



Modelling environmental perceptions using critical discourse analysis and philological interpretations

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Abstract

In recent years, ecological degradation and environmental contamination have escalated significantly. Specialists across multiple disciplines have examined pertinent topics from numerous perspectives. Ecolinguistics arose to avert the rapid degradation of the natural setting. Critical Discourse Analysis (CDA) constitutes a significant component of ecolinguistic study, critically examining language usage through its environmental context. Initially, a tone and modality system is developed from an ecological standpoint. The present research employs the environmental theology of "equal treatment, balance, and partnership" to perform a CDA of commerce friction states, to elucidate the commonalities and distinctions in the trade friction narratives, and to uncover the environmental implications of global ecological factors within the conversation. In addition, this approach formulates a vector representation of abstract terms utilizing emotion lexicon resources and incorporates emotional polarity and part-of-speech characteristics of phrases. The word vectors are constructed into a text features matrix, serving as the input during the Convolutional Neural Network (CNN) model. At the same time, the Back Propagation method is employed for model training. Based on the trained CNN approach, predictions are made on the unlabeled information, and the experimental CDA findings are evaluated. The findings indicate that throughout the training of Chinese and English information sets, the set used for training quality can approach 100%, while

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the loss rate is diminished to 0. The precision of classification for the Chinese language on the sample set achieves 82%, whereas, for the text in English, it can attain 92%, indicating favorable outcomes of the experiment. It offers an analytical framework for environmental CDA of news broadcasts regarding trade tensions. It holds significant implications for longitudinal studies on political information reporting across different camps.

Keywords: Environmental perceptions, Critical discourse analysis, Philological interpretations, Ecology

Introduction

World Climate Change (CC) (Abbass *et al.*, 2022), one of the most critical "ecological crises" (Khodjaev *et al.*, 2024) confronting humanity in the 21st century, warrants significant attention from the world community. In pushing for an understanding of shared destiny for humanity, it is the social obligation and historical mission of linguists to examine CC through the lens of ecolinguistics (Ágoston *et al.*, 2022). Investigating the environmental discourse surrounding CC possesses both intellectual and practical importance (Patil and Das, 2024). As the principal medium for general knowledge, news discourse can convey specific attitudes, intents, and emotions, influencing how people think and act. News discourse on the environment significantly influences media opinion, molds public perception, and aids in developing climate legislation (Radmanović, Nikolić and Đorđević, 2018; Kattenborn *et al.*, 2021).

The swift advancement of Internet-related technologies has subtly transformed individuals' daily lives. Users routinely articulate their opinions on the internet via microblogs and other digital media and assess goods purchased on e-commerce sites (Verma and Pillai, 2023). The analysis of texts to ascertain viewpoint alignment and affective

polarity through algorithmic learning and Natural Language Processing (NLP) has emerged as a significant research concern in Artificial Intelligence (AI) (Yasmin, 2024). Conventional sentiment analysis methodologies can be broadly categorized into strategies based on rules and statistical methods (Hui *et al.*, 2019). The rule-based technique primarily derives from linguistics, employing the expertise of language specialists to construct dictionaries and frameworks for analyzing emotional patterns in text. The statistics-based approach is initiated by Machine Learning (ML), using manually annotated training corpora to extract features and develop statistical models, thereby autonomously determining emotional orientation. Over the past decade of progress in text sentiment analysis, two methodologies have converged, advancing sentiment technology for analysis to a more sophisticated level (Davlatova, 2020). Researchers have accumulated many assets, instruments, methods, and models. The Deep Neural Networks (DNN) (Carter and Heinriksen, 2023) approach constitutes an automated sentiment assessment technique (Lashari, Shah and Memon, 2023). The extensive model parameters need a more meticulous development and exploration of the space of features and a more sophisticated model establishment, resulting in

performance benefits over prior methods (Leiserowitz *et al.*, 2021). This strategy overlooks the optimal utilization of existing mental assets, such as established rules, the mental lexicon, and the knowledge base. Integrating the DNN with existing efficient computing facilities is a challenge that requires resolution (Pokric *et al.*, 2015).

This study's uniqueness is in proposing a method utilizing Convolutional Neural Networks (CNN) (Zhang *et al.*, 2021) to extract sequential elements of textual emotional inclinations (Yang, 2024). Utilizing the intrinsic characteristics of the phrases, the text is transformed into a low-dimensional vague include matrix, thereby diminishing the level of detail of the CNN algorithm and accelerating the training process while maintaining the recognition efficacy of the text's emotional direction. The suggested method can extract sequential characteristics from the written material that signify emotional introductions, supplying additional models with valuable feature data for emotion categorization (Thapa Magar, Thapa and Li, 2024).

Background

In recent years, online news comments have discussed extensive research on CC. These studies have employed several conceptual frameworks and approaches to examine online news comments and their influence on the CC debate—a study using Critical Discourse Analysis (CDA) (Carter and Tanaka, 2024) to explore CC discourse in public communication. Power dynamics and socioeconomic inequality affect CC rhetoric, and different groups make and argue about

different readings of CC. The study stresses how important it is to understand how language affects CC speech and how important it is to be aware of the power dynamics at play in these conversations.

The study examined the debate about CC in the global media using 16 examples and 132 frames. Four principal contentious themes that polarize CC discussion were identified: acceptance versus rejection of the agreement on CC, the magnitude of ecological risk, climate politics, and endorsement of mitigation policies. The investigation elucidates the diverse viewpoints and values influencing the CC debate and the problems in achieving consensus. The research performed a CDA of the depictions of CC and the warming globe in the New York Times. It was discovered that the two phrases were frequently employed similarly in news media, and prior research typically focused on several issues, including climate doubt, professional norms, media bias, and politicization and polarization. It emphasizes the significance of comprehending the syntax employed in CC discussion and its potential to influence public attitudes (Kusal *et al.*, 2023).

Discourse evaluation is an integrative domain that CC communication scientists have progressively employed since the late 1980s. In light of the increased focus on CC in the past few years, there is an escalating need to integrate automated methods for text analysis in examining the extensive corpus of CC literature.

More studies have shown that media coverage of CC can affect the public by changing how everyone thinks about the issue. Different groups have different

thoughts and feelings about environmental problems, and different ways of communicating with these groups work well (Rajalakshmi *et al.*, 2024). The previous study has some flaws. They have mostly been reading English-language news outlets and online comment sections, which means they need to do more analysis on the environmental debate in other languages and media. The impact of news sites and comments on CC talk is complicated and varied, and more research is needed to understand the many factors that affect this impact fully. More research needs to be done on how social media affects the CC discussion.

A study of how people talk about CC in the comment sections of online news stories has given us important information about how people participate in CC conversations (Zhang *et al.*, 2021). Several different ideas and methods have been used in these studies to look at online news comments and how they affect the environmental argument. More studies are needed to understand the complex and multifaceted effects of online news comment sections on the debate about global warming fully.

Proposed CDA for Environmental Perceptions

Ecological Philosophy (EP) in the Context of CC Theory

EP looks at how living things, inanimate items, and the environment (which includes people) are connected. The analyst needs to set a goal to evaluate the direction of ecological value objectively in the talk. This means combining philosophical and moral concerns about the relationship between people and nature, applying these ideas in new and

creative ways to real-life situations and issues, creating a scientific and coherent EP perspective that fits the problem, and using it as a standard to judge the environmental introductions of conversation. In the environment, individuals, creatures, microbes, plants, abiotic influences, and other environmental elements influence the climate. They are influenced by climate, and the interplay among these ecological components constitutes a cyclical process. The EP is fundamental to human survival and a prerequisite for sustainable growth.

The global warming crisis is escalating in severity. EP creation must comply with the notion of "ecological priority," advocate for "green growth," implement sustainable practices, and undertake definitive measures to safeguard the environment and the climate. The connection between humanity and nature is one of "harmonious cohabitation." Nature is the origin of human existence, and individuals ought to revere, adhere to, and safeguard it. In response to the climate problem, the global community must establish a "community of life on Earth." CDA emphasizes the ecological characteristics of communication and requires the direction of a general environmental philosopher. The research will adhere to the ecological doctrine of "green growth, peaceful cohabitation" within the framework of the environmental change principle. It will evaluate the ecological features present in news discourse to properly categorize positive, ambiguous, and detrimental narratives.

Framework for CDA in Media Discourse

CDA, a significant study paradigm within ecolinguistics, broadens the scope of discourse analysis to encompass every aspect of the ecosystem, including the system of society. It seeks to elucidate the ecological variables that hinder the harmonious growth of humanity and nature within the conversation, prompting individuals to contemplate and rectify the crisis of the environment, thus augmenting protecting the environmental consciousness and contributing to the equilibrium of the ecological structure. The study employs the "description-explication-explanation" strategy to

analyze climate-related news discourse comprehensively. The descriptive approach pertains to the study of language characteristics in news conversations on CC, the explicative approach denotes the examination of the making procedure for news conversations, and the method of explanation involves the rational investigation of vague cultural and social variables. The three dimensions possess inherent and coherent logical relationships, and point-to-surface connection analysis will facilitate an organized comprehension of ecological language.

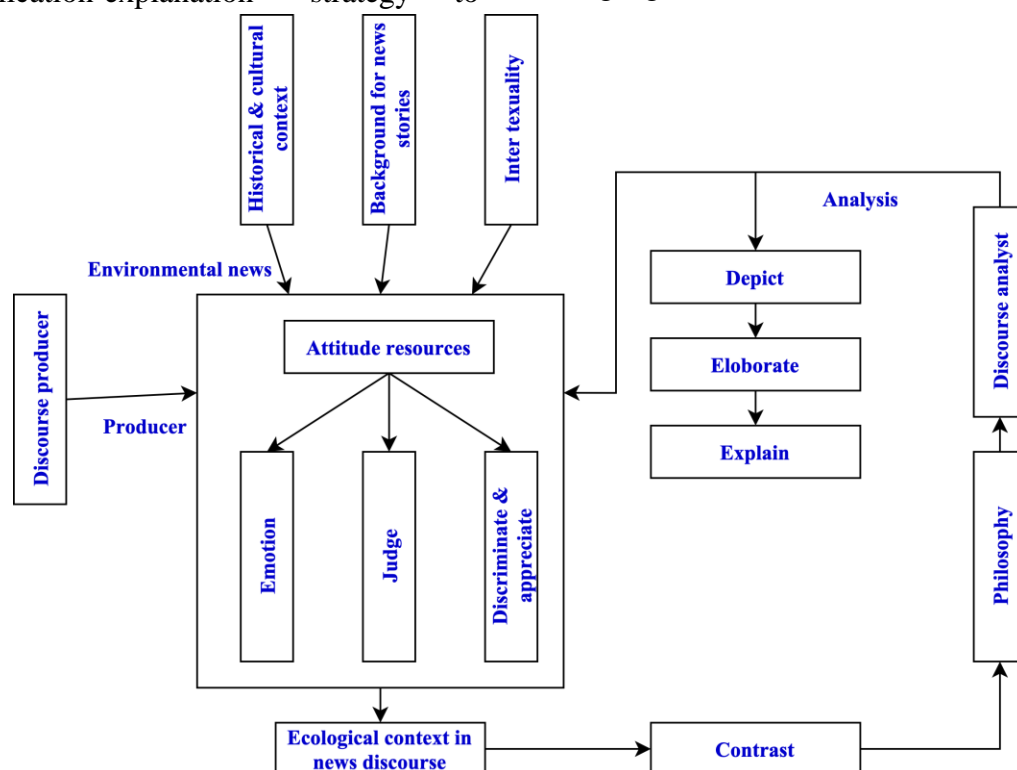


Figure 1: Environmental CDA.

The primary objective of this work is to provide a comprehensive CDA of the attitudinal resources inside news discourse on environmental issues, thereby facilitating an independent assessment of the ecological data presented in these discourses. Discourse researchers evaluate the environmental

idea of attitude assets against the philosophical framework of CC to ascertain their compatibility, finding an environmental orientation within news discourse on the issue of CC. The vowel represents positive conversation, the neutral signifies equivocal discourse, and the violation denotes negative discourse.

The present research develops a methodology for CDA focused on attitude resources in news narratives regarding CC. Fig. 1 illustrates the CDA framework about attitude variables within news discourse.

Extraction model for the emotive sequence characteristics of phrases utilizing CNN

ML is a method that examines data patterns through algorithms and forecasts outcomes based on these patterns. It is categorized into unsupervised ML, supervised ML, and reinforcement ML. Deep Learning (DL) is an advancement of the Neural Network (NN) technique within ML, representing the subsequent phase of ML, where "depth" denotes the number of layers in a neural network. The advancement of ML enhances its capacity to autonomously learn high-level characteristics from data, which fosters the evolution of DL through model refinement and the augmentation of training datasets. A NN serves as both an algorithm and a medium for deep learning. It comprises an input level, a neuronal level, and an output level. The earliest single-layer network of neurons is referred to as a perceptron.

The structure consists of a data, concealed, and output layer, with weights connecting each layer. This paper presents a CNN method that integrates words' emotional properties to mine and effectively expresses textual emotional characteristics. This method initially constructs an abstract word vector representation based on emotional dictionary resources, incorporating emotional polarity and linguistic features of words. In addition, the vectors of words are organized into text

characteristic matrices, which serve as the input data for the CNN model, and the method is employed to train the system. The model extracts sequence characteristics, which are portrayed as emotional characteristics of the text that are input and incorporated into the Support Vector Machine (SVM) classification to determine the text's emotion polarities.

A method for constructing word vectors utilizing dictionary data is proposed. Unlike graphical representations of actual carriers, such as word embeddings (word2vec), this work constructs the word vector using the intrinsic attribute features of the word source. Every word appears in a k -dimensional binary vector time, where k signifies the number of characteristics associated with the word. A value of 0 or 1 denotes every dimension; 0 indicates the absence of a characteristic, while 1 indicates its presence.

Materials and Methods

This research employs a descriptive qualitative methodology. In contrast, a descriptive study documents the current state of affairs; qualitative research utilizes a content analysis method presented in writing, offering an explanatory interpretation of the findings. Utilizing the set structure is a helpful way to carry out a CDA of CC in poor countries. Fairclough's CDA paradigm is a three-part model examining how speech, society, and authority interact. The first step is to use Fairclough's paradigm for a CDA of CC and emerging countries to find and gather relevant texts. This includes news stories, policy papers, speeches, and other writing about CC and developing countries. Textual analysis,

which means carefully looking at the words used in the texts, is the first part of Fairclough's method. This includes looking at the messages' words, grammar, and conversational style and any themes or trends that start to appear. The second part is social evaluation, which means looking closely at the social situations in which the writings were made and read. This means looking at the authors, the readers, and the social and political crisis when the works were written. In the third step, power relations focus on how authority is shown and built in the texts. This means examining how certain groups are portrayed and how language shapes power relationships. Employing Fairclough's structure, a CDA of CC and developing countries can elucidate the construction of power dynamics through conversation, using language to mold public perceptions, sway decision-making, and reinforce or contest social structures via conversation.

Information Origins

The Aljazeera web page, an online news platform, functioned as the data source. This website supplied most of the research data, encompassing phrases, paragraphs, and words. The Fairclough theory will be employed to analyze phrases or sentences that incorporate textual strategies and the presentation of news texts.

Data Collection Methodology

This study employed documenting as a data collection approach and obtaining knowledge on CDA by collecting, analyzing, and investigating various sources of text (books, news articles, theses, and journals) accessible online or

in institutions. The research results are corroborated and reinforced by this data.

Analysis of data

The data assessment in a CDA of CC and emerging nations, utilizing the Fairclough structure, would encompass multiple stages. The collected corpora of texts will be evaluated by quantitative methods, including frequency of word counts and co-occurrence analysis, to discern themes and trends in the language employed. This involves recognizing prevalent terms or expressions linked to CC, advancing nations, and discerning emerging lexical or morphological tendencies. The writings will be studied through qualitative approaches to investigate the discourse techniques employed by the writers and the political and social contexts of their production. This involves recognizing the writers, their past experiences and affiliations, the intended audience, and the aim of the materials. The analysis will investigate the construction and representation of power within the texts, focusing on portraying various groups and establishing power dynamics through language usage. This means figuring out which words or phrases support the way things are now and looking at how the texts support or challenge social hierarchies, identities, and beliefs. The data evaluation will include putting together the results of the quantitative and qualitative analyses to find out how power is established through conversation, how speech affects how people think and make decisions, and how CC and emerging markets conversations reinforce or challenge social structures.

Corpus Evaluation

A methodological approach called CDA is used for the study. CDA looks at extensive text collections with the help of computer-aided methods. It is used to find patterns and topics in the comments of news stories about CC discourse. The following steps in putting a CDA into effect are as follows:

1. Putting together the corpus: The first step is to assemble a corpus of texts relevant to CC discourse found in the comments parts of news articles on the internet. The corpus must adequately represent the people commenting on news stories about CC discourse online.
2. Pre-processing: The next step is to pre-process the text, removing extra data like stop words and punctuation. This step is crucial to ensure the research focuses on the relevant language used in online news comment sections about the CC debate.
3. Research: Different methods, such as frequency and collocation research, are used to look at the data. With these methods, it can find themes and trends in the comments of news stories about the CC debate.
4. The results can be understood better by looking at the power dynamics and ideologies shaping the conversation and how they affect people's feelings about their surroundings. It can find and examine the main narratives or frameworks used in the discourse.
5. Conclusion: Finding conclusions means putting together all the data and explaining how it relates to the CC debate in online news comments.

CDA is an effective tool for examining the formulation of environmental rhetoric in online news comments. This tool identifies trends and trends throughout online news comments about CC discussion and the prevailing narratives or frames employed in the conversation. The methodology encompasses corpus creation, pre-processing, evaluation, comprehension, and conclusions.

Conclusion

CDA is conducted on the pertinent corpus of news articles regarding CC. From an ecolinguistic viewpoint, this study performs a comparative analysis of the paper's title, vocabulary choice, and topic choice to examine the parallels and disparities between the views and behaviors regarding global warming. Reports about China's CC objectively convey their attitudes and perspectives on pertinent events in the title; the text employs predominantly positive and affirmative language to cultivate a responsible image for viewers. Regarding topic choice, there is a preference for authoritative institutions and individuals. Conversely, articles on CC typically emphasize the adverse effects of governmental actions on the nation's future in their headings. The chosen terminology is predominantly negative, with the theme primarily focused. Most themes are directed, focusing on pertinent stakeholders such as entrenched interests. A more comprehensive examination of the news reporting on CC has been done. The suggested method's efficiency is directly influenced by the amount and caliber of the lexicon resources it relies upon. Future studies will focus on leveraging the benefits of CNNs in the

abstraction extraction of features to enhance and increase dictionary supplies.

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