When Algorithms Learn Irony: The Future of AI in Detecting Sarcasm

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In today's digital ecosystem, social media has become a vital platform for expressing opinions about products, services, politics, and daily experiences. Yet, a significant portion of online communication is sarcastic, where words convey meanings opposite to their literal sense. This creates a major challenge for businesses, analysts, and artificial intelligence systems attempting to interpret public sentiment accurately.

To address this issue, recent research introduces an innovative AI framework called SD-GKOT, designed to detect sarcasm in social media conversations. By integrating natural language processing (NLP) with advanced mathematical modelling, the system enhances the ability of machines to uncover hidden meanings in online text and interpret user intent more precisely.

Organizations today depend heavily on social media analytics to understand consumer behaviour and brand perception. They analyse tweets, comments, and reviews to gauge public opinion. However, sarcasm often distorts this analysis. For instance, a statement like "Great, my phone battery died again—just what I needed today!" appears positive but actually expresses frustration. Traditional sentiment analysis systems frequently misinterpret such remarks because they rely on surface-level word meanings rather than contextual intent.

Existing AI models use machine learning and deep learning techniques for sarcasm detection, but they often require vast labelled datasets and still struggle with subtle expressions. Complex forms such as humblebrag—where a person complains while subtly boasting—or oxymoron, which combines contradictory terms like "organized chaos," remain particularly difficult to detect.

As digital communication continues to expand, accurately interpreting online sentiment is becoming increasingly critical.

The SD-GKOT framework addresses these limitations through a structured three-stage approach. First, it performs sentiment analysis to determine whether a sentence appears positive, negative, or neutral. Second, it extracts key contextual phrases using keyword identification techniques, highlighting important elements that may signal sarcasm. Finally, the system applies mathematical optimization and probability-based modelling to identify contradictions between apparent sentiment and contextual meaning—an essential marker of sarcasm.

A notable strength of this model is its ability to detect nuanced sarcasm types, including humblebrag and oxymoron, which are often overlooked by conventional systems. The framework was tested on extensive datasets from platforms such as Reddit, Twitter, and online forums. Results indicated higher accuracy and reliability compared to several existing sarcasm detection models, demonstrating the effectiveness of combining linguistic and mathematical approaches.

As digital communication continues to expand, accurately interpreting online sentiment is becoming increasingly critical. Improved sarcasm detection can provide businesses with deeper customer insights, more reliable brand analysis, and better-informed decision-making. It can also enhance applications such as chatbots, sentiment monitoring tools, and marketing analytics platforms.

Looking ahead, further research could extend this framework to multilingual environments and integrate it with more advanced AI systems. Such developments will help bridge the gap between human expression and machine understanding, enabling technology to better grasp the complexities of real-world communication.