Delta Airline Stock Price Analysis using NLP

Group 2 (Arlene Huang, Wen Wang, Junlin Yang, Xiatong Cui)

Content

Background

Data Sources

Methodologies and Evaluation

Conclusion

Background & Data Sources

Company: Delta

Topic: Stock Market Analysis

Reason: Airlines business was heavily affected by coronavirus
- Capacity
    - Severe Reduction
- Expenses
    - Undertake cost reduction initiatives
- Balance Sheet and Cash Flow
    - Deferring $500 million in capital expenditures
    - Delaying $500 million of voluntary pension funding
    - Suspending share repurchases

Project Goal: Analyze the performance of Delta's stock market in the past one month

Data Sources

Data: Stock Price
Data Source: Yahoo Finance
Procurement:

1. Set filters:
   - Time Period:
     2020-7-7 to 2020-8-7
   - Frequency: daily
2. download from the website

Data Description:

1. Original Length: 24
2. Length After Preprocessing: 32
3. Useful Attributes: Date & Close price

Data: News
Data Source: Webhose
Procurement:

1. Set filters:
   - Topic: Delta Airline;
   - Language: English;
   - Site type: news
   - Format: Json;
   - Time Period: 2020-7-7 to 2020-8-7
   - Sort by: published
2. Crawl data in python

Data Description:

1. Original Length: 7,076
2. Deduplicated: 3,231
3. Useful attributes: published; title; text

Methodologies

Entity Analysis

Topic Analysis

- Topic analysis for the whole dataset
- Topic analysis based on stock price
- Topic analysis based on stock price trends

Sentiment Analysis

- Sentiment analysis for the whole dataset
- Sentiment analysis based on stock price
- Sentiment analysis based on stock price trends

Topic - Sentiment Analysis

- Topic - Sentiment analysis based on stock price
- Topic - Sentiment analysis based on stock price trends

Entity Analysis

Company (Potential Competitors)

Number of Related Entities: 5,965

Top 5 Related Company:
- Delta
- American Airlines
- United Airlines
- Southwest Airlines
- JetBlue

Location

Number of Related Entities: 2,390

Top 3 Related Countries(Area):
- United States
- Europe
- China

Top 3 Related Cities:
- New York City
- London
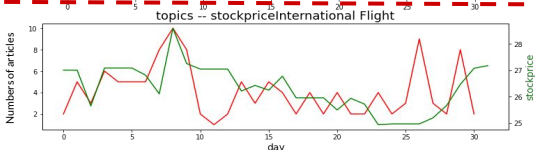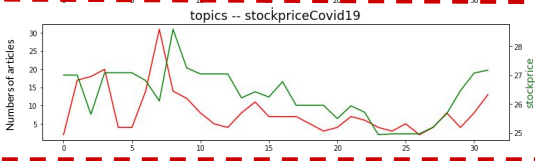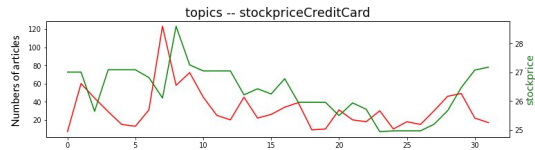- Los Angeles

Topic analysis for the whole dataset

Topics	Key words	Interpretation
Topic 0 : Credit Card	travel, flight, card, American, point, united, said, u, credit, year.	Travel-reward credit card on US market
Topic 1 : Masks	mask, flight, passenger, it, said, people, one, time, u, like.	Passengers wearing masks on flights
Topic 2: Covid	covid, coronavirus, case, new, state, health, said, u, pandemic, july.	Covid-19 new cases of states in July, public health
Topic 3: Stock Market	company, share, stock, air, quarter, line, billion, year, market, million.	Stock market performance this quarter/ year
Topic 4 : International Flight	airport, flight, july, international, travel, passenger, service, said, terminal, also.	International flight service in July, passengers' opinion

Results:
- Most articles are about credit card and masks.
- The pandemic impacted Delta dramatically since Topic 1,2&4 are about the pandemic.

topic	Number of Documents
1	1048
0	1031
3	734
2	269
4	130

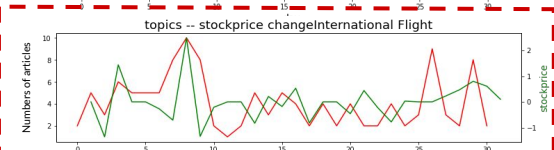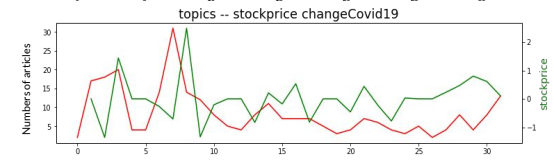# Topic analysis based on stock price

Results:
- International flight and covid-19 are correlated with stock price.
- International flight are also correlated with the first difference of stock price.

Evaluation and Metrics
Correlation Between Topic and Stock Price

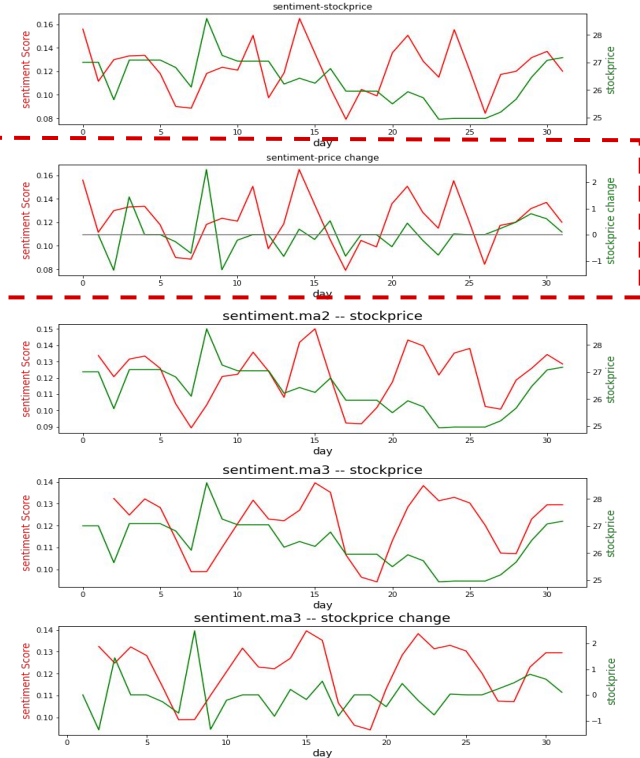| Topic	Stock Price	Stock Price Change
0.Credit Card	0.1807	-0.1591
1. Masks	0.0607	-0.0318
2. Covid	**0.2897**	-0.0178
3. Stock Market	0.1058	-0.0752
4.International Flight	**0.3142**	**0.2017**

Sentiment analysis

Results:

- Sentiment score is slightly correlated with stock price change.
- We didn't capture a correlation between sentiment moving average and stock price.

Evaluation and Metrics
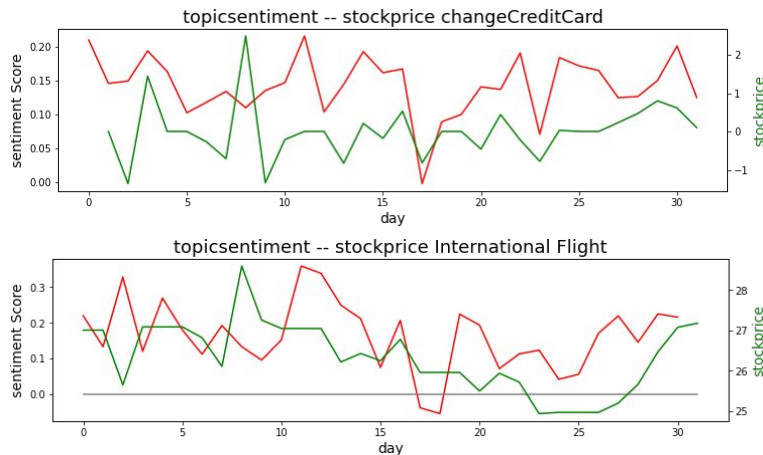Correlation Between Sentiment Scores and Stock Price

Sentiment	Stock Price	Stock Price Change
Original	0.0817	**0.1910**
2-day Moving Average	0.0873	0.1251
3-day Moving Average	-0.0649	-0.0796

Topic - Sentiment Analysis

Results:

- There is a correlation between sentiment of topic credit card and stock price change.
- Topic international flight is positively correlated with stock price.

Evaluation and Metrics
Correlation Between Sentiment and Stock Price Based on Topics

Topics	Stock Price	Stock Price Change
0: Credit Card	0.0969	**0.2211**
1: Mask	-0.0977	-0.0644
2: Covid	0.1525	0.0438
3: Stock Market	-0.0982	0.1580
4: International Flight	**0.1978**	-0.1086

Conclusion

1. **What we did?**

   We did entity analysis, topic analysis, sentiment analysis and topic-sentiment analysis on our dataset.

2. **What we found?**

   1) 41% articles related to Covid-19(Masks and Covid)

   2) International flight reopening in the COVID-19 leads to stock price rise

   3) No significant correlation between news sentiment and stock price

3. **What we suggest?**

   1) For Delta

      ○ Maintain good relationship with credit card companies

      ○ Try to open up more international airlines

   2) For investors

      ○ Look at the new travel credit card plans

      ○ Pay attention to worldwide international flights new policies

Thank you!