Detecting Fake News

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Group 11

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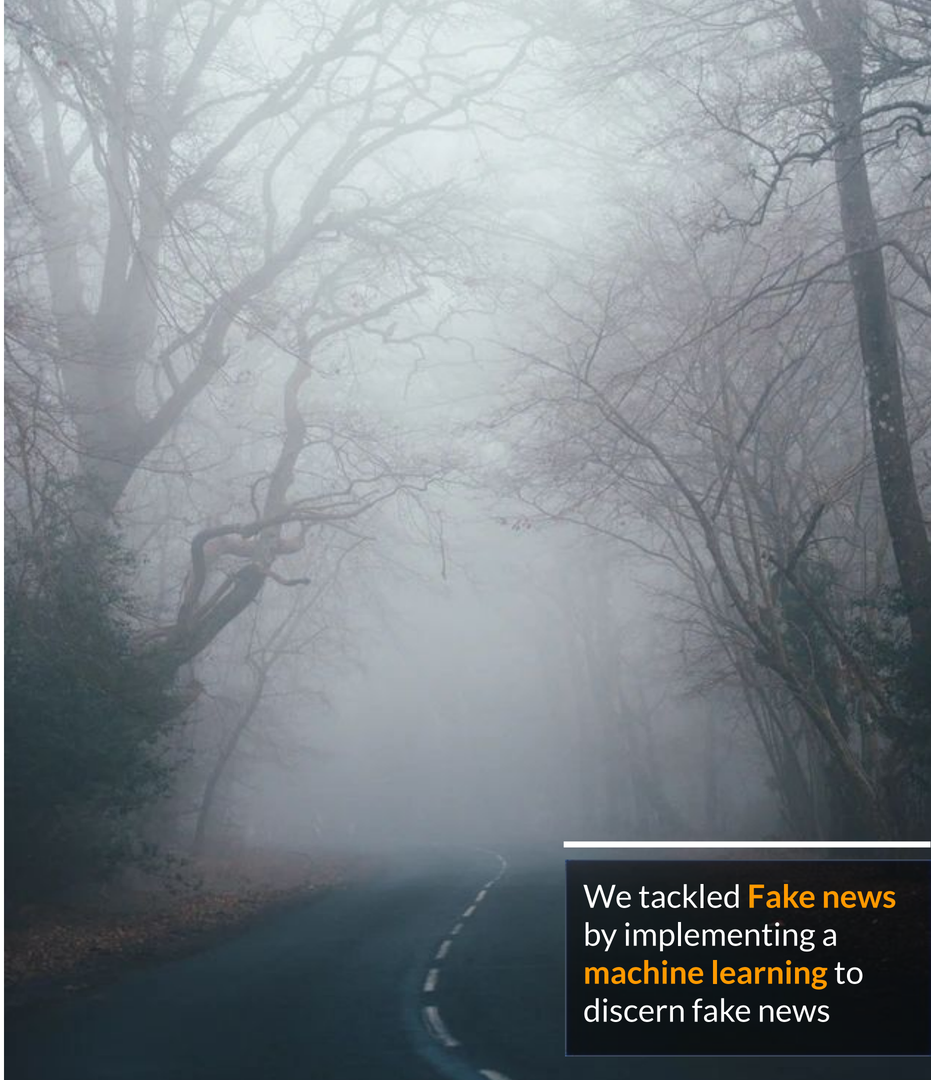
Problem Definition and Motivation

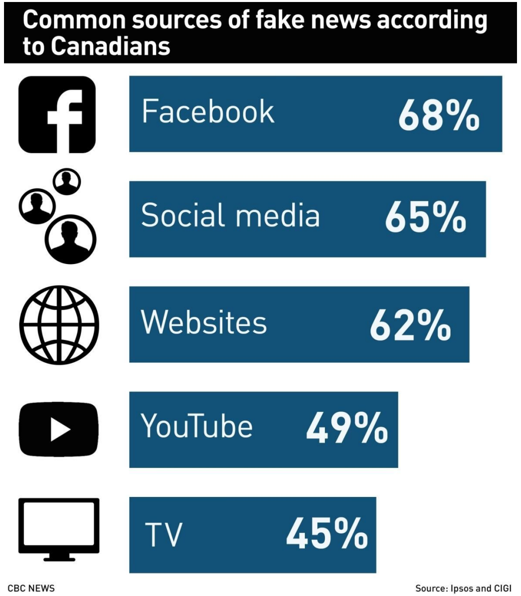
Pain Points

- Algorithmic Filtering
- Persistent False Rumours
- Infectious Unverified Rumour
- Subjective High Profile Users



We tackled **Fake news** by implementing a **machine learning** to discern fake news

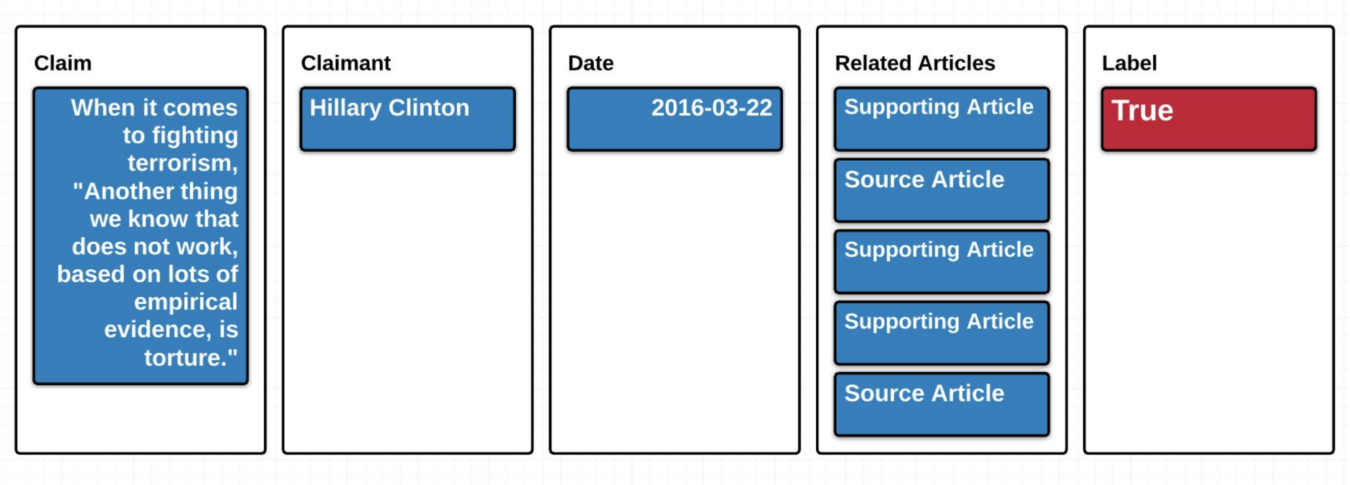
Relevant Data



- 90% Canadians fallen prey to fake news online.
- 80+% Canadians agree or somewhat agree that search engines should be forced to remove inaccurate search results related to a person's name.
- 21,600 tweets from troll accounts directly targeted Canadians in the 2019 Canada's federal election.
- Fake news has cost the US stock market $39 billion annually.
- At least $200 million will spend on fake news in 2020 US presidential election.

Dataset Description

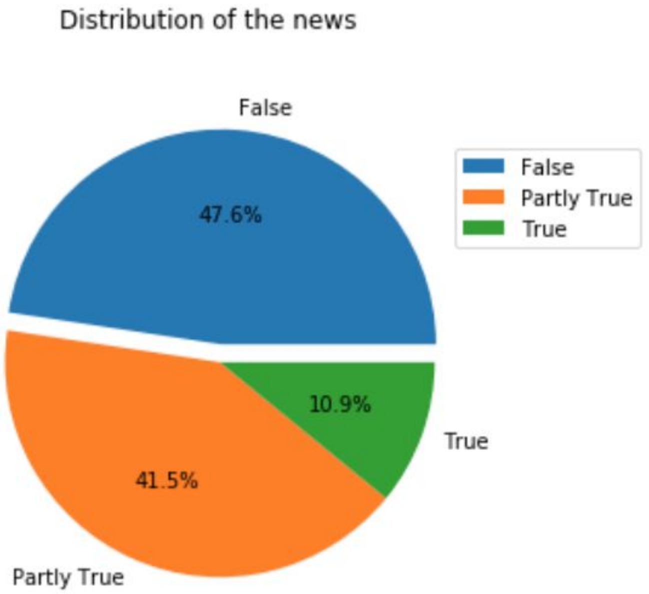
- Composed of 15,555 claims from 9 fact-checking websites
- Claims categorized by humans as false, partly true, or true
- Included claimant, date, and related articles
- Total of 64,974 related articles composed of source and supporting articles

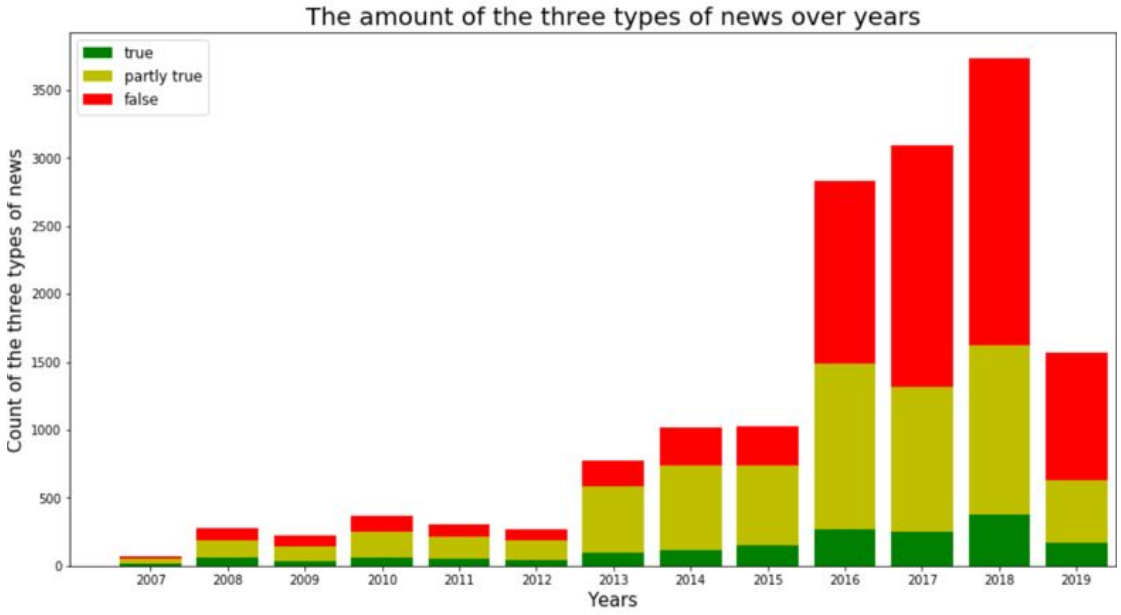


Claim	Claimant	Date	Related Articles	Label
When it comes to fighting terrorism, "Another thing we know that does not work, based on lots of empirical evidence, is torture."	Hillary Clinton	2016-03-22	Supporting Article Source Article Supporting Article Supporting Article Source Article	True

Exploration

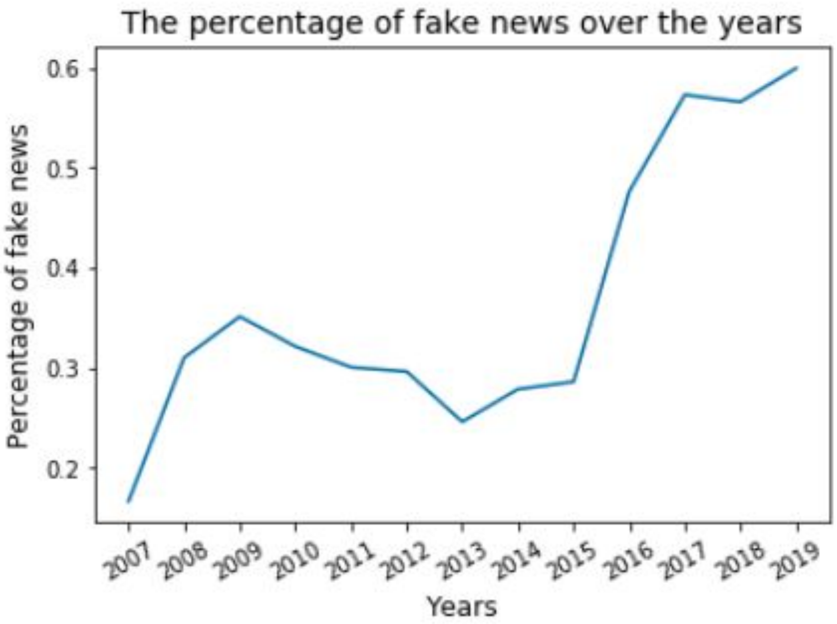
- True news take a small portion
- Nearly half of the dataset is fake news
- News before 2013 contribute a small portion
- Ratio of fake news increased significantly compared to partly true and true news

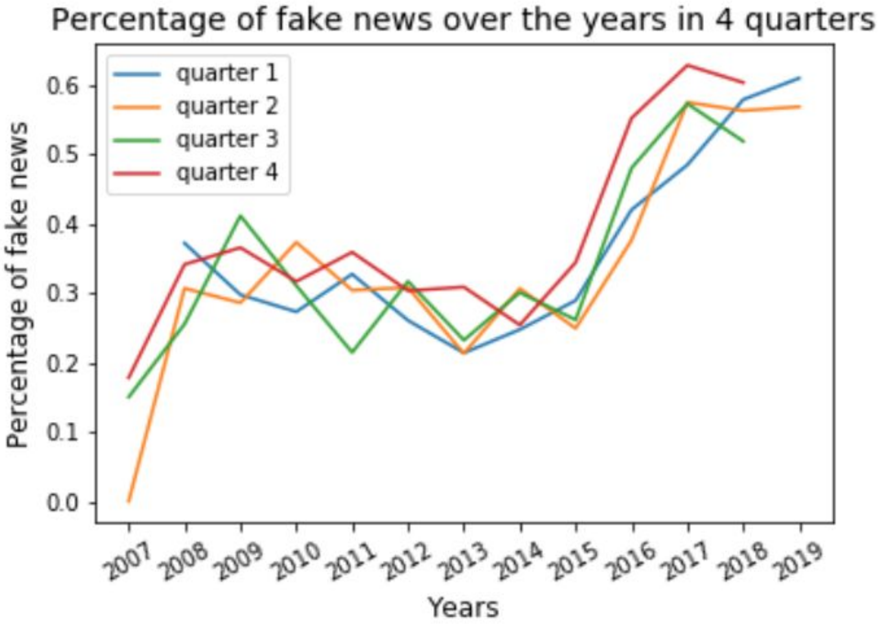




Exploration

- Overall increasing trend of fake news
- Ratio of fake news increased significantly since 2015
- Each quarter has a similar trend
- The fourth quarter has higher percentage of fake news



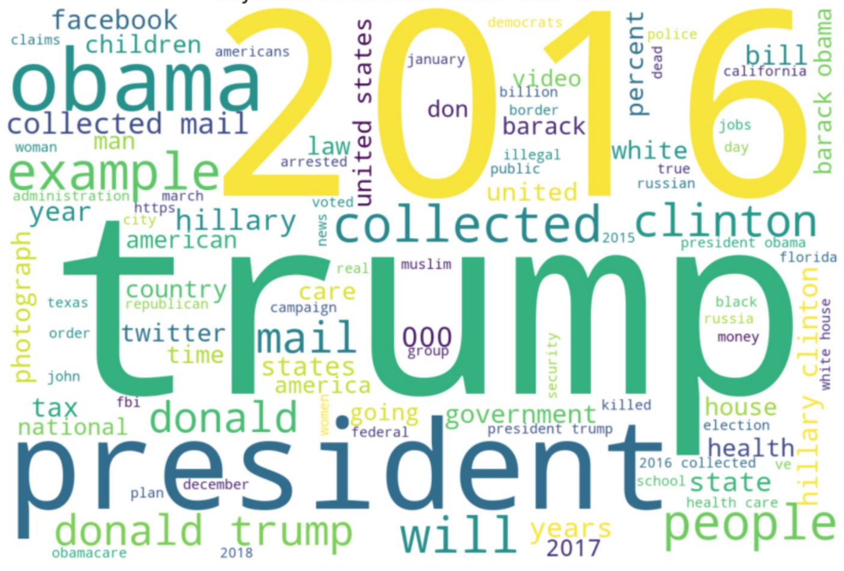


Exploration

- Frequent words are political
- ‘Trump’ frequently occurred in both fake and true claims

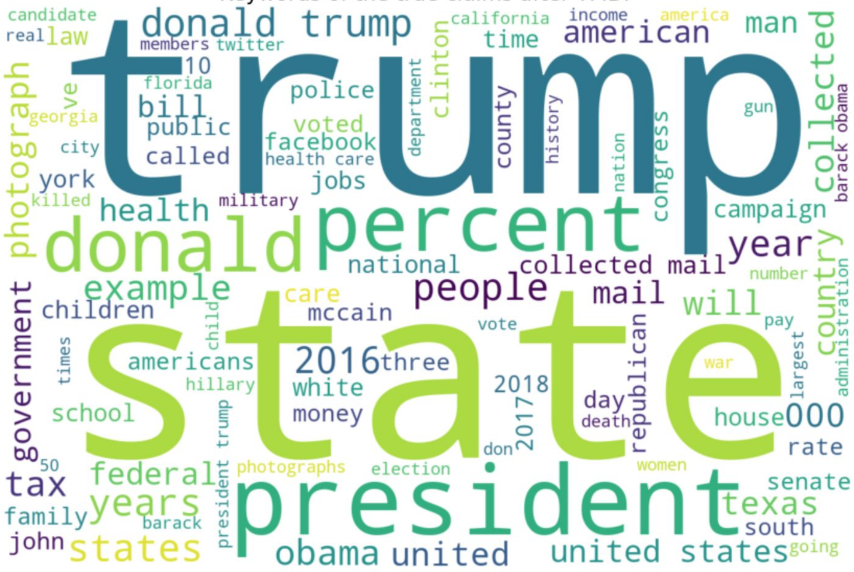
Fake News

Keywords of the false claims after TFIDF



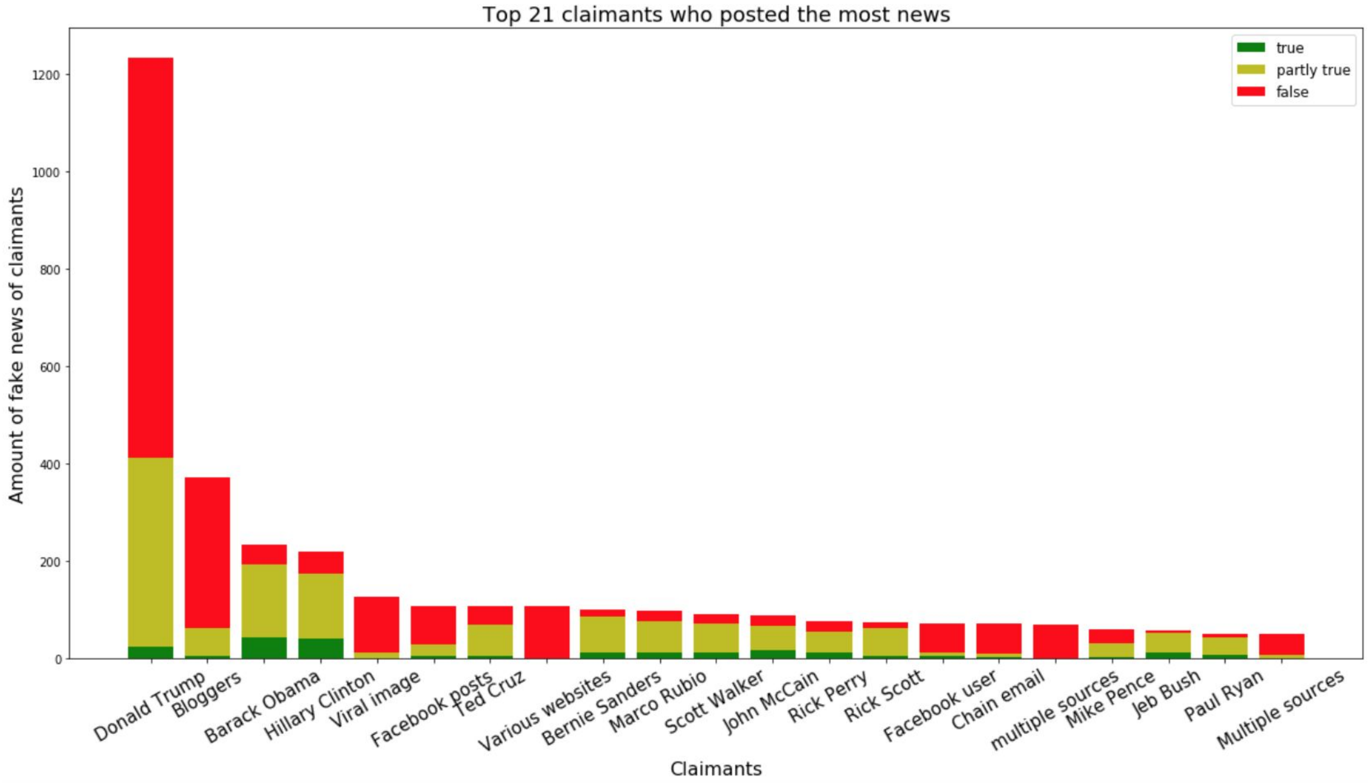
Proper News

Keywords of the true claims after TFIDF



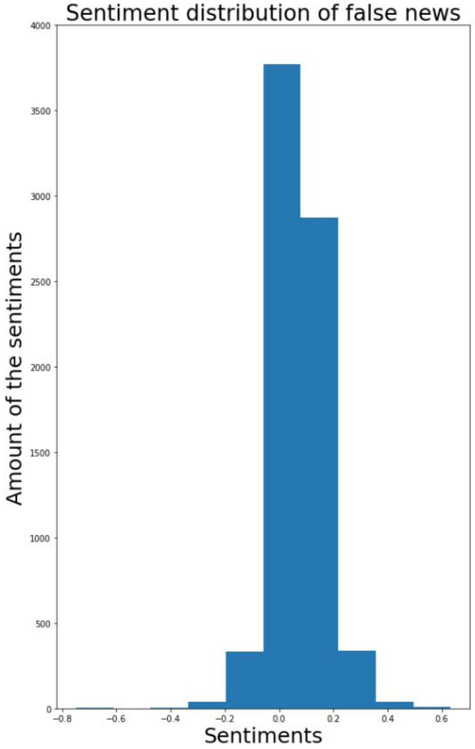
Exploration

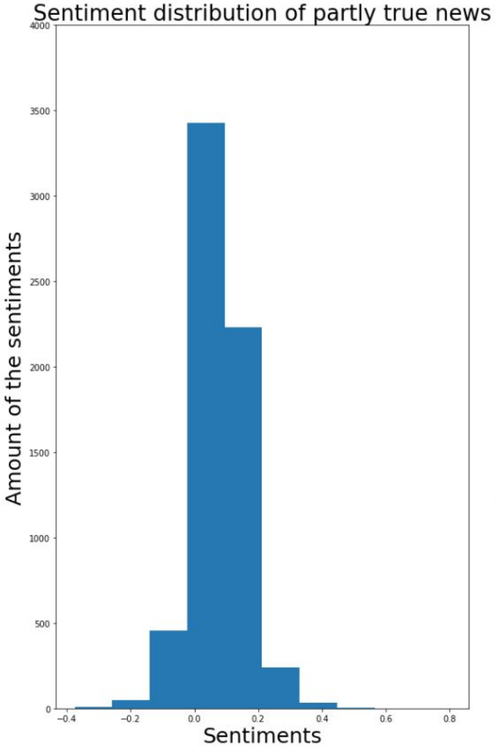
- Social media is the main source of fake news
- Donald Trump posted more than 1200 news, more than half of them are false

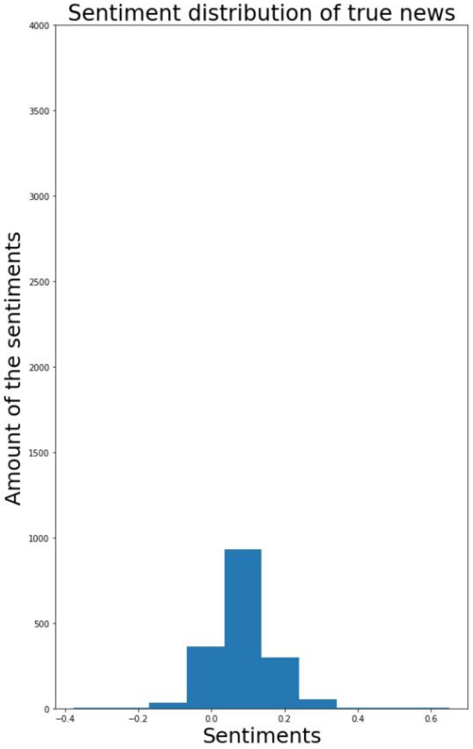


Exploration

- Most of the news are positive
- True news are more positive than fake and partly true news

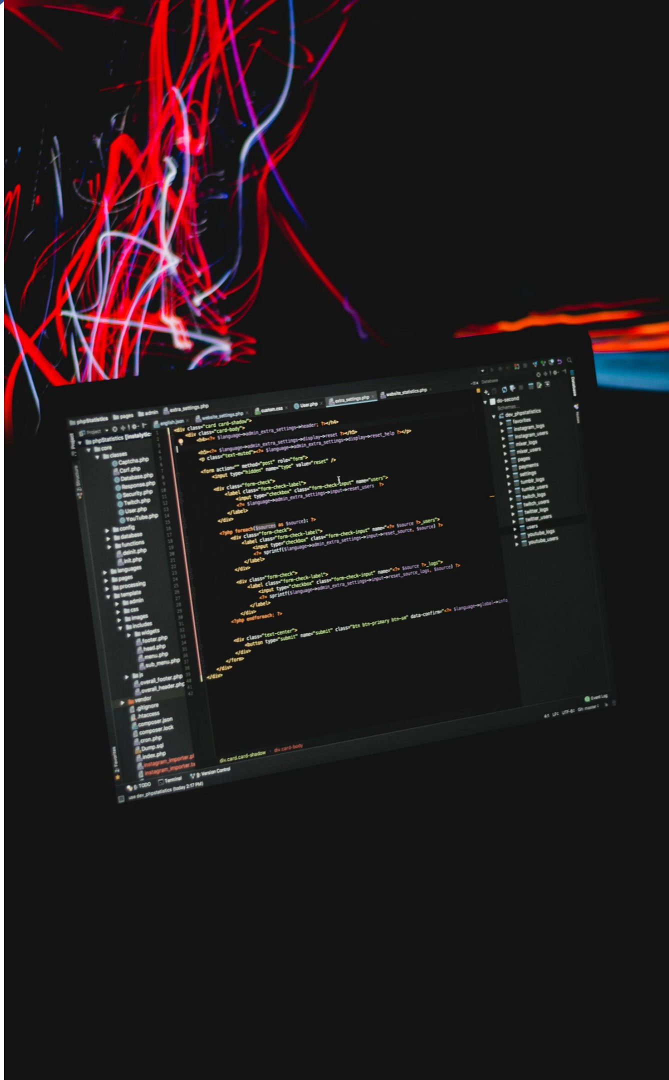






Machine Learning Implementation

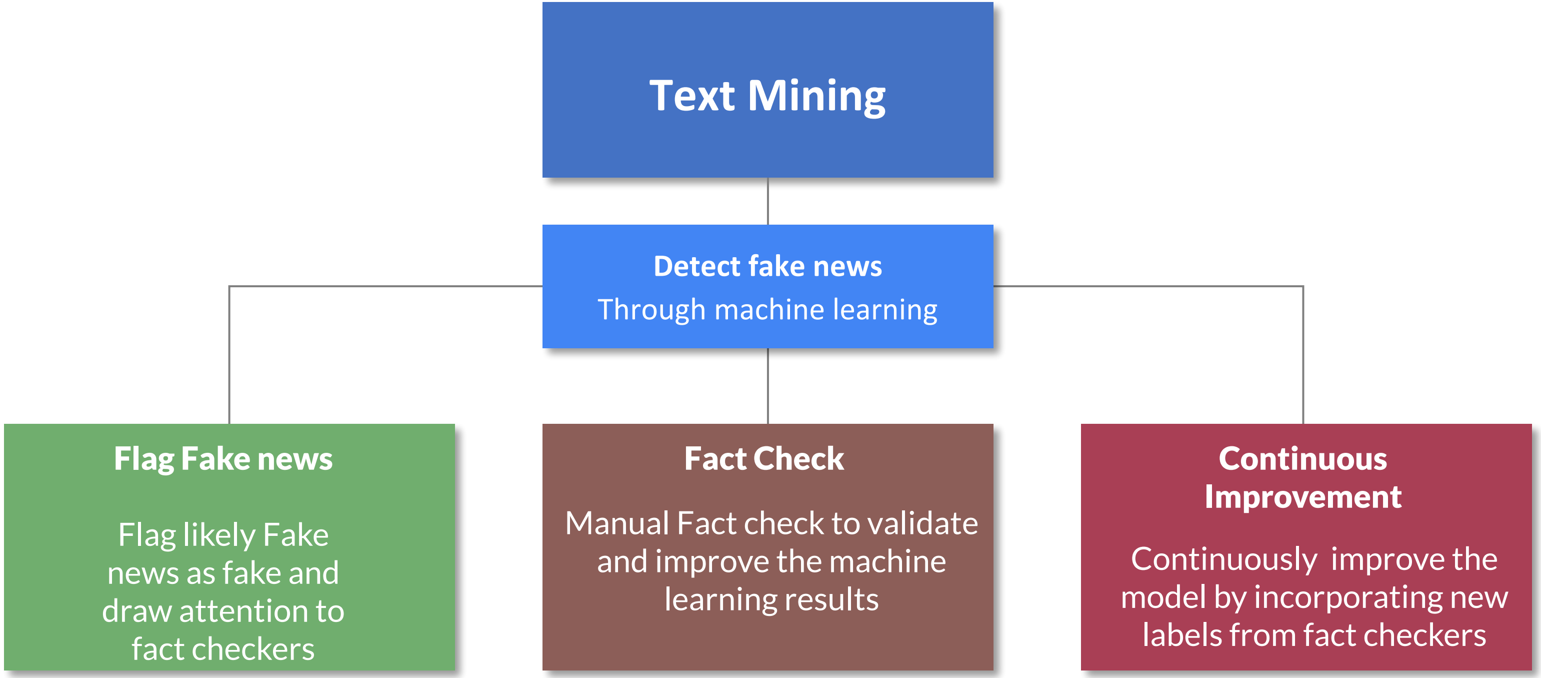
- Calculated how similar the claim is to each sentence in the supporting articles which indicates if the claim is well supported
- Analyzed the sentiment of the claims
- Also considered the claimant, month, and year
- Used the reliable XGBoost open source machine learning model that was used by several Kaggle competition winners



Results

- Testing on a **30%** subset of the original data:
  - Achieved **59%** accuracy in classifying claims as false, partly true, or true
  - Detected **80%** of false news with **69%** accuracy
- Obtained F1 score of **36%** in the DataCup competition
- Possibility to flag misleading posts and news articles
- Automation of fact checking enables immediate results and processing huge volumes of news

DECISION MAKING



Text Mining

Detect fake news
Through machine learning

Flag Fake news

Flag likely Fake news as fake and draw attention to fact checkers

Fact Check

Manual Fact check to validate and improve the machine learning results

Continuous Improvement

Continuously improve the model by incorporating new labels from fact checkers