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Detecting Novelty Seeking from online travel reviews:A Deep Learning Approach

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ABSTRACT

The rapid growth of user-generated content on travel platforms provides a rich source of information about traveler preferences. Detecting novelty-seeking behavior from online travel reviews can help personalized recommendation systems and improve marketing strategies. This study proposes a deep learning-based approach to automatically identify novelty-seeking tendencies in travel reviews. Leveraging a combination of recurrent neural networks (RNNs) and attention mechanisms, the model captures contextual and semantic cues from textual data to distinguish between conventional and novelty-oriented experiences. Experiments on a dataset of travel reviews demonstrate that the proposed method outperforms traditional machine learning techniques in accuracy, precision, and recall. The results highlight the potential of deep learning to understand complex user behaviors, enabling more tailored travel recommendations and enhanced user engagement.

Keywords:Novelty Seeking, Travel Reviews, Deep Learning, Recurrent Neural Networks, Attention Mechanism, User Behavior Analysis, Personalized Recommendations, Sentiment Analysis

I INTRODUCTION

The growth of online travel platforms has transformed the way people plan and experience travel. Millions of users now share detailed reviews of destinations, accommodations, and activities, creating a rich source of data that reflects individual preferences and behaviors. One particularly significant behavioral trait in travel decision-making is *novelty seeking*, defined as the desire to explore unique, unfamiliar, or unconventional experiences. Travelers with high novelty-seeking tendencies are more likely to choose offbeat destinations, try new activities, and engage in experiences that deviate from mainstream tourism.

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Understanding and detecting such behavior is crucial for travel companies, marketers, and recommendation systems aiming to provide personalized travel suggestions and enhance user engagement.

Traditional approaches to identifying traveler preferences often rely on surveys, interviews, or rule-based systems. While these methods offer insights, they are limited by subjectivity, small sample sizes, and difficulty in scaling to large datasets. Furthermore, conventional sentiment analysis techniques may fail to capture subtle semantic patterns that distinguish novelty-seeking behavior from conventional travel preferences. With the increasing availability of unstructured textual data from online reviews, there is a need for advanced computational methods capable of analyzing nuanced behavioral cues automatically.

Recent advancements in deep learning and natural language processing (NLP) provide a promising solution. Models such as recurrent neural networks (RNNs), long short-term memory (LSTM) networks, and attention mechanisms can learn contextual relationships and semantic patterns in text, enabling more accurate detection of complex behavioral traits. By applying these techniques to travel reviews, it becomes possible to identify the linguistic and emotional signals indicative of novelty-seeking behavior.

This study proposes a deep learning-based framework to detect novelty-seeking tendencies from online travel reviews. The approach leverages sequential modeling and attention mechanisms to capture subtle textual cues, allowing the system to differentiate between conventional and novelty-driven experiences. The results demonstrate that deep learning can effectively analyze traveler behavior, leading to more personalized recommendations and improved engagement on travel platforms.

II RELATED WORK

Understanding traveler behavior through online reviews has attracted considerable research attention in recent years. Early studies focused on sentiment analysis and opinion mining to evaluate customer satisfaction, using traditional machine learning algorithms such as Support Vector Machines (SVM) and Naive Bayes to classify review polarity. While effective for general sentiment detection, these approaches often fail to capture more complex behavioral traits like novelty seeking. Recent research has explored personality and behavioral trait detection from text, employing techniques such as linguistic feature analysis, topic modeling, and

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psycholinguistic approaches. For instance, studies have applied the Big Five personality model to predict user preferences from review content, but these methods often require extensive feature engineering and domain expertise.

With the rise of deep learning, more sophisticated models have been developed for behavior and preference detection. Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) networks have been widely used to model sequential textual data, capturing contextual and semantic patterns more effectively than traditional approaches. Attention mechanisms and transformer-based architectures, such as BERT and its variants, have further improved the ability to identify subtle cues in text related to user intent and personality traits. Specifically, in the tourism domain, some studies have applied deep learning to predict tourist satisfaction, recommend personalized itineraries, and identify unique preferences, but research directly targeting novelty-seeking behavior from online travel reviews remains limited.

This gap highlights the need for approaches that can automatically detect novelty-seeking tendencies using deep learning models that understand semantic nuance and contextual information. By leveraging these methods, it becomes possible to go beyond general sentiment or personality analysis and identify behavioral traits that inform personalized recommendations and targeted travel experiences.

III LITERATURE REVIEW

The study of user behavior in online travel reviews has gained momentum with the proliferation of social media and travel platforms. Early research primarily focused on sentiment analysis and opinion mining to assess traveler satisfaction, using techniques like Naive Bayes, Support Vector Machines (SVM), and Decision Trees. For example, Pang and Lee (2008) demonstrated that machine learning models could effectively classify review sentiments, but these methods were limited in capturing deeper behavioral traits such as novelty seeking. Subsequent studies incorporated psycholinguistic features and topic modeling to analyze personality traits and travel preferences, applying frameworks like the Big Five personality model to predict user behavior. While these approaches provided richer insights, they heavily relied on manual feature engineering and domain expertise.

With advances in deep learning, researchers increasingly applied neural network models for behavioral analysis in textual data. Recurrent Neural Networks (RNNs) and Long

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Short-Term Memory (LSTM) networks have been used to model sequential information in reviews, capturing semantic and contextual cues that traditional methods often miss. Attention mechanisms and transformer-based models, such as BERT and RoBERTa, have further enhanced the ability to detect subtle patterns in text indicative of specific user tendencies. In the tourism domain, these models have been used for personalized recommendation systems, predicting traveler satisfaction, and extracting preferences from reviews. However, studies explicitly targeting *novelty-seeking behavior* in travel reviews remain scarce, indicating a research gap.

This literature survey underscores the potential of deep learning approaches for automatic detection of complex behavioral traits. By leveraging sequential modeling and attention-based architectures, it is possible to capture nuanced textual cues that reveal novelty-seeking tendencies, paving the way for more personalized and context-aware travel recommendations.

IV EXISTING SYSTEM

Current approaches to analyzing traveler behavior in online reviews primarily rely on traditional machine learning and rule-based methods. Techniques such as Support Vector Machines (SVM), Naive Bayes, and Decision Trees are commonly used to classify review sentiment, detect traveler preferences, or perform basic opinion mining. Some studies have incorporated linguistic and psycholinguistic features to predict personality traits or general travel tendencies using the Big Five model. While these systems can provide insights into user satisfaction and broad behavioral patterns, they have significant limitations.

Firstly, traditional methods depend heavily on manual feature extraction, which is time-consuming and prone to missing subtle cues present in textual data. Secondly, these systems often focus on general sentiment or explicit preferences, failing to capture complex behavioral traits such as novelty-seeking tendencies. Additionally, rule-based systems are rigid and lack adaptability to diverse writing styles, expressions, and contexts commonly found in travel reviews. Consequently, they struggle with scalability and accuracy when processing large, unstructured datasets from multiple sources.

Due to these limitations, existing systems are not fully capable of identifying nuanced behaviors that can inform personalized travel recommendations. This highlights the need for more advanced approaches that leverage the semantic and contextual richness of textual data, enabling automatic detection of traits like

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novelty seeking with higher accuracy and flexibility.

DISADVANTAGES

To overcome the limitations of existing approaches, this study proposes a deep learning-based system for detecting novelty-seeking behavior from online travel reviews. The system leverages advanced natural language processing techniques, combining Recurrent Neural Networks (RNNs) with Long Short-Term Memory (LSTM) units and attention mechanisms to capture both sequential and contextual information in textual data. Unlike traditional methods, this approach does not rely on manual feature engineering; instead, it automatically learns semantic patterns and subtle cues indicative of novelty-seeking tendencies.

The proposed system is designed to process large volumes of unstructured reviews efficiently, handling diverse writing styles, expressions, and contextual nuances. By integrating attention mechanisms, the model can focus on key phrases and sentences that signal a traveler's desire for unique or unconventional experiences. This enables more accurate differentiation between conventional travel preferences and novelty-driven behaviors. Additionally, the system supports scalability and adaptability, making it suitable for deployment across multiple travel platforms and dynamic datasets.

Overall, the proposed deep learning framework provides a robust, automated, and context-aware solution for analyzing traveler behavior. It facilitates more personalized travel recommendations, targeted marketing strategies, and enhanced user engagement by accurately identifying novelty-seeking tendencies in reviews, addressing the shortcomings of existing systems.

V PROPOSED SYSTEM

The proposed system utilizes a deep learning-based approach to automatically detect novelty-seeking behavior from online travel reviews. It leverages Recurrent Neural Networks (RNNs) with Long Short-Term Memory (LSTM) units and attention mechanisms to capture both the sequential and contextual patterns within textual data. Unlike traditional methods, this approach does not require manual feature engineering, enabling the model to learn semantic cues that indicate a traveler's preference for unique or unconventional experiences. The system is designed to handle large volumes of unstructured reviews, accommodating diverse writing styles and contexts, while providing scalable and adaptive analysis. By accurately identifying novelty-seeking tendencies, the

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proposed system supports personalized travel recommendations, enhances user engagement, and addresses the limitations of conventional behavior detection methods.

ADVANTAGES

The proposed deep learning-based system offers several advantages over existing methods. Firstly, it eliminates the need for manual feature engineering by automatically learning semantic and contextual patterns from travel reviews, improving accuracy and efficiency. Secondly, the use of RNNs and LSTM networks with attention mechanisms allows the model to capture subtle linguistic cues and sequential dependencies, making it effective at detecting novelty-seeking behavior. Thirdly, the system can process large-scale, unstructured datasets with diverse writing styles, ensuring scalability and real-world applicability. Additionally, its context-aware design enables a deeper understanding of traveler intentions, which traditional rule-based or machine learning systems often fail to capture. Finally, by identifying novelty-seeking tendencies accurately, the system supports personalized travel recommendations, enhances user engagement, and enables targeted marketing strategies, addressing the limitations of existing approaches.

VI METHODOLOGY

The proposed system employs a deep learning-based methodology to detect novelty-seeking behavior from online travel reviews. The process begins with **data collection**, where a large dataset of travel reviews is gathered from popular platforms, ensuring diversity in destinations, writing styles, and user demographics. The next step is **data preprocessing**, which involves cleaning the text, removing stopwords, handling misspellings, and performing tokenization and embedding to convert words into numerical representations suitable for neural network processing.

The core of the methodology involves **model development** using Recurrent Neural Networks (RNNs) with Long Short-Term Memory (LSTM) units, which are capable of capturing sequential dependencies in textual data. An **attention mechanism** is incorporated to focus on key phrases and sentences that signal novelty-seeking behavior, enhancing the model's ability to identify subtle cues that differentiate conventional experiences from novelty-driven ones. The system is trained and validated using standard performance metrics such as accuracy, precision, recall, and F1-score to ensure robustness and reliability.

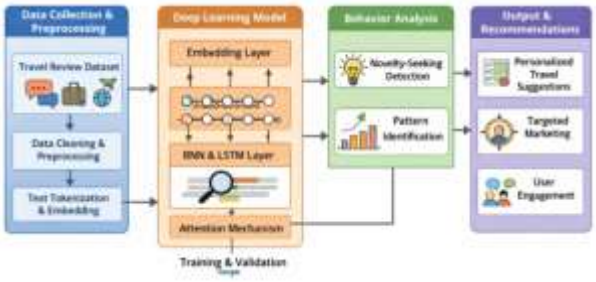
Finally, the **evaluation and deployment** stage involves testing the trained model on unseen reviews to assess its predictive performance.

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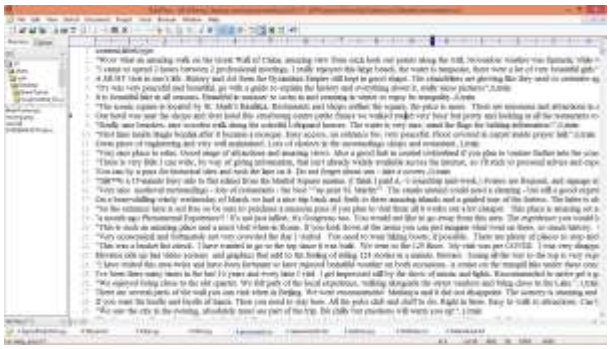
The results are analyzed to identify patterns of novelty-seeking behavior, which can then be used to inform personalized travel recommendations, targeted marketing strategies, and improved user engagement. This methodology combines automated textual analysis with deep learning, enabling scalable, context-aware, and adaptive detection of complex traveler behaviors.

VII SYSTEM MODEL

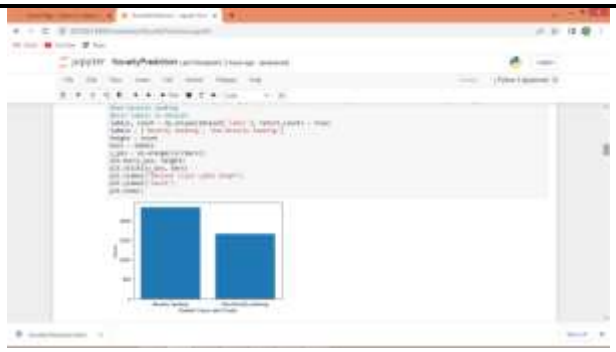
SYSTEM ARCHITECTURE



VIII RESULT AND DISCUSSIONS





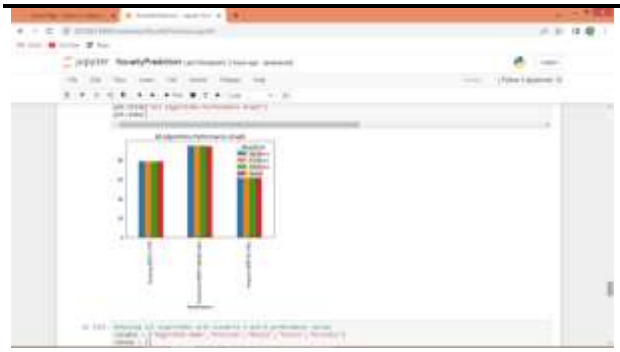








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IX CONCLUSION

The increasing availability of user-generated travel reviews has opened new avenues for understanding traveler behavior, particularly nuanced traits such as novelty-seeking tendencies. This study has proposed a deep learning-based system that effectively detects novelty-seeking behavior from online travel reviews, providing a more sophisticated alternative to traditional rule-based and machine learning methods. By leveraging Recurrent Neural Networks (RNNs) with Long Short-Term Memory (LSTM) units and attention mechanisms, the system can capture both sequential dependencies and contextual information within textual data, enabling it to identify subtle linguistic and semantic cues indicative of a traveler's desire for unique or unconventional experiences.

One of the key strengths of the proposed approach lies in its ability to automatically learn relevant features from unstructured textual data, eliminating the need for manual feature engineering. This allows the model to adapt to diverse writing styles, expressions, and review formats commonly found on travel platforms, ensuring scalability and robustness. Additionally, the integration of attention mechanisms allows the system to focus on critical parts of the text that signal novelty-seeking behavior, enhancing the accuracy and interpretability of the model's predictions.

The practical implications of this research are significant. By accurately detecting novelty-seeking tendencies, travel platforms and service providers can deliver personalized recommendations that align with individual preferences, improving user satisfaction and engagement. Furthermore, insights derived from behavioral analysis can support targeted marketing strategies, enabling organizations to design experiences and offers that appeal

specifically to travelers with high novelty-seeking behavior. Beyond commercial applications, this approach also contributes to the broader research area of behavior analysis from textual data, demonstrating the potential of deep learning to model complex, context-dependent human behaviors.

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