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Cyber Bullying Detection using Machine Learning

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Abstract: Cyberbullying has emerged as a pervasive and psychologically damaging consequence of digital communication, necessitating the development of automated tools for early detection and mitigation. This research presents a machine learning-based approach to cyberbullying detection by targeting two linguistically and structurally distinct platforms: Twitter and Wikipedia. Recognizing the unique characteristics of each platform, we employed a Support Vector Machine (SVM) classifier to analyze short, informal, and often explicit tweets, and a Random Forest classifier to interpret longer, context-heavy Wikipedia talk page comments. Both datasets underwent comprehensive natural language preprocessing and feature extraction using TF-IDF and CountVectorizer techniques. The SVM model achieved an accuracy of 96.02% on the Twitter dataset, indicating high effectiveness in classifying offensive content in short text. In contrast, the Random Forest model attained 65.21% accuracy on Wikipedia discussions, reflecting the inherent difficulty in detecting implicit aggression in more nuanced discourse. The results underscore the importance of platform-specific modeling strategies and highlight the limitations of traditional machine learning models when applied to complex, context-dependent language. This study not only contributes to the growing field of online safety through intelligent moderation but also lays the groundwork for future enhancements using contextual and deep learning architectures tailored for semantic understanding in digital conversations.

Keywords: Cyberbullying, SVM, Random forest

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