Paper Title: A survey on sentiment analysis methods, applications, and challenges
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1. **Summary**
   - 1.1. **Motivation:** The study shows practical applications in product research, stock market trends, and healthcare, as well as the importance of comprehending public opinion for decision-making. Although it aims to be a useful tool for academics and professionals in modern settings, it also recognizes difficulties with things like sarcasm, irony identification, and informal writing styles.
   - 1.2. **Contribution:** The study emphasizes how sentiment analysis may be used practically to give businesses valuable information about how the public views their products. Sentiment analysis is an essential tool that helps businesses understand and address the emotions present in online material in order to make better decisions and increase customer happiness.
   - 1.3. **Methodology:** The hybrid, machine learning, and lexicon-based methodologies are all combined in the sentiment analysis methodology. Lexicon-Based uses sub-methods such as Corpus-Based and Dictionary-Based, and uses predetermined sentiment ratings for overall polarity. Machine learning uses taught on datasets methods such as SVM, Naive Bayes, Logistic Regression, and others. With the suggested SVM and Random Forest hybrid models, the Hybrid method combines Lexicon-Based and Machine Learning, demonstrating promise in accuracy improvement. This thorough approach provides useful information for real-world sentiment analysis applications.
   - 1.4. **Conclusion:**In summary, the paper investigates sentiment analysis approaches with an emphasis on machine learning, highlighting Naive Bayes and Support Vector Machine for their ease of use and accuracy. It emphasizes common applications and obstacles, emphasizing the importance of nuanced methods owing to domain dependence.

2. **Limitations**
   - 2.1. **Sarcasm Detection and Informal Writing:** Informal writing styles with acronyms and emojis present challenges for sentiment analysis, especially in detecting sarcasm. Efforts to address this, like multimodal analysis, still face obstacles in capturing nuanced language, limiting accurate sentiment interpretation online.
   - 2.2. **Code-Mixing in Multilingual Societies:** Code-mixing, using different languages in a sentence, complicates sentiment analysis due to the lack of formal grammar and mixing guidelines. Research emphasizes the need for tailored language models, revealing limitations in handling sentiment analysis across diverse linguistic contexts.

3. **Synthesis**

   Understanding internet sentiments, including sarcasm and informal writing, helps machines grasp people's true meaning. This is valuable for gauging product opinions and reactions to events. Improving computers' ability to comprehend mixed languages could enhance online communication, offering insights from social media, refining research precision, and optimizing technology use in a diverse linguistic world.