ZAALIMA DEVELOPMENT

DATA ANALYTICS INTERNSHIP

Project 3: Airline Customer Sentiment Analysis using NLP

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CRISP DATA INSIGHT REPORT

Airline Customer Sentiment Analysis using NLP

1. Executive Summary

Analysis of airline-related tweets shows that negative sentiment dominates customer conversations, indicating widespread dissatisfaction with airline services. While some airlines receive relatively higher positive feedback, recurring complaints around delays, customer service, and flight experience highlight critical areas requiring immediate attention to improve brand perception and customer satisfaction.

2. Objective / Business Question

The objective of this analysis is to understand customer sentiment toward airline services using social media data and identify key sentiment patterns across airlines and over time to support better customer experience and brand management decisions.

3. Key Metrics / KPIs

- Sentiment Distribution (Positive / Neutral / Negative)
- Sentiment by Airline
- Sentiment Trend Over Time
- Volume of Customer Complaints
- Sentiment Prediction vs Ground Truth Accuracy

4. Insights & Findings

- Negative sentiment is the most dominant across airline tweets. This indicates that customers are more likely to use social media to report dissatisfaction rather than praise.
  Recommendation: Airlines should proactively monitor social platforms and address issues in real time.

- Customer service–related issues contribute heavily to negative sentiment. Repeated complaints around delays, cancellations, and support responsiveness affect brand trust.
  Recommendation: Improve customer support response times and communication during disruptions.

- Sentiment varies significantly by airline. Some airlines consistently show higher negative sentiment compared to competitors.
  Recommendation: Benchmark best-performing airlines and adopt similar service strategies.

- Sentiment spikes occur on specific days with high tweet volume. These spikes often align with operational issues or service failures.
  Recommendation: Use sentiment spike detection as an early-warning system for service breakdowns.

5. Supporting Visuals

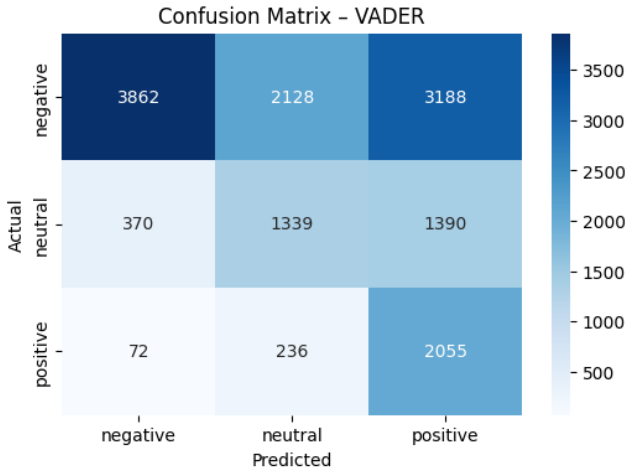

Fig 5.1: Sentiment Distribution Chart showing overall Positive, Neutral, and Negative tweet counts

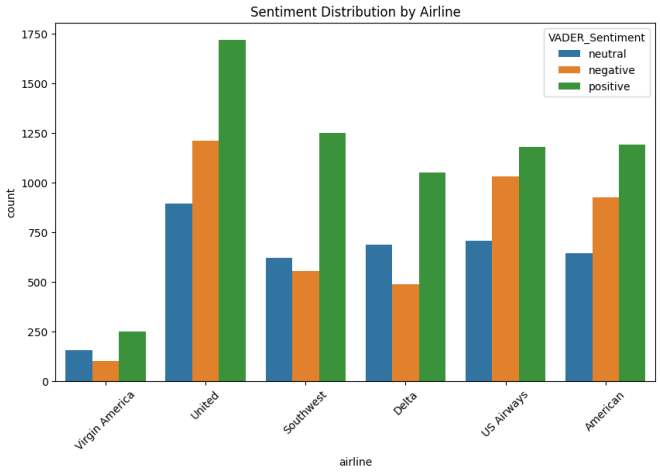

Fig 5.2: Sentiment by Airline Bar Chart comparing customer perception across airlines

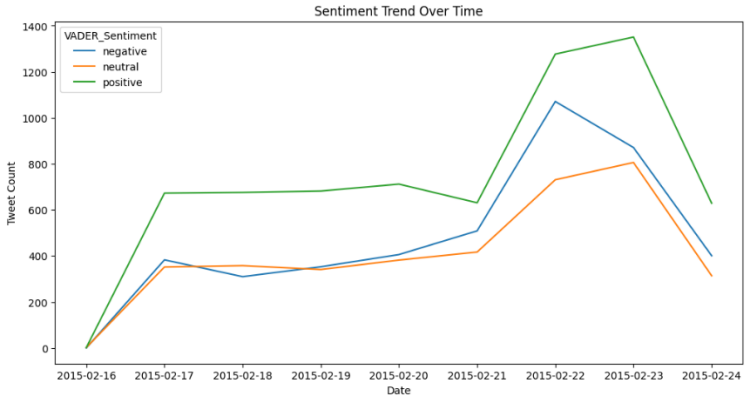

Fig 5.3: Sentiment Trend Over Time Line Chart highlighting spikes and fluctuations in customer sentiment

6. Limitations

- Analysis is limited to Twitter data, which may not represent all customer segments.
- Lexicon-based models (TextBlob, VADER) may miss sarcasm or contextual nuances.
- Language variations and slang may affect sentiment classification accuracy.

7. Next Steps / Recommendations

- Integrate machine learning–based sentiment models to improve accuracy.
- Perform root-cause analysis on negative sentiment categories such as delays and service issues.
- Build a real-time sentiment monitoring dashboard for airline operations teams.
- Combine social media data with customer surveys and service metrics for deeper insights.

8. Conclusion

This project successfully demonstrated the use of Natural Language Processing (NLP) techniques to analyze customer sentiment toward airline services using social media data. By preprocessing tweet text and applying lexicon-based sentiment analysis methods, customer opinions were effectively classified into positive, neutral, and negative categories. The analysis revealed that negative sentiment dominates airline-related discussions, highlighting recurring service-related issues that impact customer satisfaction. Additionally, sentiment trends over time and across airlines provided actionable insights into brand perception and potential service gaps. Overall, this project shows how NLP-driven sentiment analysis can support data-driven decision-making and help organizations proactively improve customer experience and brand reputation.