Capstone 3

Applying Sentiment Analysis to Improve Customer Satisfaction for Airlines

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Springboard Nov 2nd 2020 Cohort

The Problem

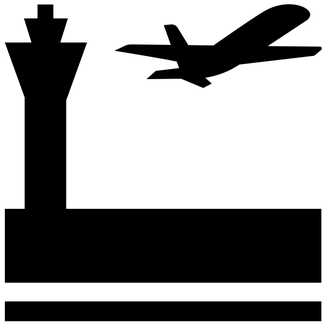
- 80% of customers who have had two or more bad experiences with a brand will consider switching to a different brand.*
- A growing number of customers are using social media to raise customer service complaints.*
- As air travel is looking to rebound post-covid19, it is imperative now more than ever that airlines perform review monitoring to address and ease the concerns of returning customers.

* Source: Zendesk Customer Experience Trends Report 2020
https://d1eipm3vz40hy0.cloudfront.net/pdf/cxtrends/cx-trends-2020-full-report.pdf

Problem Statement

What opportunities exist for airlines to increase customer retention by 5% within one quarter through:

developing loyalty programs



offering more destinations

improving brand reputation

Data

- Tweets labelled positive or negative for training a neural network

Citation: Go, A., Bhayani, R. and Huang, L., 2009. Twitter sentiment classification using distant supervision. CS224N Project Report, Stanford, 1(2009), p.12.

Source: https://www.kaggle.com/kazanova/sentiment140

- Tweets from airlines and their customers to predict on

Citation: Thought Vector and Axelbrooke, Stuart (December 2017). Customer Service on Twitter, Version 10. Retrieved 4 May 2021 from: https://www.kaggle.com/thoughtvector/customer-support-on-twitter.

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Source: https://www.kaggle.com/thoughtvector/customer-support-on-twitter

Customer Service Data

tweet_id: the unique ID for this tweet

author_id: The unqiue ID for this tweet author (anonymized for non-company users)

inbound: Whether or not the tweet was sent (inbound) to a company

created_at: When the tweet was created

text: The text content of the tweet

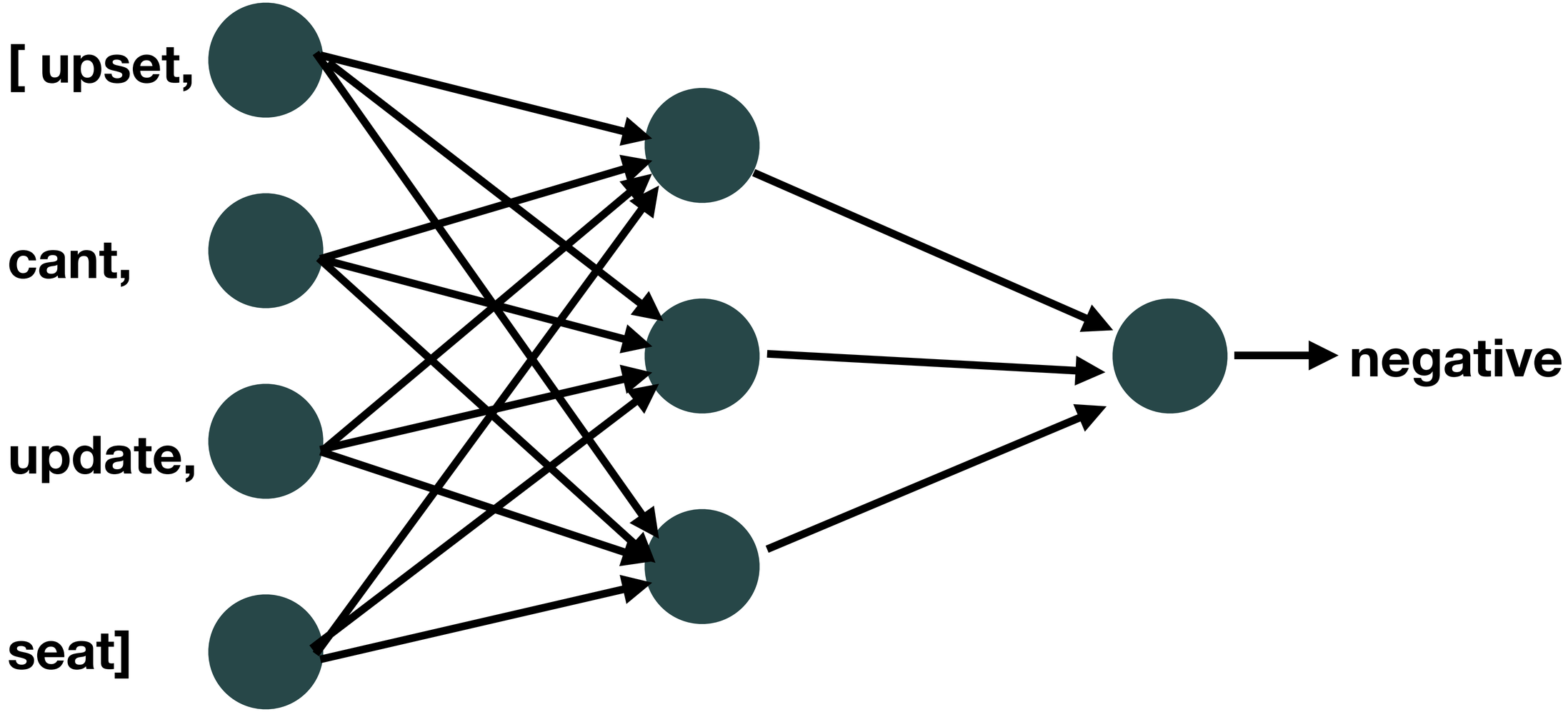
response_tweet_id: The IDs of tweets that responded to this one, if any

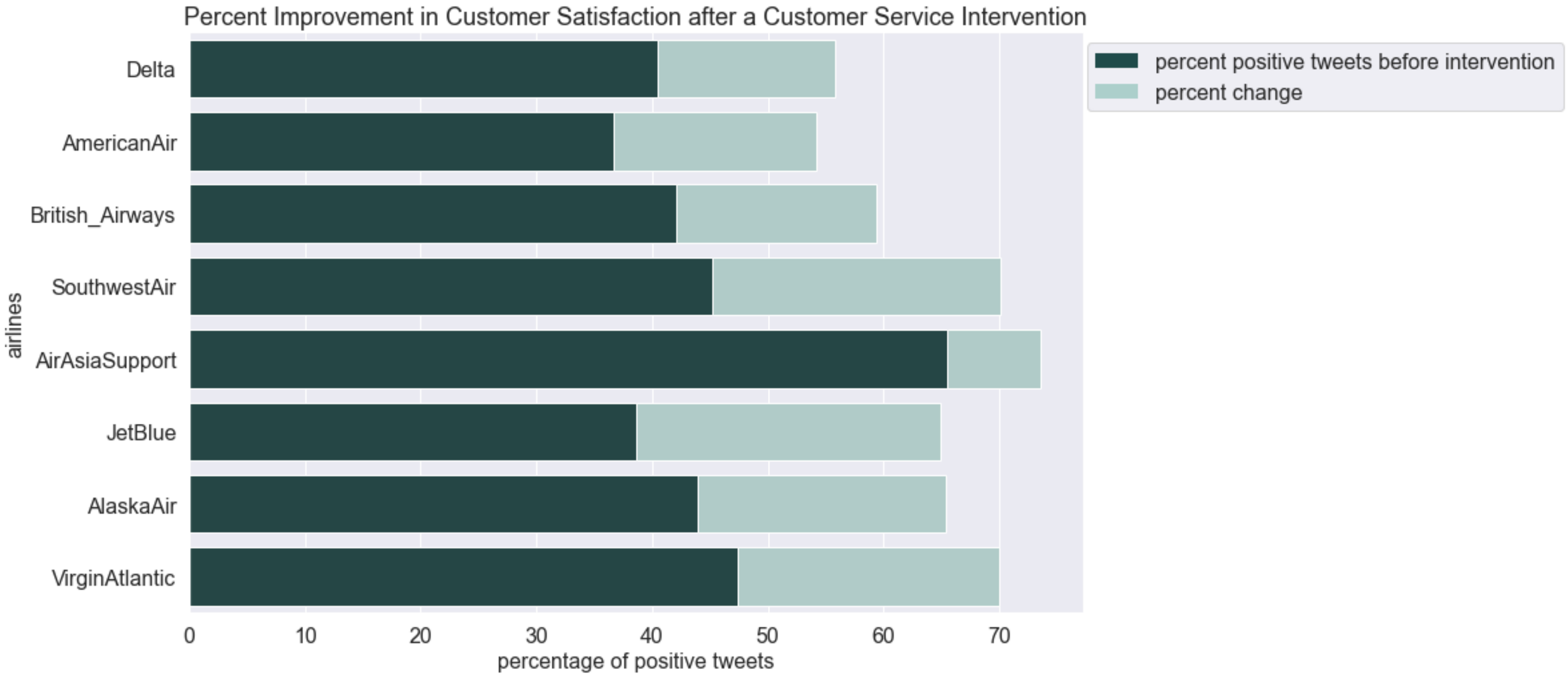
in_response_to_tweet_id: The ID of tweet this tweet was in response to, if any

	tweet_id	author_id	inbound	created_at	text	response_tweet_id	in_response_to_tweet_id
0	1177204	396895	True	2017-10-25 00:53:28	@Delta weWEREonFLIGHT58today Gate change and p...	1177203,1177205,1177206	NaN
0	2703404	759310	True	2017-11-19 19:41:34	@Delta mislead told me seat 15C was a bulkhead...	2703403	NaN

Airlines in Dataset

Predicting Sentiment Using a Neural Network





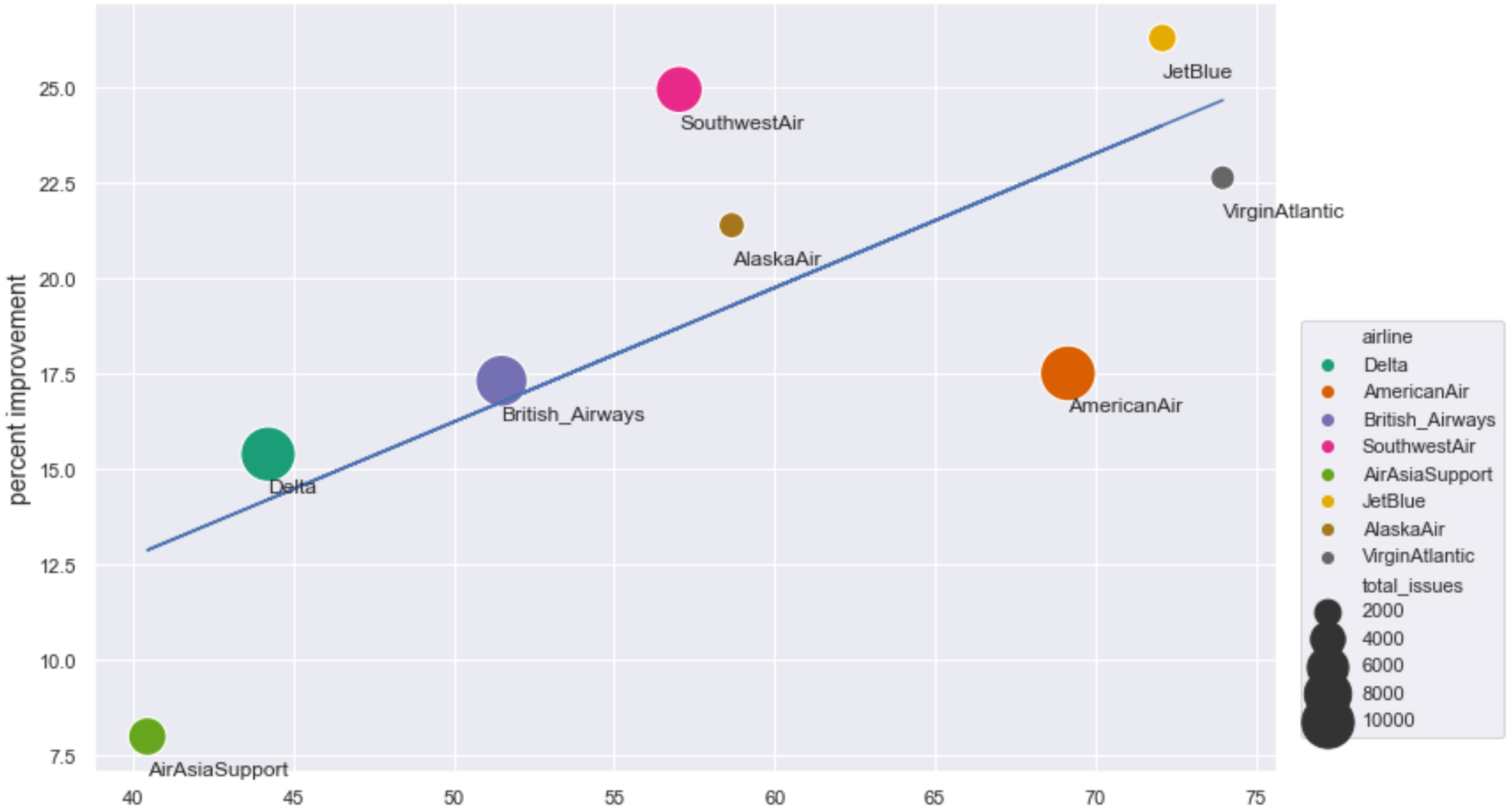
Customer service on Twitter works: every airline was able to improve the percentage of positive tweets after a customer service intervention.

What Factors Make Twitter Customer Service Interactions Successful?

I will take a look at:

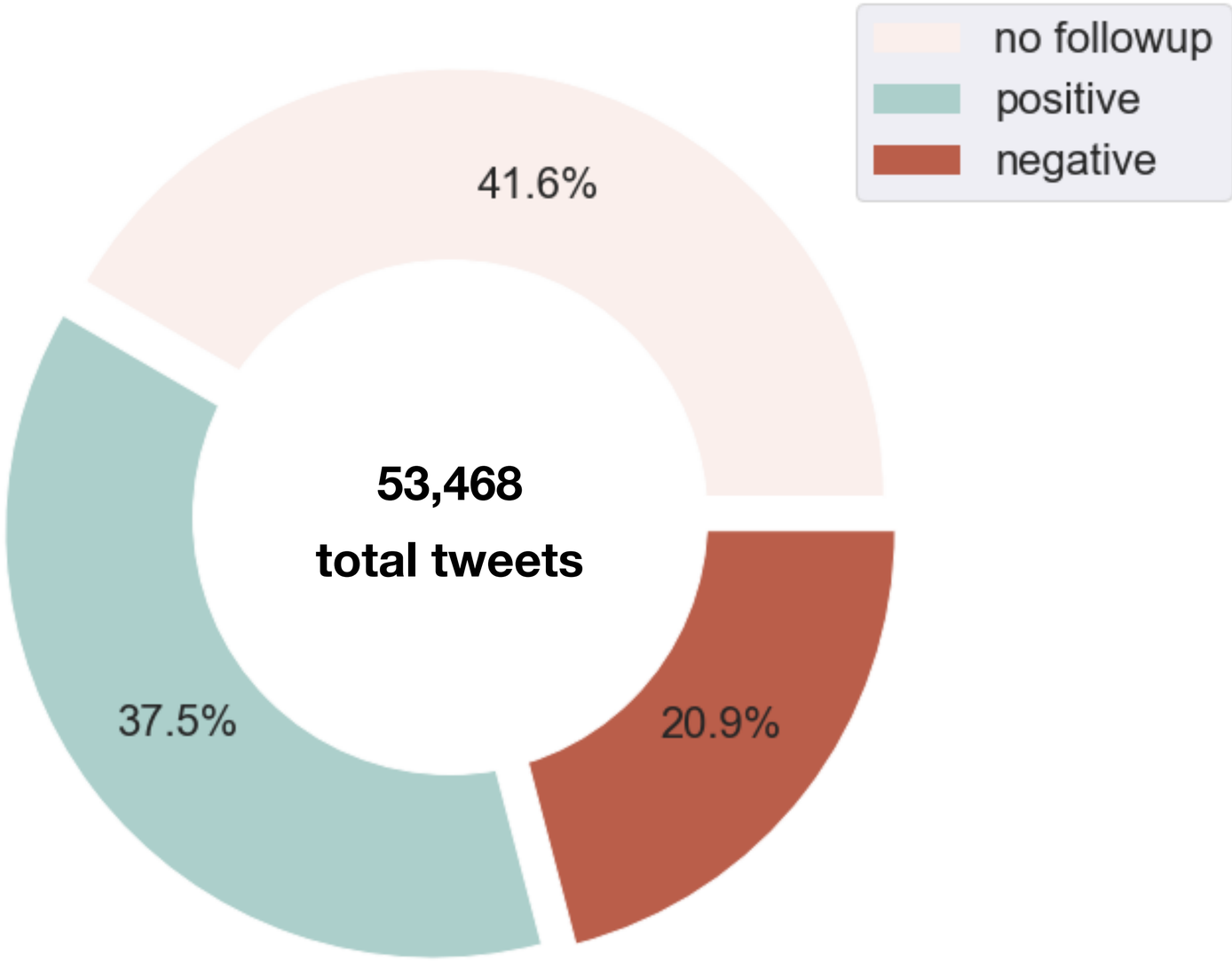
- Percentage of customers who follow up
- Response time
- Average words per tweet
- Total tweets

Percentage of Customers Who Follow up

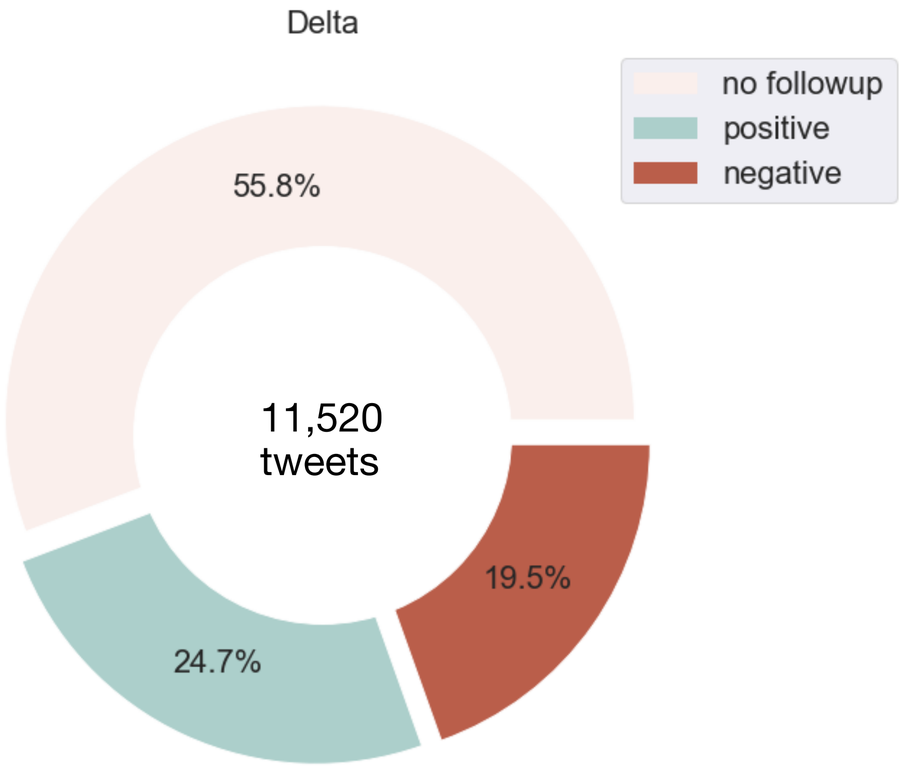


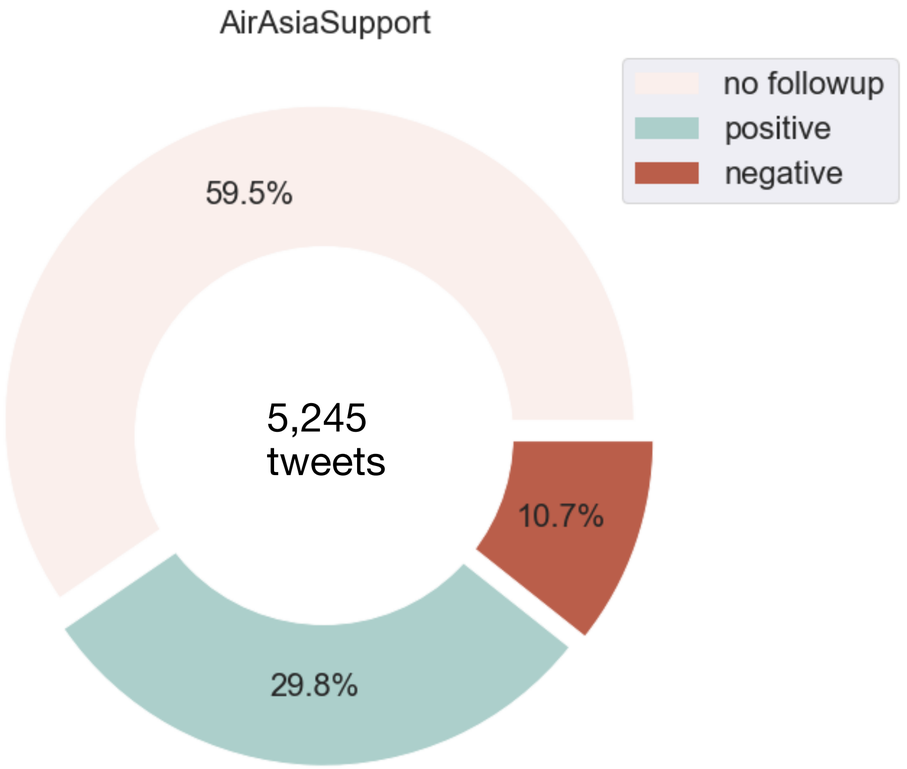
Insight: Customers who do not follow up after receiving a response from a customer service agent on Twitter may be discontent and need additional support.

Overall, what percentage of customer service interactions ended with positive sentiment, negative sentiment, or no follow-up?

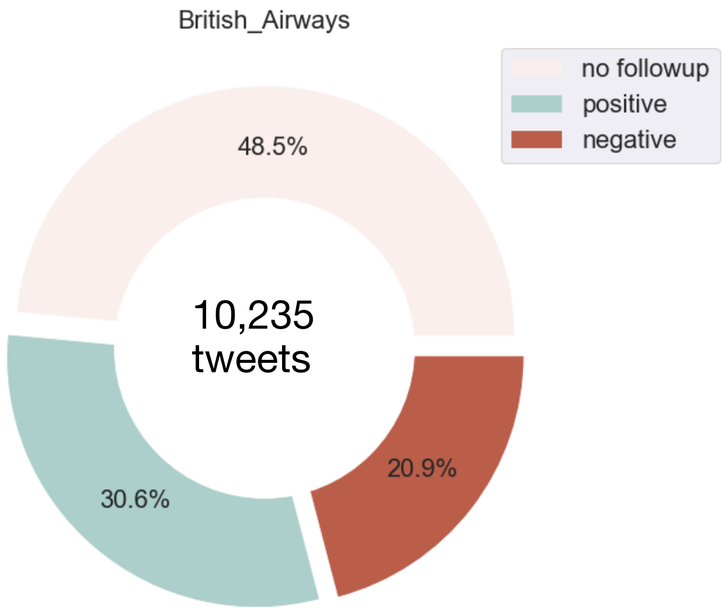


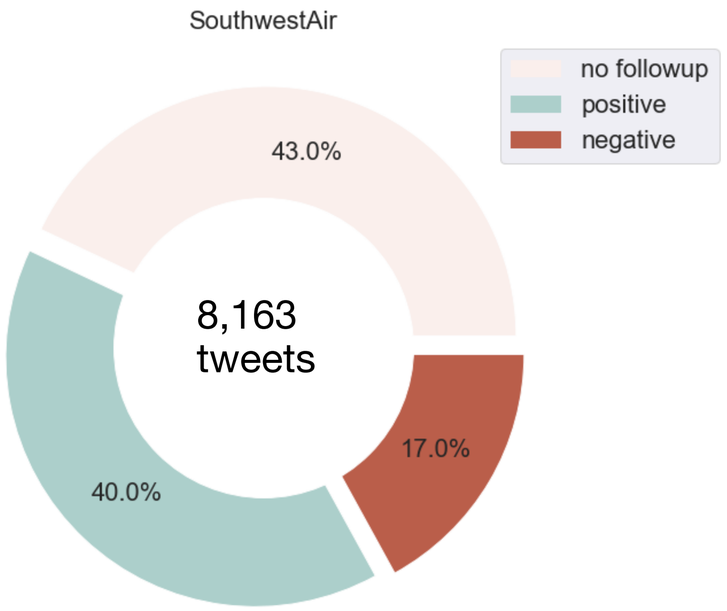
Airlines with less than 50% follow-up

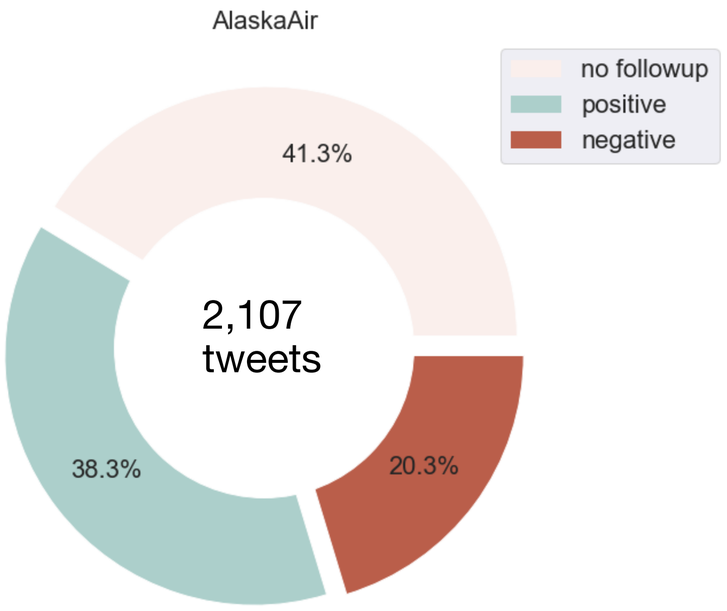




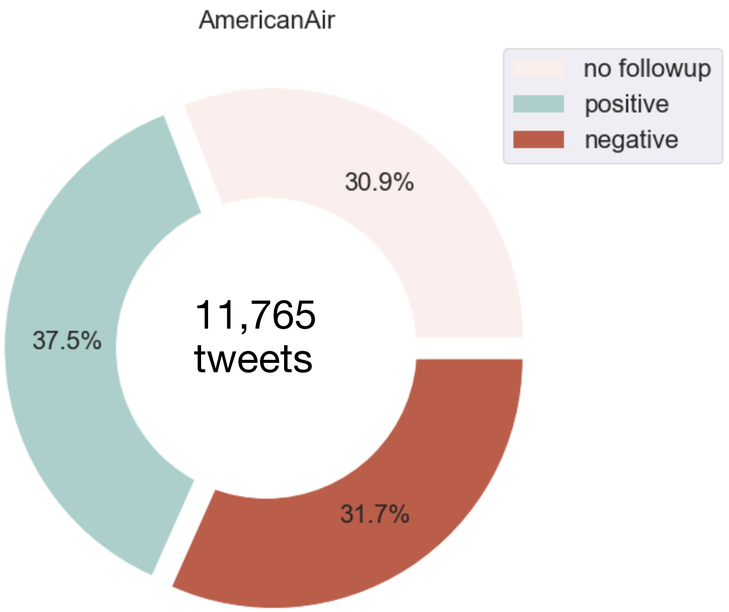
Airlines with 50-60% follow-up

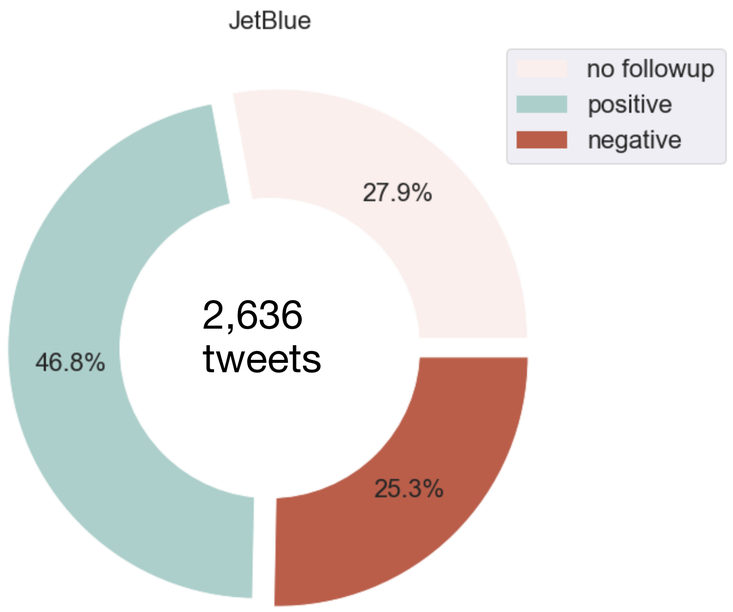


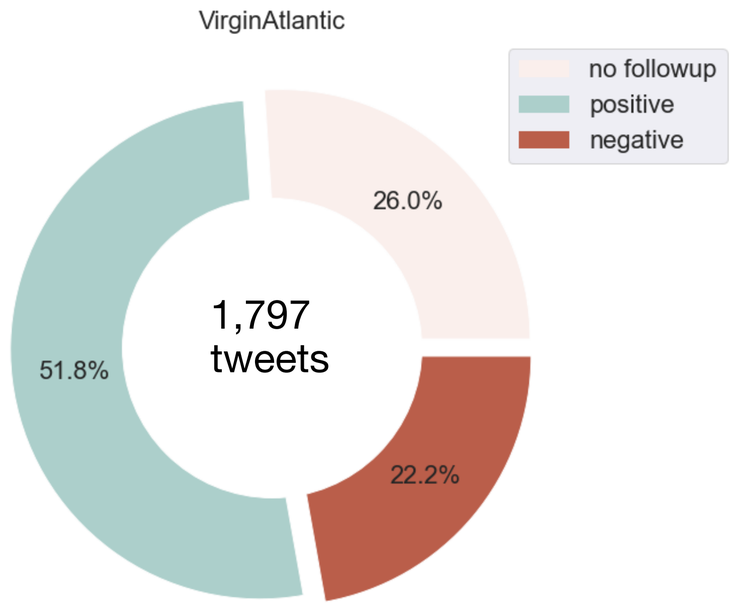




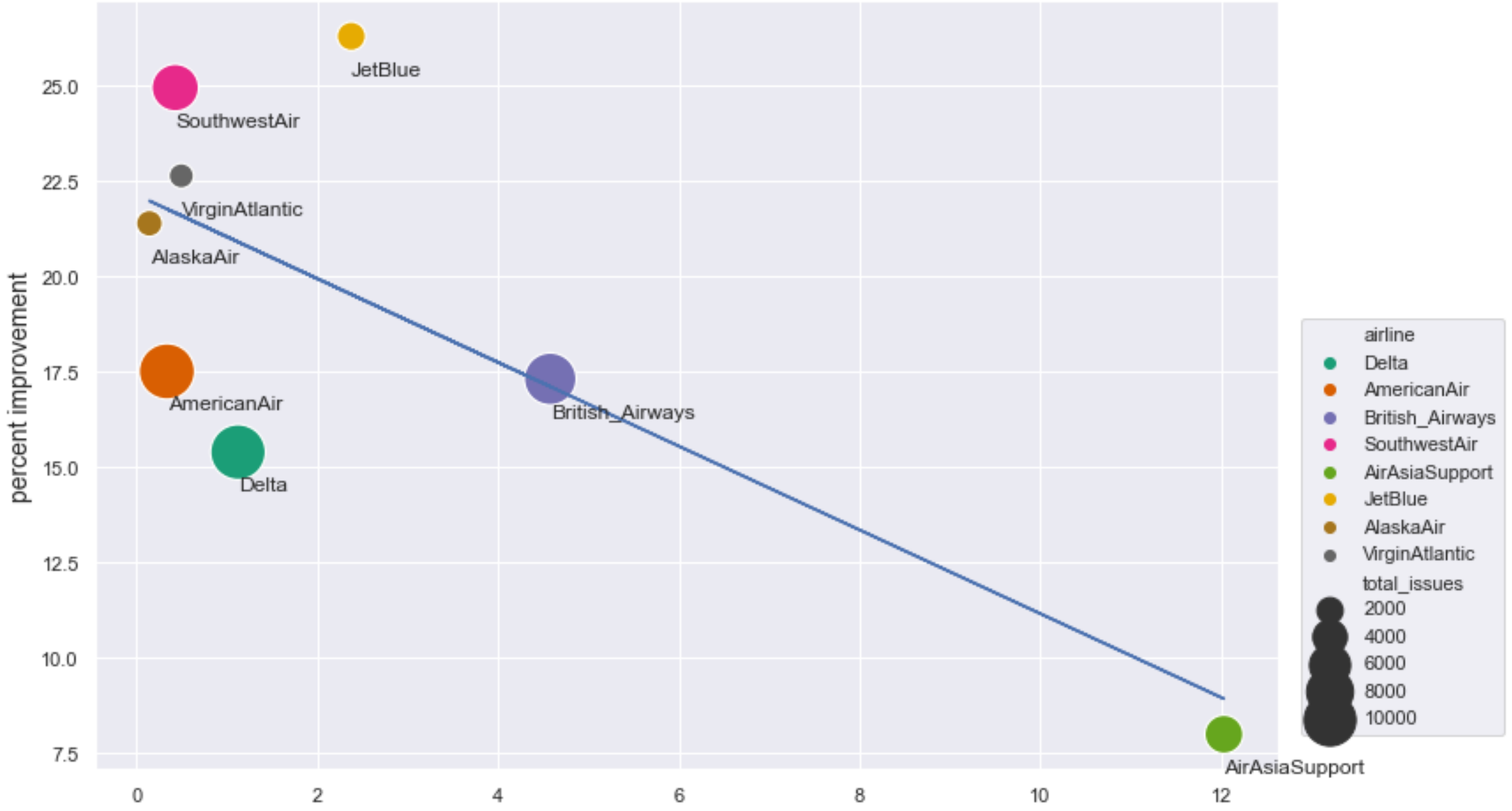
Airlines with greater than 60% follow-up





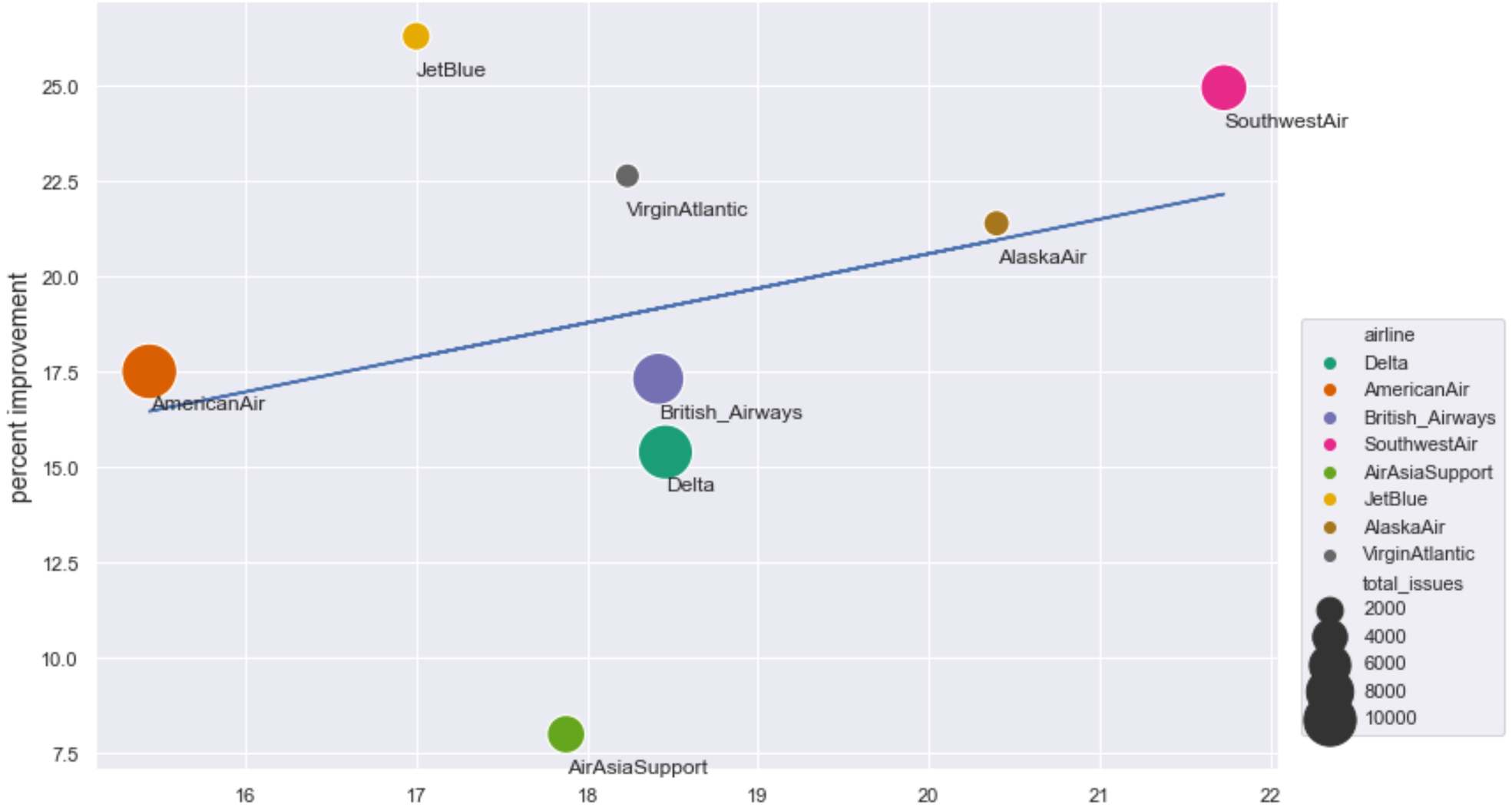


Response Time



Insight: Airlines that take longer to respond tend to have a much smaller increase in the percentage of positive tweets after a customer service intervention.

Words per Tweet



Insight: Providing more detailed responses may lead to happier customers.

Total Tweets

Should Airlines Tweet More or Less?

The total number of tweets by an airline is **negatively correlated** with the increase in the percent of positive tweets after a customer service intervention. I speculate that this could be for one (or all) of the following reasons:

- **Customers prefer quick resolutions:** The more tweets it takes for a customer's issue to be resolved, the less likely they are to be content after the interaction.

- **Platform bias:** The more active an airline is on social media, the more likely customers will see Twitter as a platform to voice concerns. Customers of other airlines might be more accustomed to use email or phone call.

- **Size bias:** The airlines with more data are simply larger airlines, and therefore serve more customers. The more customers you serve, the more diverse the range of issues and the number of issues to resolve is, which may lead to a smaller percentage of customers having their issues resolved in a satisfactory way.

Conclusions

To increase customer retention, airlines can improve their brand reputation on Twitter by:

- Responding to customer issues within at least 2 hours
- Resolving issues with detailed responses within one tweet rather than asking questions throughout several tweets
- Clarifying for customers the best platform to resolve customer service issues
- Developing resources to respond to customer complaints on social media to reach younger generations of customers (Millennials/Gen Z)

Further Analysis

- **Named Entity Recognition (NER)** could be used to identify if customer issues are associated with a particular airport
- **Data collection:** Using more labelled data could provide a more accurate model
- **Time series analysis** could be done to identify if there are **seasonal trends** around certain issues so that airlines can preemptively address concerns customers are likely to have in a given season.
- **Automated responses:** Via Latent Dirichlet Allocation (LDA) topic modeling, I grouped customer issues into 4 major concerns: flight delays, flight changes, flight experience, and issues with online accounts. Chatbots could be developed to answer some of the issues that are raised repeatedly. This would allow customer service agents to address more nuanced questions, leading to faster response times and higher customer satisfaction.