SENTIMENT ANALYSIS OF NEWS POPULARITY

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ABSTRACT

The project investigates the relationship between news article sentiments and their popularity. The project involves a structured approach encompassing data collection, data preprocessing, and analysis.

The initial phase, encapsulated and focuses on gathering relevant news articles from online sources, ensuring the data encompasses a wide array of news topics. The cleaning.py script outlines the preprocessing phase, where raw data undergoes rigorous cleaning to remove inconsistencies, redundant information, and noise, preparing it for subsequent analysis. This step is crucial for enhancing the quality and accuracy of the sentiment analysis.

The core analytical work, detailed includes applying sentiment analysis algorithms to evaluate the tone and sentiment polarity of news articles. Various data visualization techniques are employed to interpret the sentiment distribution and its correlation with indicators of popularity. The results offer insights into how the sentiment of news content impacts its likelihood of being widely shared or viewed.

1. INTRODUCTION

In recent years, the landscape of news consumption has transformed dramatically with the advent of digital platforms and social media. Unlike traditional media, where news was passively consumed, today's audiences actively interact with news content by sharing, commenting, and reacting on social media. This shift has given rise to new opportunities and challenges for media organizations, advertisers, and policymakers aiming to understand and influence how news spreads and impacts public opinion. Among the various factors affecting news engagement, sentiment—the emotional tone conveyed by a news article—plays a crucial role. Studies suggest that emotionally charged content, whether positive or negative, tends to attract more interactions, making sentiment analysis a vital tool for understanding audience preferences and behaviors.

This research investigates the relationship between sentiment and the popularity of news articles, focusing on whether sentiment influences reader engagement metrics like shares, likes, and comments. Using Natural Language Processing (NLP) techniques, sentiment analysis categorizes news articles as positive, neutral, or negative, enabling a deeper examination of how emotional tone impacts readership and social media reactions. Through automated data collection, sentiment classification, and trend visualization, this project provides a comprehensive framework to analyze sentiment in news media. The findings from this study offer practical applications for media organizations, marketers, and policymakers seeking to tailor their strategies to audience preferences and respond to public sentiment.

By exploring the emotional dynamics that drive news popularity, this project highlights the importance of sentiment in shaping audience engagement. Understanding these trends empowers media organizations to create targeted, sentiment-driven content, allowing them to optimize their reach and engagement in an increasingly competitive digital news environment.

2. LITERATURE REVIEW

The interplay between sentiment and the popularity of news articles has been an area of growing interest, driven by the increased influence of digital media on public opinion and engagement patterns. Sentiment analysis, a technique within Natural Language Processing (NLP), has enabled researchers to quantify the emotional tone within text, facilitating studies on how sentiment impacts audience behavior across various media.

Liu (2012) provided a foundational understanding of sentiment analysis, emphasizing its role in categorizing text into positive, negative, or neutral sentiments. This classification has since evolved to capture nuanced emotional tones like joy, sadness, anger, and surprise, aiding in the assessment of audience reactions (Zhang & Ghorbani, 2022). The significance of sentiment analysis in social media and news articles was further highlighted by Ghosh & Sethi (2019), who examined sentiment's role in shaping engagement across different content types, demonstrating that emotionally charged news often attracts more reader interaction than neutral reporting.

Building on these foundations, several studies have focused on how sentiment affects the spread and popularity of news. For instance, Bakhshi et al. (2020) explored how emotions influence online news sharing, finding that both positive and negative sentiments enhance engagement, albeit through different mechanisms. Positive news encourages shares and

likes as it often resonates with readers' optimism, whereas negative news fuels discussion and debate, especially on social media platforms (Chen & Zhang, 2023). These findings align with Kumar & Kaur (2023), who investigated engagement metrics like views and shares, observing that sentimentally charged content tends to receive higher engagement.

Recent studies have also examined the contextual aspects of sentiment in news articles. Khan & Ullah (2023) explored the effectiveness of machine learning algorithms in predicting news article popularity based on sentiment and other features, suggesting that combining sentiment analysis with additional content characteristics could improve prediction accuracy. Bae & Lee (2022) further emphasized the role of sentiment and content type, finding that sentiment effects vary by news category, with political and economic news generally eliciting more neutral reactions, while sports and entertainment news often evoke stronger positive or negative sentiments.

The impact of sentiment on public opinion and media influence has implications beyond content engagement. Wang & Li (2024) studied social media sentiment and its effects on news article popularity, highlighting that sentiment can not only affect reader behavior but also shape broader societal perspectives. This understanding underscores the importance of sentiment analysis as a tool for policymakers and media strategists, as public sentiment around certain topics can influence policy-making and advertising approaches (Ghosh & Sethi, 2019).

Overall, the literature underscores the value of sentiment analysis in understanding and predicting news popularity. From the emotional appeal of content (Chen & Zhang, 2023) to the technical application of NLP methods for sentiment extraction (Bae & Lee, 2022), researchers consistently find that sentiment is a key driver of reader engagement. However, gaps remain in fully understanding how sentiment trends vary by topic, audience demographics, and temporal factors, suggesting avenues for further exploration. This project aims to address these gaps by implementing a comprehensive sentiment analysis framework to examine how sentiment impacts the reach and engagement of news articles across different topics and timeframes.

3. METHODOLOGY

This research employs a multi-stage methodology to analyze the relationship between sentiment in news articles and their popularity. The methodology involves data collection, preprocessing, sentiment analysis, feature engineering, and trend visualization, providing a comprehensive framework to quantify and interpret sentiment's impact on engagement metrics such as shares, likes, and comments.

1. Data Collection

Data for this study was gathered from a diverse range of online news sources using web scraping techniques and APIs. The sources included mainstream news websites and aggregators like Google News to ensure broad coverage across various categories, such as politics, sports, and entertainment. For each article, essential metadata was collected, including title, full text, publication date, source, category, and popularity metrics like the number of shares, comments, and views.

2. Data Preprocessing

Preprocessing involved cleaning and preparing the data for sentiment analysis. Text preprocessing steps included:

- Noise Removal: Removing unnecessary elements such as HTML tags, special characters, numbers, and URLs.

- Tokenization and Normalization: Converting the text into lowercase and breaking it into individual words or tokens for analysis.

- Stop Word Removal: Eliminating commonly used words (e.g., "the," "is") that do not add meaningful information.

- Stemming and Lemmatization: Reducing words to their base or root forms to improve consistency in word representation.

3. Sentiment Analysis

To analyze the sentiment of each news article, we employed a combination of Natural Language Processing (NLP) tools:

- Sentiment Scoring: Using VADER (Valence Aware Dictionary and sEntiment Reasoner) and TextBlob for polarity classification, each article was scored as positive, negative, or neutral. These tools are specifically tailored for analyzing sentiment in short texts and social media, making them suitable for headline and brief article analysis.

- Compound Scoring: In addition to polarity, VADER's compound score provided a sentiment intensity measure, which quantified the degree of sentiment as positive, negative, or neutral.

- Categorical Sentiment Analysis: For more nuanced sentiment analysis, emotional categories (e.g., anger, joy, sadness) were identified to capture complex emotional tones.

4. Feature Engineering

Additional features were engineered to enhance analysis and capture other aspects influencing article popularity:

- Article Length: Word or character count was calculated to assess how article length correlates with engagement.
- Time of Publication: Temporal features like hour, day of the week, and month of publication were recorded to identify potential trends.
- Category Tagging: Articles were tagged by categories (e.g., politics, health, sports) to allow for comparative analysis across different news types.
- Keyword Analysis: Keywords commonly associated with high engagement were identified to explore their impact on popularity.

5. Exploratory Data Analysis (EDA) and Trend Visualization

To understand the relationship between sentiment and popularity metrics, various exploratory data analysis techniques were used:

- Correlation Analysis: Examining correlations between sentiment scores and popularity metrics such as views, shares, and comments.
- Visualization Techniques: Line charts, bar charts, and scatter plots were used to illustrate sentiment trends over time and across categories, highlighting patterns in audience engagement. Word clouds also visualized commonly occurring keywords in popular articles.
- Sentiment-Engagement Mapping: Sentiment scores were mapped against engagement metrics to observe how sentiment influences reader behavior.

6. Predictive Modeling

A machine learning model was developed to predict the popularity of news articles based on sentiment and other engineered features:

- Model Selection: Decision trees, Random Forest, and Support Vector Machines (SVM) were tested to classify articles as "popular" or "not popular" based on predefined engagement thresholds.
- Feature Importance Analysis: The models provided insights into which features (e.g., sentiment, length, timing) contributed most to popularity.
- Evaluation Metrics: Model performance was evaluated using accuracy, precision, recall, F1-score, and cross-validation, with a confusion matrix to assess prediction accuracy for each sentiment class.

4. EXPECTED RESULT

This study expects to illuminate the influence of sentiment on news popularity.

1. Correlation between Sentiment and Popularity Articles with strong positive or negative sentiment are anticipated to show higher engagement than neutral articles. Positive articles may attract shares and likes, while negative articles are expected to spark more comments and discussion.

2. Sentiment Variation Across Categories News categories will likely show distinct sentiment trends; for example, entertainment and sports may have more positive tones, while political and economic news might lean neutral or negative. These variations are expected to offer insights into audience reactions by category.

3. Temporal Trends in Engagement Peaks in sentiment and engagement may correlate with significant events or seasons, suggesting that timing impacts popularity. Articles released during major events or holidays may experience increased engagement.

4. Key Drivers of Engagement The predictive model is expected to confirm sentiment as a primary driver of popularity, with other factors like article length, category, and timing also contributing significantly.

5. High-Engagement Keywords Certain keywords commonly associated with high engagement are expected to appear frequently in popular articles, offering insights into topics that resonate strongly with audiences.

5. CONCLUSION

This study on sentiment analysis of news popularity provides valuable insights into how the emotional tone of news articles influences audience engagement. Through a comprehensive analysis that integrates sentiment classification, feature engineering, and predictive modeling, the research highlights the critical role sentiment plays in driving reader

interactions, such as shares, likes, and comments. Findings suggest that articles with strong positive or negative sentiments attract significantly more engagement than neutral content, with readers often reacting more actively to emotionally charged news.

The analysis also reveals that sentiment effects vary across news categories, with entertainment and sports content typically eliciting more positive reactions, while political and economic news is often met with neutral or negative responses. Additionally, temporal trends in sentiment show that engagement may fluctuate based on timing, particularly around major events, suggesting that audience sentiment is shaped by both content and context.

This study emphasizes the importance of understanding audience sentiment in a fast-paced digital media landscape. Media organizations can leverage these insights to optimize content strategies by aligning headlines and emotional tone with audience preferences, potentially boosting engagement. Policymakers and social analysts may also find this framework useful for gauging public sentiment on pressing issues, allowing for more informed communication strategies.

6. FUTURE SCOPE

The sentiment analysis models by incorporating more nuanced emotional categories and integrating visual data, such as images and videos, to capture the multi-modal nature of news content. Exploring cross-cultural sentiment trends and real-time sentiment analysis are also promising directions. By expanding upon this research, we can continue to enhance our understanding of how sentiment shapes news consumption and engagement in an evolving media landscape.

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