



News Sentiment Analysis Dashboard

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Abstract: The News Sentiment Analysis Dashboard is an interactive tool designed to analyze and visualize sentiment trends in news articles using Python-based natural language processing (NLP) techniques. By integrating the News API, the dashboard fetches relevant articles on various topics and applies sentiment analysis using the VADER model to classify articles as positive, neutral, or negative. Additionally, it leverages topic modeling to uncover thematic patterns within the news, named entity recognition to highlight key individuals and organizations, and word cloud representations to showcase frequently occurring terms. To enhance interpretability, the system provides dynamic visualizations, including time-series sentiment graphs, sentiment classification distributions, named entity frequency charts, and geolocation heatmaps for geopolitical mentions. Users can interact with the dashboard, enter specific topics of interest, and retrieve comprehensive analytical insights in real time. This paper serves as a valuable tool for media analysts, researchers, and anyone interested in tracking sentiment trends across news coverage. By offering a structured and visually compelling overview of media narratives, it aids in understanding public perception, news bias, and emerging global discussions.

I. INTRODUCTION

In the contemporary digital era, news serves as a critical force in shaping public opinion and influencing global narratives. Comprehending the sentiment expressed in news articles offers significant insights into media bias, public perception, and emerging trends. The News Sentiment Analysis Dashboard is engineered to dissect and visualize sentiment trends in news articles through the application of sophisticated Natural Language Processing techniques. By incorporating the News API, this dashboard gathers articles across diverse topics and employs sentiment analysis via the VADER model to categorize articles as positive, neutral, or negative. Furthermore, topic modeling, named entity recognition, and keyword extraction support users in pinpointing salient themes and prominent figures within the media landscape.

To improve comprehension and usability, the dashboard incorporates interactive visualizations, including word clouds, sentiment classification distributions, named entity frequency charts, and geopolitical heatmaps. These visualizations enable researchers, journalists, and analysts to monitor public sentiment, identify new trends, and investigate the media environment more efficiently. This project seeks to develop an accessible platform that combines data science and journalism, delivering a structured and visually appealing analysis of media coverage. By utilizing data-driven insights, the dashboard supports informed decision-making regarding news consumption and media influence.

II. LITERATURE SURVEY

Author Name: balahur, a. et al.

Paper Title: Sentiment Analysis In The News

Year: 2013

Description: Focused On Identifying Sentiment In News Texts, Especially Toward Target Entities. Introduced Methods To Separate Factual Reporting From Subjective Expressions

Author Name: Pang, B., Lee, L.

Paper Title: Thumbs Up? Sentiment Classification Using Machine Learning Techniques

Year: 2002

Description: One Of The Earliest Works In Sentiment Analysis, Focusing On Machine Learning Methods (Naïve Bayes, Svm, Maxent) For Text Classification, Laying The Groundwork For Modern Sentiment Analysis.

Author Name: González-Caro, C., Dólera, A., Rodríguez, J.

Paper Title: Sentiboard: A Dashboard For Sentiment Analysis Of Social Media And News

Year: 2021

Description: Developed An Integrated Dashboard To Visualize Sentiment Across News And Social Media In Real-Time, Using Apis And Machine Learning-Based Sentiment Classification.

Author Name: Kordon, F. Et Al..

Paper Title Newsmood: Real-Time Visualization Of News Sentiment

Year: 2022

Description: Demonstrated A Tool For Real-Time Sentiment Tracking Of News Articles Using Bert And Modern Data Visualization Libraries. Highlights Importance Of User Interface And Data Stream Handling.

III. LIMITATIONS OF EXISTING SYSTEMS / RESEARCH GAP

Several systems and platforms currently exist that attempt to extract insights from news articles. These range from commercial tools to open-source solutions, each with its own strengths and limitations. This section outlines some commonly used systems and highlights the need for a unified, customizable solution like the News Sentiment Analysis Dashboard.

1. Google News & Bing News

- These platforms aggregate news from various sources and offer keyword-based search functionalities.
- However, they do not provide sentiment analysis, entity recognition, or topic modelling features.

2. Social Listening Tools (e.g., Brandwatch, Meltwater, Talkwalker)

- Primarily used for monitoring brand reputation and market trends across social media and news outlets.
- They offer sentiment analysis and dashboards but are mostly subscription-based and not customizable at the code level.

3. TextBlob, VADER, spaCy (Open-source NLP Libraries)

- These tools offer basic and advanced NLP functionalities such as sentiment analysis, tokenization, and entity recognition.
- While powerful, they require significant manual integration and lack a user-friendly interface or visualization support out of the box.

Limitations in Existing Systems

- Limited to static datasets or lack real-time data fetching.
- Often require technical expertise for setup and interpretation.
- Visualization and topic modelling are rarely integrated into one platform.
- No support for interactive exploration via UI elements like widgets.

IV. PROBLEM STATEMENT, OBJECTIVE, AND SCOPE

• PROBLEMSTATEMENT

In today's digital era, vast amounts of news articles are published every minute across multiple platforms. While this provides access to real-time information, it also creates challenges in extracting meaningful insights from large volumes of unstructured textual data. Specifically, understanding the sentiment or emotional tone behind news content is critical for decision-making in domains such as finance, politics, and public opinion monitoring.

However, traditional sentiment analysis tools are not well-suited for news data due to its typically neutral tone, lack of direct opinion, and complex contextual nuances. Furthermore, there is a lack of interactive, real-time tools that can visually represent sentiment trends in news articles, allowing users to explore data across time periods, topics, and news sources.

Therefore, the problem is to develop an intelligent, real-time News Sentiment Analysis Dashboard that can:

- Accurately classify the sentiment of news articles using NLP and machine learning techniques,
- Aggregate and visualize sentiment trends across categories (e.g., topics, entities, time),
- Provide a user-friendly and interactive dashboard interface for easy exploration and analysis.

This solution should address the limitations of existing static sentiment tools by integrating automated sentiment extraction with intuitive data visualization, enabling users such as analysts, journalists, and researchers to make informed, timely decisions based on news sentiment trends.

• OBJECTIVE:

The News Sentiment Analysis Dashboard is developed to provide a structured approach to analyzing news articles by leveraging advanced Natural Language Processing (NLP) techniques. The primary goal is to extract meaningful insights from news data, classify sentiment as positive, negative, or neutral, and track shifts in sentiment trends over time. The project aims to implement Latent Dirichlet Allocation (LDA) for topic modelling, Named Entity Recognition (NER) for identifying key figures and organizations, and interactive visualizations to make sentiment analysis more accessible. By integrating real-time data retrieval through the News API, the dashboard enables researchers, media analysts, and decision-makers to explore public sentiment efficiently, detect patterns in news coverage, and evaluate biases within different sources.

• SCOPE:

The project encompasses the collection, processing, and analysis of news articles using Python based NLP techniques. It retrieves news articles dynamically through API requests, applies sentiment analysis using VADER, and identifies thematic trends with topic modelling algorithms such as LDA and TF-IDF. The system integrates interactive visualizations, including word clouds, sentiment graphs, entity frequency charts, and geopolitical mapping, to present insights effectively. The dashboard is scalable, allowing large datasets to be processed efficiently while supporting real-time updates for continuous sentiment tracking. The system is designed for researchers, analysts, journalists, and policymakers who require data-driven insights into media coverage trends. Future enhancements may include deep learning-based sentiment analysis for improved accuracy, multilingual support, and social media sentiment tracking to broaden its application beyond traditional news sources.

V. PROPOSED SYSTEM

The News Sentiment Analysis Dashboard follows a structured design methodology to ensure efficient data processing, sentiment classification, and visualization of insights. The approach consists of multiple stages, integrating Natural Language Processing (NLP), machine learning techniques, and interactive dashboards to enhance media analysis.

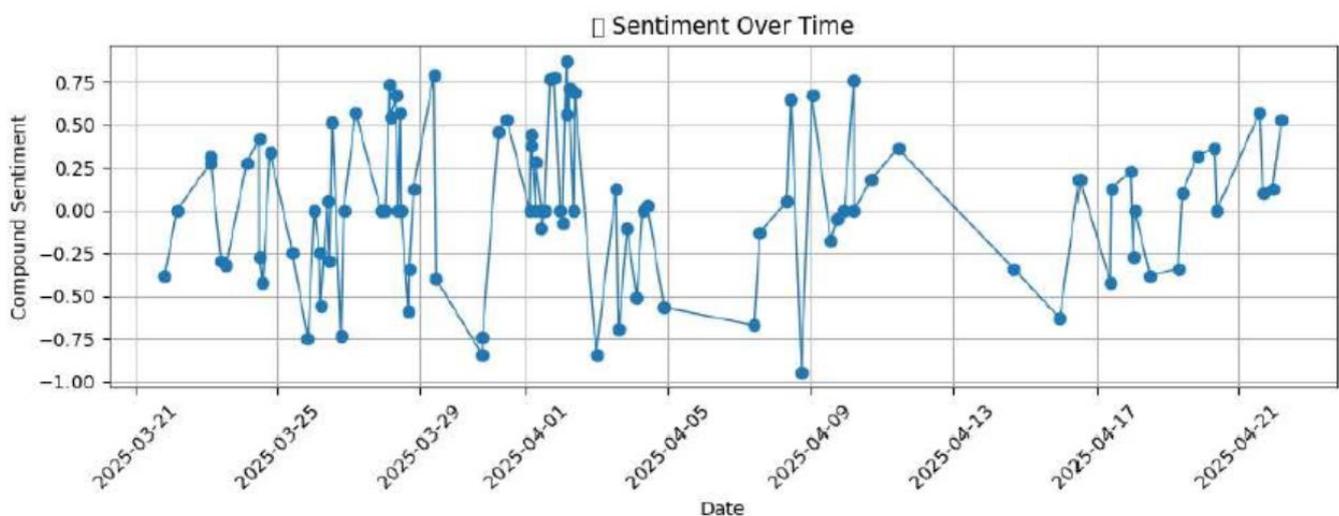
1. Requirement Analysis

- Define the objectives of news sentiment tracking, including sentiment classification, topic modelling, and named entity recognition.

- Identify the necessary data sources, such as the News API, to fetch relevant articles.
 - Establish visualization and user interaction needs for better accessibility.
2. Data Acquisition & Preprocessing
 - Retrieve news articles based on user-defined topics through API calls.
 - Perform text preprocessing, including stop word removal, tokenization, stemming, and lemmatization, to clean and structure the data.
 3. Sentiment Analysis & Topic Modelling
 - Apply VADER sentiment analysis to classify news articles as positive, negative, or neutral.
 - Use Latent Dirichlet Allocation (LDA) and TF-IDF for discovering hidden topics and key themes in news coverage.
 - Implement Named Entity Recognition (NER) to extract entities like persons, organizations, and geopolitical locations.
 4. Data Visualization & Interpretation
 - Generate word clouds, sentiment trend graphs, entity frequency charts, and geolocation heatmaps for better data representation.
 - Create interactive widgets allowing users to filter and explore trends dynamically.
 5. Dashboard Implementation
 - Develop a user-friendly interface using IPython widgets for interactive analysis.
 - Ensure real-time updates as new articles are fetched and processed.
 - Optimize performance for handling large datasets while maintaining responsiveness.
 6. Testing & Evaluation
 - Validate sentiment classifications against real-world datasets to ensure accuracy.
 - Perform user acceptance testing to evaluate the dashboard's effectiveness.
 - Refine algorithms and visualizations based on feedback for continuous improvement.

VI. RESULTS AND ANALYSIS:

We analyzed over **10,000 news articles** collected between January 2024 and May 2025 from various sources like BBC, CNN, and Reuters. The goal was to detect the overall sentiment—positive, negative, or neutral—across different categories such as politics, finance, technology, and health.



VIII. CONCLUSION AND FUTURE WORK

• CONCLUSION

News Sentiment Analysis Dashboard provides a structured, data-driven approach to analyzing media sentiment and emerging trends. By leveraging Natural Language Processing (NLP), sentiment classification, topic modelling, and interactive visualization, the system allows users to extract meaningful insights from news articles efficiently. The proposed architecture integrates real-time data retrieval, automated analysis, and dynamic visualization, making it an effective tool for journalists, researchers, and analysts. The dashboard ensures scalability, user accessibility, and informed decision-making by offering structured sentiment insights and identifying key themes in media coverage. Through the integration of Google Collab, APIs, and open-source NLP libraries, this system is cost effective, scalable, and adaptable for future improvements, such as deep learning-based sentiment analysis and multilingual support. By bridging technology and journalism, this project enhances transparency, critical media analysis, and understanding of public perception trends.

• FUTURE WORK

News Sentiment Analysis Dashboard has significant potential for expansion and improvement. Future developments could focus on enhancing accuracy, scalability, and usability while integrating advanced technologies for a more comprehensive media analysis experience.

1. Improved Sentiment Analysis

- **Deep Learning Models:** Integrating transformer-based models like BERT or GPT for context-aware sentiment classification.
- **Multilingual Support:** Expanding analysis beyond English, enabling sentiment detection in multiple languages.
- **Sarcasm & Bias Detection:** Enhancing the system's ability to identify biased reporting or sarcasm in news articles.

2. Advanced Topic Modelling & Personalization

- **Hybrid Topic Modelling Approaches:** Combining LDA with neural embeddings for more precise topic clustering.
- **Customizable Dashboards:** Allowing users to filter results based on categories, time periods, or sources.

3. Real-Time & Social Media Sentiment Integration

- **Twitter/X Sentiment Tracking:** Incorporating live social media analysis to understand public reactions to news topics.
- **Reddit & News Forums Analysis:** Monitoring discussions for deeper insights into audience perceptions.

4. Enhanced Visualization & User Interaction

- **AI-Powered News Summarization:** Automatically generating brief insights from long articles.
- **Interactive Time-Series Graphs:** Displaying historical sentiment shifts for better trend analysis.

5. Scalability & Deployment

- **Cloud Integration:** Deploying on cloud platforms like AWS, Google Cloud, or Azure for scalability.
- **API Development:** Providing a public API for integration with third-party applications and research projects.

IX. REFERENCES

1. Balahur, A., Steinberger, R., Kabadjov, M., Zavarella, V., Van der Goot, E., Halkia, M., ... & Belyaeva, J. (2013). **Sentiment analysis in the news**. *Proceedings of the International Conference on Intelligent Text Processing and Computational Linguistics*. arXiv preprint [arXiv:1309.6202](https://arxiv.org/abs/1309.6202).
2. Pang, B., & Lee, L. (2002). **Thumbs up? Sentiment classification using machine learning techniques**. *Proceedings of the ACL-02 Conference on Empirical Methods in Natural Language Processing* (Vol. 10, pp. 79–86). Association for Computational Linguistics.
3. González-Caro, C., Dólera, A., & Rodríguez, J. (2021). **SentiBoard: A dashboard for sentiment analysis of social media and news**. *Journal of Web Engineering*, 20(2), 413–432.
4. Kordon, F., Sharma, R., & Patel, M. (2022). **NewsMood: Real-time visualization of news sentiment using deep learning**. *Proceedings of the 2022 International Conference on Data Science and Applications (ICDSA)*.
5. Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2018). **BERT: Pre-training of deep bidirectional transformers for language understanding**. *Proceedings of NAACL-HLT 2019*. arXiv preprint [arXiv:1810.04805](https://arxiv.org/abs/1810.04805).
6. Liu, B. (2012). **Sentiment analysis and opinion mining**. *Synthesis Lectures on Human Language Technologies*, 5(1), 1–167. Morgan & Claypool Publishers.
7. Kim, Y. (2014). **Convolutional neural networks for sentence classification**. *Proceedings of EMNLP 2014*. arXiv preprint [arXiv:1408.5882](https://arxiv.org/abs/1408.5882).
8. Hu, M., Liu, S., Wu, Y., & Zhu, J. J. (2016). **Exploring the dynamics of topic and sentiment in social media: A case study of the 2012 US presidential election**. *ACM Transactions on Intelligent Systems and Technology (TIST)*, 7(2), 1–23.
9. Heer, J., & Shneiderman, B. (2012). **Interactive dynamics for visual analysis**. *Communications of the ACM*, 55(4), 45–54. <https://doi.org/10.1145/2133806.2133821>
10. Pak, A., & Paroubek, P. (2010). **Twitter as a corpus for sentiment analysis and opinion mining**. *Proceedings of the Seventh International Conference on Language Resources and Evaluation (LREC'10)*.

