
Aspect-Based
Sentiment Analysis
Bhubaneswar Hospitals

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01 Problem Specification

- Develop an aspect-based sentiment analysis model to analyze hospital reviews.
- Scrape reviews from Google Maps and other free sources.
- Focus on individual aspects like service, food, staff, facilities, and hygiene.
- Identify relevant aspects in hospital reviews.
- Determine sentiment polarity for each aspect.
- Aggregate multi-dimensional sentiment information.
- Generate an overall sentiment score for the hospital.
- Compare the sentiment score with the hospital’s existing rating for cross-validation.

02 Introduction

- Patient feedback from online reviews is essential for improving healthcare service quality.
- Star ratings on platforms like Google Maps lack detailed insights into specific aspects of hospital experiences.
- Aspect-Based Sentiment Analysis (ABSA) extracts fine-grained opinions on dimensions like care, staff, and hygiene.
- The project involves scraping hospital reviews, identifying key aspects, and analyzing sentiment using RoBERTa.

03 Literature Survey

Table 1:Literature Study

YEAR	AUTHOR	TITLE	METHOD	ADVANTAGES	DISADAVNTAGES
2024	JUNJIE CHEN , HAO FAN, AND WENCONG WANG	Syntactic and Semantic Aware Graph Convolutional Network for Aspect-Based Sentiment Analysis	Graph Construction with SS-GCN model	• Incorporation of both syntactic and semantic information • Automatic learning of weights • Insight into sentiment polarity	• Complexity • Dependency on available data • Generalization
2023	HUA ZHAO , MANYU YANG , XUEYANG BAI , AND HAN LIU	A Survey on Multimodal Aspect-Based Sentiment Analysis	A multimodal aspect-based sentimental analysis	• Comprehensive overview • Analysis of existing methods • Evaluation of research results	• Limitations in literature survey • Lack of detailed future research trends • Scope for expansion
2023	SIGEON YANG 1,QINGLONG LI 1,HAEBIN LIM 1,ANDJAEKYEONG KIM	An Attentive Aspect-Based Recommendation Model With Deep Neural Network	Attentive Aspect-Based Recommendation model with a Deep Neural Network (AARN).	• Incorporation of BERT-based ABSA with Attention Mechanism • Significant Performance Improvement • Richer Insights and Granular Recommendations	• Limited Information Consideration • Limited Dataset Domain • Simplistic Neural Network Architecture
2024	HUA ZHAO,MANYU YANG,XUEYANG BAI,HAN LIU	A Survey on Multimodal Aspect-Based Sentiment Analysis	Attention Mechanism-Based Model with Graph Convolutional Network-Based Models	• Comprehensive Survey • Emerging Trends • Multimodal Insights	• Limited Focus on Practical Applications • Dataset and Evaluation Diversity • Narrow Scope of Modalities

04 Proposed Solution

- Data Collection and Preprocessing: Scrape hospital reviews from Google Maps, clean the data, and define relevant aspects like service, food, and hygiene.
- Aspect Identification: Define aspect categories and extract aspect-related phrases using rule-based or NLP methods.
- RoBERTa Sentiment Analysis: Use the pre-trained RoBERTa model to determine sentiment polarity for each aspect, fine-tuning it for hospital reviews.
- Score Aggregation: Combine aspect-level sentiments into an overall score, with weighting based on aspect importance and frequency.
- Validation: Compare the sentiment scores with existing hospital ratings to evaluate model accuracy and identify improvement areas.
- LSTM Integration: Implement LSTM models to enhance sentiment classification by capturing temporal dependencies.

05 Block Diagram

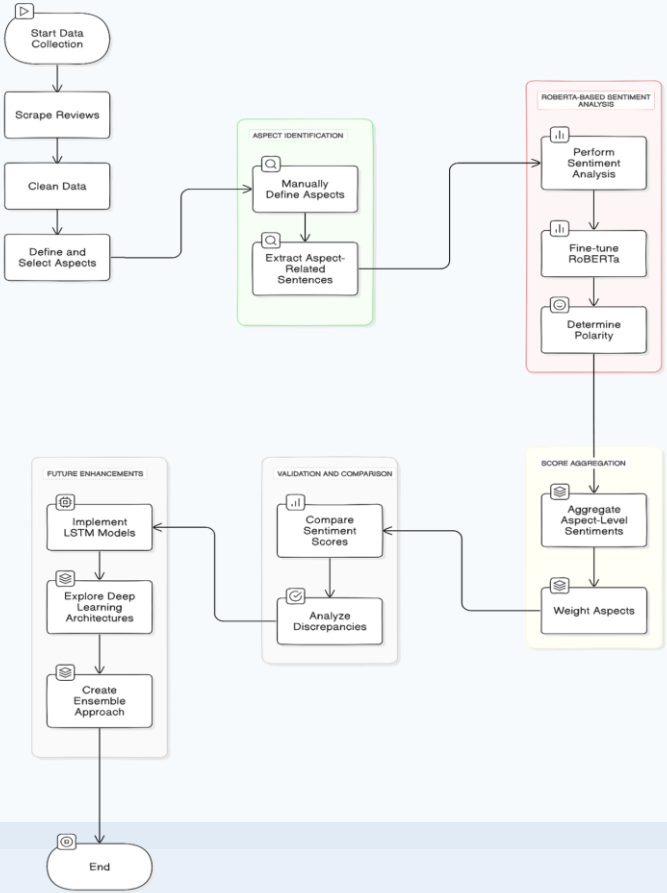

Figure 1:Block Diagram

06 Results & Discussion

Table 2:Result

Title	Hospital Rating	Review Stars	Aspect Scores
Vivekanand Hospital Bhubaneswar	4.6	5	{'service': 0.12956, 'cleanliness': 0.19434, 'food': 0.06478, 'facilities': 0.12956, 'staff': 0.12956}
Health Village Hospital	4.6	3	{'service': -0.19454000000000002, 'cleanliness': -0.29181, 'food': -0.09727000000000001, 'facilities': -0.19454000000000002, 'staff': -0.19454000000000002}
Manipal Hospitals, Bhubaneswar	4.6	1	{'service': -0.1756, 'cleanliness': -0.26339999999999997, 'food': -0.0878, 'facilities': -0.1756, 'staff': -0.1756}
Sunshine Hospital	4.6	5	{'service': 0.19424, 'cleanliness': 0.29135999999999995, 'food': 0.09712, 'facilities': 0.19424, 'staff': 0.19424}

Sentiment Classification Accuracy for Each Aspect:

- Measures the model's ability to correctly classify sentiment (positive, negative, neutral) for each aspect.
- Metrics: Accuracy, precision, recall, and F1-score will be used for evaluation.
- Importance: Ensures accurate sentiment analysis for specific hospital features.

Correlation Between Generated Overall Sentiment Scores and Existing Hospital Ratings:

- Evaluates the relationship between ABSA sentiment scores and existing star ratings.
- Metrics: Pearson or Spearman correlation coefficients will be used to measure association.
- Importance: Validates the reliability and alignment of the ABSA model with current rating systems.

Qualitative Analysis of Aspect-Level Insights:

- Involves manual review of how well the model identifies aspects and classifies nuanced sentiments.
- Importance: Provides in-depth insights into the model's performance on real-world data and highlights areas for improvement.

07 References

[1] S. Yang, Q. Li, H. Lim, and J. Kim, “An attentive aspect-based recommendation model with deep neural network,” IEEE Access, vol. 12, pp. 5781–5791, 2024.

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[3] Y. Yu, D.-T. Dinh, B.-H. Nguyen, F. Yu, and V.-N. Huynh, “Mining insights from esports game reviews with an aspect-based sentiment analysis framework,” IEEE Access, vol. 11, pp. 61161–61172, 2023.

[4] J. Chen, H. Fan, and W. Wang, “Syntactic and semantic aware graph convolutional network for aspect-based sentiment analysis,” IEEE Access, vol. 12, pp. 22500–22509, 2024.

[5] Jahanbin, K., & Chahooki, M. A. Z. (2023). Aspect-Based Sentiment Analysis of Twitter Influencers to Predict the Trend of Cryptocurrencies Based on Hybrid Deep Transfer Learning Models. IEEE Access, 11, 121656-121670.