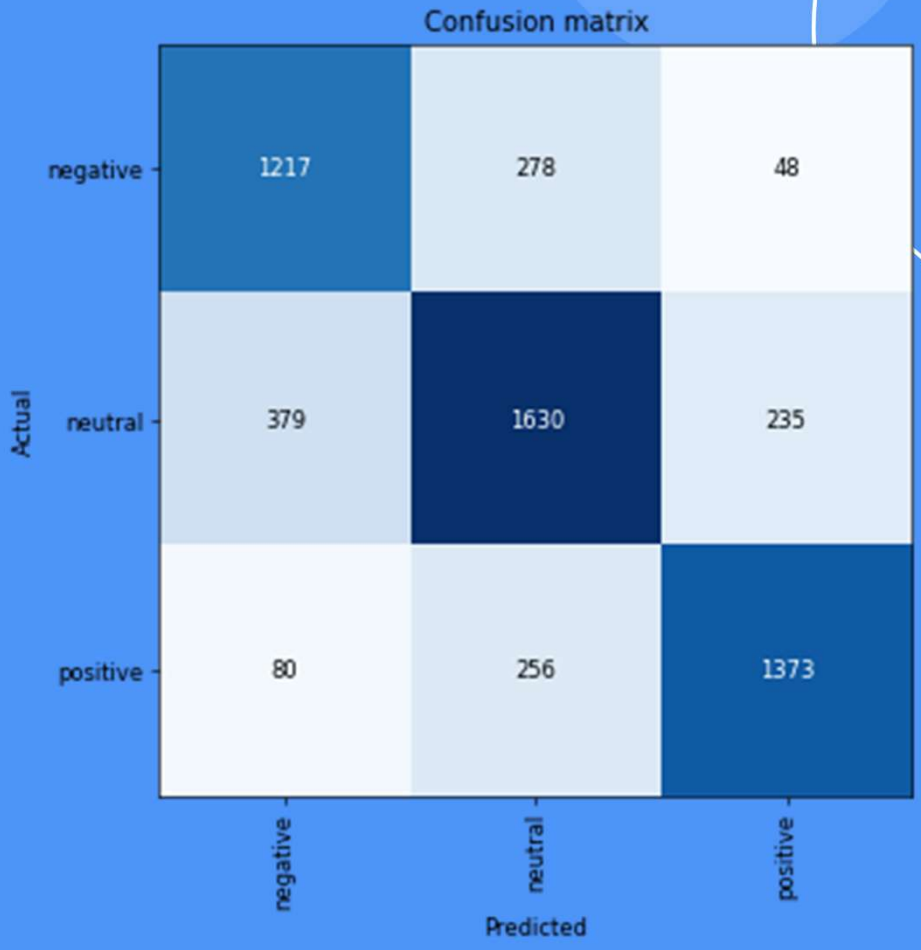
```
'sooo sad'  time: 229 ms
```

03 RESULTS

Model Performance and Intrinsic Attention

Model Performance

Average Overall Accuracy ~76%



Intrinsic Attention

Desired Output

	textID	text	selected_text	sentiment
0	cb774db0d1	I`d have responded, if I were going	I`d have responded, if I were going	neutral
1	549e992a42	Sooo SAD I will miss you here in San Diego!!!	Sooo SAD	negative
2	088c60f138	my boss is bullying me...	bullying me	negative
3	9642c003ef	what interview! leave me alone	leave me alone	negative

Our Output

	textID	text	selected_text	sentiment
0	cb774db0d1	I`d have responded, if I were going	I`d have responded, if I were going	neutral
1	549e992a42	Sooo SAD I will miss you here in San Diego!!!	sooo sad	negative
2	088c60f138	my boss is bullying me...	my boss	negative
3	9642c003ef	what interview! leave me alone	leave	negative

04 CONCLUSIONS

Takeaways and Future Work

Takeaways

Fastai

- Powerful and efficient library built on pytorch, but takes some time to understand the inner-workings.
- Highly recommend the fast.ai course!

Twitter

- Unique dialect
  - Character limit
  - Slang
  - Typos
- A lot of non alphanumeric characters
  - URLs

FUTURE WORK

- Improvements to Vocab creation
  - Experiment with stop words...etc
- Experiment with different Tokenizers
  - BERT, ROBERTA, GPT-2...etc
- Refinement of our “Selected Text” function
  - Words in different parts of the sentence may have similar weights
- Attempting additional tuning parameters or starting from a different pretrained model
- Explore alternative methods to intrinsic attention and compare results


THANK
YOU!