# Detecting and Quantifying Emotional Loneliness Risk in the Digital Age: An Innovative Lexicon-Based Text Analysis Method Combining Deep Learning and Rule-Based Classification

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The research addresses the escalating issue of loneliness and its potential progression to suicide, a concern magnified by the advent of social media and heightened by the Covid-19 pandemic. While the silent epidemic of loneliness is increasingly prevalent, as evidenced by alarming suicide statistics and the growth of online communities like Reddit's r/lonely, detecting and addressing this issue remains challenging due to its subjective nature and societal stigma. Traditional methods of intervention, such as counseling, are often inaccessible due to financial and interpersonal barriers. The research gap lies in the need for innovative and interpretable approaches to quickly detect and quantify loneliness efficiently. This research contributes to filling this gap by 1) introducing a novel method for loneliness lexicon construction using an ensemble approach of both deep learning-based bootstrapping method and bag-of-words term weighting method; 2) developing multiple feature extraction methods (including my own lexicon) for loneliness detection and quantification using deep learning and interpretable machine learning methods; 3) validating the approach comprehensively against benchmarks using real world social media posts from Reddit; 4) building a Web-based loneliness detection and quantification system with multiple dashboards. This system could be used by psychiatrists, counselors, social scientists and other interested stakeholders in identifying signs of loneliness through automated analysis of patient engagement and social interactions. This research offers a more accessible and automated means of detecting and understanding the nature and depth of an individual's loneliness, potentially leading to more effective and timely interventions.

**Awards Won:**