

## Introduction

### Motivation:

Companies are often concerned about public perception, and rightly so. How people view a company, whether positively or negatively, influences a company's profit margin and growth. Furthermore, it is also important for a company to gauge the public's reactions to recent events like a new product launch or marketing campaign.

### Goal:

To aid such companies, we create a system that can retrieve recent tweets about a company. The system then performs sentiment analysis on them, classifying them as positive or negative, so that businesses can quickly, easily, and cheaply evaluate public sentiment.



## Data

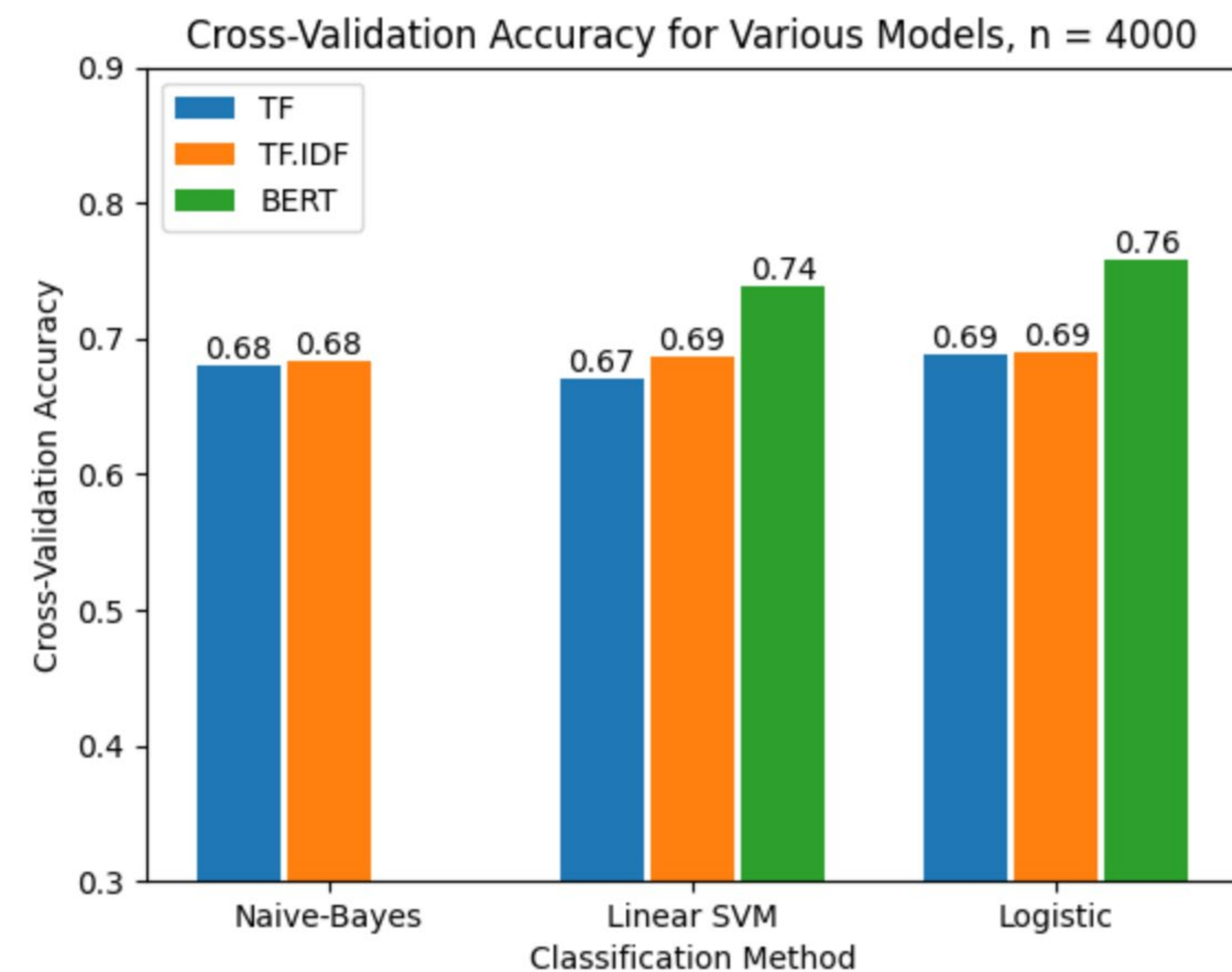
### Dataset:

- **Training:** Sentiment140
  - 1.6 Million Tweets, contains multiple brands and companies as targets
  - Labeled with positive, neutral, or negative sentiment
- **Testing:** Twitter US Airline Sentiment
  - 14,000 labeled tweets with airlines as targets

## Methodology

### Model Selection:

Compared combinations of various features and classifiers to use for our model:

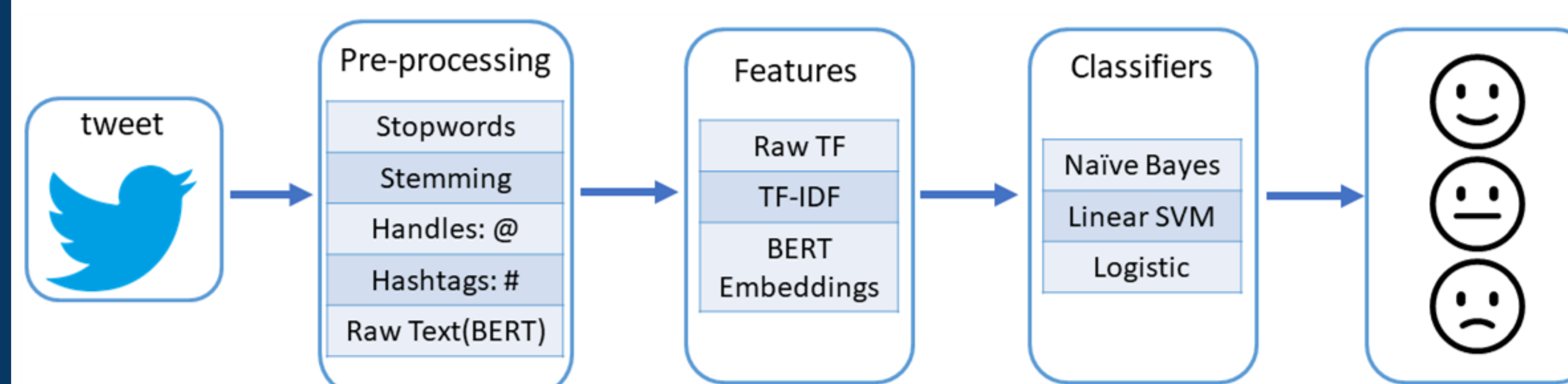


### BERT:

Producing the best accuracy was models using BERT embeddings as features, while the classifiers performed similarly.

### PySentimiento:

- Used this library containing a pre-trained BERT model for sentiment analysis.
- Allows us to not have to fine-tune BERT model ourselves, which would've taken computing power beyond our capabilities.



## Results

### BERT on Airline Data

	Precision	Recall	F1-Score	Support
0 😞	0.91	0.82	0.86	1260
2 😐	0.56	0.65	0.60	416
4 😊	0.73	0.86	0.79	324
<b>Accuracy</b>			0.79	2000
<b>Macro Avg.</b>	0.73	0.78	0.75	2000
<b>Weighted Avg.</b>	0.81	0.79	0.79	2000

### Naive Bayes on Airline Data

	Precision	Recall	F1-Score	Support
0 😞	0.95	0.46	0.62	1260
4 😊	0.30	0.90	0.45	324
<b>Accuracy</b>			0.55	1584
<b>Macro Avg.</b>	0.62	0.68	0.54	1584
<b>Weighted Avg.</b>	0.82	0.55	0.59	1584

## Conclusions

### Findings:

- BERT significantly outperformed other methods.
- Our results suggest that classifiers have more difficulty correctly classifying positive and neutral tweets in comparison to negative tweets.
- Users may be more inclined to post about a negative experience with a brand or company.

### Future Work:

- Train using a more domain-specific dataset
- Expand system to include more than companies and brands (i.e., universities)
- Expand system to include posts from other media platforms (i.e., YouTube comments).