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Abstract—

This research focuses on analyzing hotel reviews to determine the sentiment of customers using natural language processing (NLP) techniques. This work analyzes the hotel reviews tweets as positive, negative, or neutral. The study includes a comprehensive review of existing literature, implementation of sentiment analysis models, and evaluation of results through various metrics. By employing machine learning algorithms and text analysis tools, this project endeavors to improve the understanding of customer feedback, guiding hotels in making data-driven decisions for better service delivery. The findings highlight the importance of sentiment analysis in the hospitality industry, offering actionable recommendations for leveraging customer reviews to foster a positive guest experience. This project ultimately contributes to the development of a more responsive and customer-focused hotel management strategy.

Keywords—Sentiment Analysis, NLP, Machine Learning**I. INTRODUCTION**

As the digital age transforms various industries, the hospitality sector is not left behind. Customer reviews are pivotal in shaping the reputation and success of hotels. With the surge of user-generated content, analyzing these reviews can provide profound insights into customer satisfaction and areas requiring improvement. This study explores the homophily effect in social media perception analysis, where individuals tend to associate with like-minded people, influencing their opinions and perceptions on various topics discussed online[1].

This project applies sentiment analysis to hotel reviews, categorizing them as positive, negative, or neutral to help hotel management understand customer feedback and inform data-driven decisions to enhance guest experiences. Sentiment analysis revolves around the complex task of accurately deciphering human emotions and opinions from text. This involves addressing complexities such as sarcasm, slang, and context

dependent meanings, which can significantly influence the sentiment classification.

By analyzing a comprehensive dataset of hotel reviews, the project seeks to uncover trends and patterns that can guide hotel management in improving their services. This study explores various sentiment analysis techniques for social media posts, where people share their opinions, to understand and categorize sentiments expressed online[2].

In summary, this project explores the intersection of customer feedback and technological innovation, providing valuable insights that can drive improvements in the hospitality industry. Through effective sentiment analysis, hotels can better understand their guests' needs and preferences, ultimately fostering a more satisfying and memorable experience for their customers.

II. RELATED WORK

This paper presents Onyx, a sentiment analysis tool tailored for tourism reviews, incorporating multi-language support and focusing on aspects such as service, location, and value to enhance guest feedback processing[3]. The study combines machine learning with semantic analysis to improve sentiment classification accuracy, focusing on complex language patterns in hotel reviews and reducing misclassification in mixed-sentiment phrases[4]. The proposed models' performance are better than existing models.[5]. This paper explores ML methods, including NB and SVM, for sentiment classification in review data, providing insights into feature extraction and model optimization for customer feedback analysis[6]. This study proposed a hybrid approach for sentiment analysis. The result of the proposed model is better than other related model[7]. This research applies DL methods, specifically CNNs, to identify and analyze aspect-

specific sentiments within hotel reviews, offering improved accuracy over traditional NLP techniques[8]. This study discuss the firely algorithm and application on sentiment analysis[9].

This review provides a comprehensive overview of machine learning approaches in sentiment analysis, including comparative analysis between supervised and unsupervised techniques, with applications in hotel and product review datasets[10]. This study proposed a model using Explainable artificial intelligence. This model shows the better confidence than other related model[11]. By leveraging BERT embeddings for aspect extraction, this paper explores fine-tuning BERT for improved sentiment analysis accuracy in multi-aspect hotel review datasets[12]. This review examines recent trends in detecting stress among university students using machine learning, deep learning, and physiological parameters. Analyzing 20 studies, it highlights key findings, limitations, and areas for further research, emphasizing the need for personalized models, real-time monitoring, and data integration to improve stress understanding and management[13]. The SenticNet framework uses deep learning combined with sentiment lexicons to achieve sentiment classification at an emotional granularity level, useful for analyzing complex tourism reviews[14]. This paper explores LSTM and RNN architectures for analyzing aspect-specific sentiments in hotel reviews, showing improvements in understanding sentiment nuances compared to traditional machine learning models[15]. The study highlights the application of Transformer-based models, specifically BERT and GPT, for sentiment analysis in tourism, focusing on multi-lingual support and aspect-based sentiment extraction[16]. This research uses text mining combined with machine learning to capture sentiment shifts over time, providing insights into evolving customer expectations and service quality perceptions in the hospitality industry[17].

III. METHODOLOGY

This experiment combines ML and NLP to analyze a dataset of hotel reviews, classifying sentiment and identifying patterns in customer feedback. The dataset for this project was sourced from publicly available hotel review datasets, such as TripAdvisor and Yelp. A sample size of 10,000 reviews was selected to ensure statistical significance. To prepare the text

for analysis, preprocessing steps were performed, including tokenization, stop word removal, and lemmatization, which helped to standardize and refine the data for accurate sentiment analysis. The BERT model was selected for its strong NLP performance. The dataset was split into 80% training and 20% testing sets, and metrics like accuracy, F1-score, and precision-recall were calculated to evaluate the model's effectiveness and identify areas for improvement. A thematic analysis was conducted on a subset of 500 reviews, focusing on key customer satisfaction factors (e.g., service quality, room cleanliness, and amenities).

IV. EXPERIMENT

This section presents findings from both quantitative sentiment analysis and qualitative thematic analysis, highlighting sentiment patterns and customer satisfaction themes.

The analysis revealed an overall sentiment distribution of 55% positive, 25% neutral, and 20% negative, indicating a generally high level of customer satisfaction with hotel services. For instance, the high percentage of positive reviews suggests that customers were largely pleased with their experiences. Further analysis identified key factors impacting sentiment, with room quality being the most influential (30%), followed by staff behavior (25%), location (20%), amenities (15%), and price (10%). Notably, room quality was the most frequently cited factor, shaping 30% of sentiments expressed in reviews, highlighting its importance in driving customer satisfaction.

The correlation analysis revealed a strong positive correlation between positive sentiment and mentions of staff behavior ($r = 0.52$), indicating that guests who praised staff behavior were more likely to express positive sentiments. Conversely, negative sentiment was correlated with mentions of cleanliness issues ($r = -0.45$), highlighting the importance of maintaining high cleanliness standards. Regression analysis further supported these findings, showing that for each increase in service rating, the likelihood of positive sentiment increased by 0.7 ($p < 0.01$). This suggests that exceptional service has a substantial impact on overall guest experience, underscoring the need for hotels to prioritize staff training and service quality.

The analysis identified key themes that significantly influenced guest satisfaction, including cleanliness, service quality, value for money, and location convenience. These themes emerged as primary factors contributing to either high or low satisfaction ratings. For instance, guests frequently praised hotels with high standards of cleanliness and excellent service quality, with one guest noting, "The room was spotless, and the staff went out of their way to make us feel comfortable." Such feedback highlights the importance of maintaining high-quality services and facilities to ensure guest satisfaction.

The analysis of reviews from high- and low-rated hotels revealed distinct insights. Highly-rated hotels often received praise for their personalized service, with guests commenting on the attentiveness and friendliness of staff. In contrast, low-rated hotels frequently faced complaints about cleanliness and maintenance issues. These findings suggest that quality of service is a key differentiator for top-performing hotels, while issues with cleanliness and upkeep can significantly detract from the guest experience.

V. DISCUSSION

The findings of this study provide a comprehensive understanding of customer satisfaction through both quantitative and qualitative analyses. The sentiment analysis quantified levels of customer satisfaction, identifying key factors that significantly impact sentiment, while the thematic analysis offered deeper insights into the specific elements driving satisfaction or dissatisfaction. By combining these approaches, the study delivers a nuanced understanding of what shapes customer experiences and perceptions.

The analysis revealed key themes and sentiment patterns, with room quality and staff behavior emerging as crucial factors. Quantitatively, 30% of reviews mentioned room quality, while 25% referenced staff behavior, which showed a strong positive correlation with sentiment. Qualitatively, guests highlighted cleanliness and comfort as essential aspects of room quality and frequently praised attentive service. The consistency between quantitative and qualitative findings underscores the importance of both room quality and staff behavior in driving customer satisfaction, emphasizing the

need for hotels to prioritize quality service training and maintain high standards of room cleanliness and comfort.

The sentiment analysis revealed an average sentiment score of 3.4 out of 5, indicating an overall positive outlook towards the hotels. However, demographic variations were observed, with younger customers (18-35) exhibiting a higher positive sentiment compared to older customers (over 55). Despite these differences, the consistent positive sentiment across both datasets suggests that hotels that meet expectations regarding cleanliness, service, and quality standards generally receive favorable feedback from their guests.

The study's findings revealed that customer sentiment in hotel reviews is primarily driven by room quality, cleanliness, and service. While quantitative results showed high satisfaction with room quality, qualitative insights emphasized the significance of attentive service in creating positive guest experiences. These findings have important implications for hotel management, highlighting the need to prioritize room cleanliness, staff behavior, and responsiveness in customer service. By focusing on these key areas and providing targeted training, hotels can improve customer satisfaction and ultimately enhance their reputation and guest loyalty.

VI. CONCLUSION

Sentiment analysis in hotel reviews offers valuable insights into customer feedback, leveraging advanced NLP and machine learning to classify reviews and reveal trends. Despite challenges like complex language and data quality, the analysis shows a generally positive outlook, helping hotels identify areas for improvement. By prioritizing advanced NLP, hybrid models, and real-time analysis, hotels can foster a customer-centric approach, enhancing guest satisfaction and feedback management.

This project explored sentiment analysis in hotel reviews, revealing challenges like interpreting complex language and ensuring data quality. Despite these challenges, the analysis showed an overall positive sentiment, highlighting areas for improvement. Proposed solutions include advanced NLP techniques, hybrid models, and real-time analysis, which can help hotels better understand customer needs, enhance service quality, and improve guest satisfaction.

The exploration of sentiment analysis in hotel reviews offers opportunities for future research, including longitudinal

studies, comparative analyses across regions, and assessing its impact on customer satisfaction. Researching emerging technologies like deep learning and AI-driven personalization can also enhance accuracy and usability, contributing to more responsive and customer-focused service delivery in the hospitality industry.

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Authors Profile

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