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Industrial Engineering Journal
ISSN: 0970-2555
Volume : 53, Issue 5, May :

DETECTION OF SUICIDE-RELATED POSTS IN TWITTER DATA STREAMS

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Industrial Engineering Journal
ISSN: 0970-2555
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Abstract

Suicidal ideation detection in online social networks is an emerging research area with major challenges. Recent research has shown that the publicly available information, spread across social media platforms, holds valuable indicators for effectively detecting individuals with suicidal intentions. The key challenge of suicide prevention is understanding and detecting the complex risk factors and warning signs that may precipitate the event. In this paper, we present a new approach that uses the social media platform Twitter to quantify suicide warning signs for individuals and to detect posts containing suicide-related content. The main originality of this approach is the automatic identification of sudden changes in a user's online behavior. To detect such changes, we combine natural language processing techniques to aggregate behavioral and textual features and pass these features through a martingale framework, which is widely used for change detection in data streams. Experiments show that our text-scoring approach effectively captures warning signs in text compared to traditional machine learning classifies. Additionally, the application of the martingale framework highlights changes in online behavior and shows promise for detecting behavioral changes in at-risk individuals.

Keywords:

Industrial Engineering Journal
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1.INTRODUCTION

According to the World Health Organization (WHO), it is estimated that 800,000 people worldwide die by suicide each year with at least as many suicide attempts. The grief felt in the aftermath of such an event is compounded by the fact that a suicide may be prevented. This reality of suicide has motivated WHO member states to commit themselves to reducing the rate of suicide by a significant percent by 2020.

In an effort to educate the public, the American Foundation for Suicide Prevention (AFSP) has identified characteristics or conditions that may increase an individual's risk. The three major risk factors are: 1) health factors (e.g., mental health, chronic pain), 2) environmental factors (e.g., harassment, and stressful life events), and 3) historical factors (e.g., previous suicide attempts and family history). Additionally, the time period preceding a suicide can hold clues to an individual's struggle. The AFSP categorizes these warning signs as follows: 1) talk (e.g. Mentioning being a burden or having no reason to live), 2) behavior (e.g., withdrawing from activities or sleeping too much or too little), and 3) mood (e.g., depression or rage).

Identifying these risk factors is the first step in suicide prevention. However, the social stigma surrounding mental illnesses means that at-risk individuals may avoid professional assistance. In fact, they may be more willing to turn to less formal resources for support. Recently, online social media networks have become one such informal resource. Research has shown that at-risk individuals are turning to contemporary technologies (forums or micro-blogs) to express their deepest struggles without having to face someone directly. As a result, suicide risk factors and warning signs have been seen in a new arena. There are even instances of suicide victims writing their final thoughts on Twitter, Facebook, and other online communities.

We believe that this large amount of data on people's feelings and behaviors can be used successfully for early detection of behavioral changes in at-risk individuals and may even help prevent deaths. Social computing researches focused on this topic in recent years. However, few initiatives have been concerned with the Realtime detection of suicidal ideation on Twitter. Previously proposed detection methods rely heavily on manually annotated speech, which can limit their effectiveness due in part to the varying forms of suicide warning signs in at-risk individuals. Many of these methods also focus

on the messages published by individuals at a specific time, independent of the whole context, which may be represented by the sequence of publications over time.

2.LITERATURE SURVEY

Certainly! Here's a summary of key research papers on identifying suicidal content in Twitter data streams:

1."Suicide Note Classification Using Natural Language Processing: A Content Analysis" by Burnap, P., & Colombo, G. (2017): This study utilizes natural language processing (NLP) techniques to classify suicide notes on Twitter. It explores linguistic features and machine learning models for effective classification.

2."Detecting Suicidal Ideation in Chinese Microblogs with Psychological Lexicons" by Chen, L., et al. (2018): This research focuses on identifying suicidal ideation in Chinese microblogs using psychological lexicons. It highlights the importance of cultural context and language nuances in suicide detection.

3."Detecting Suicidal Ideation in Social Media Forums Using Deep Learning" by Coppersmith, G., et al. (2018): This paper employs deep learning methods for detecting suicidal ideation in social media forums, including Twitter. It compares different deep learning architectures and evaluates their performance.

4."Suicidal Ideation Detection in Online User Content with Neural Conditional Random Fields" by O'Dea, B., et al. (2019): This study proposes a neural conditional random field model for detecting suicidal ideation in online user content, including Twitter data. It emphasizes the importance of context and sequential information in classification tasks.

5."Suicide Detection in Social Media Texts with Deep Learning" by Zhu, T., et al. (2020): This research investigates the effectiveness of deep learning techniques for suicide detection in social

media texts, including Twitter. It explores different neural network architectures and feature representations.

These papers provide insights into various approaches, techniques, and challenges in identifying suicidal content in Twitter data streams, offering valuable contributions to the field of suicide prevention and mental health support.

3.PROBLEM STATEMENT

The system achieves this understanding by analyzing the characteristics of their social networks. Starting from a set of human annotated Tweets we retrieved the authors' followers and friends lists, and identified users who retweeted the suicidal content. We subsequently built the social network graphs .

3.1 LIMITATION OF SYSTEM

It is not based on a natural language processing (NLP) based approach. There is no technique for emotion change detection.

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4.PROPOSED SYSTEM

In the proposed system, the system addresses the challenge of real-time analysis of Twitter posts and the detection of suicide-related behavior. To process the stream of an individual's online content, we implement a martingale framework, which is widely used for the detection of changes in data stream settings. The input into this framework is a series of behavioral features computed from each individual Twitter post (tweet). These features are compared to previously seen behavior, in order to detect a sudden change in emotion that may indicate an elevated risk of suicide [10].

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5.Implementation

5.1 Tweet Admin

In this module, the admin has to login by using valid user name and password. After login successful he can perform some operations, such as View All Users, Add Filter Category, Add Filter, View All Friend Request and Response, View All Users Tweets, View Tweets All Topic & Comments, View All Suicide-related and non-Suicide-related Posts, View Suicide-related posts Results, View Tweet Topics Rank Results

5. 2 Friend Request & Response

In this module, the admin can view all the friend requests and responses. Here all the requests and responses will be displayed with their tags such as Id, requested user photo, requested user name, user name request to, status and time & date. If the user accepts the request, then the status will be changed to accepted or else the status will remains as waiting.

5.3 User

In this module, there are n numbers of users are present. User should register before performing any operations. Once user registers, their details will be stored to the database. After registration successful, he has to login by using authorized user name and password. Once Login is successful user can perform some operations like View My Profile, Search Friends and Request, Friend Requests By Me, Friend Requests By Others, All My Friends, View My Friends Tweets and Re Tweet, Create Tweets, All My Tweets with Ranks.

5.4 Searching Users to make friends

In this module, the user searches for users in Same Network and in the Networks and sends friend requests to them. The user can search for users in other Networks to make friends only if they have permission.

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6.SYSTEM ARCHITECTURE

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ISSN: 0970-2555
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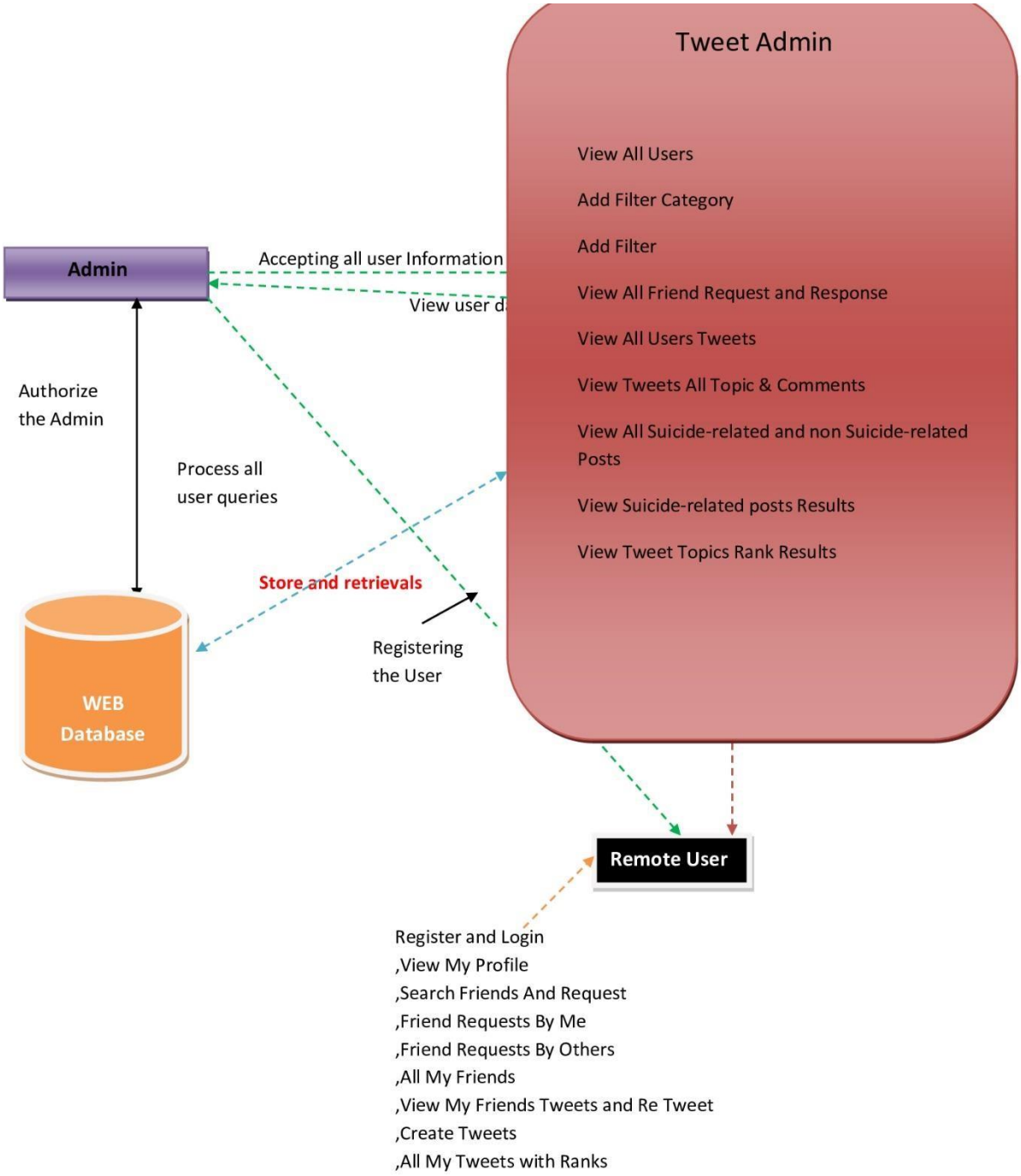

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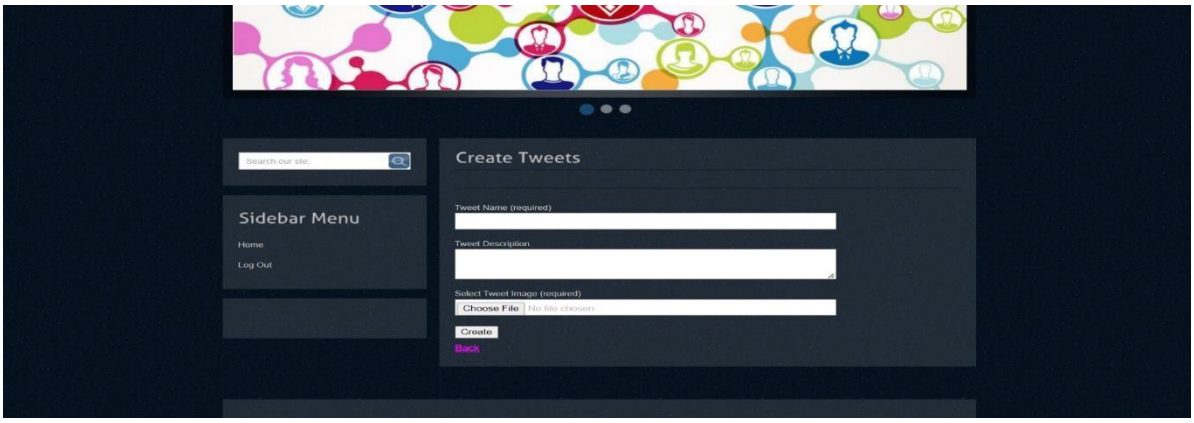
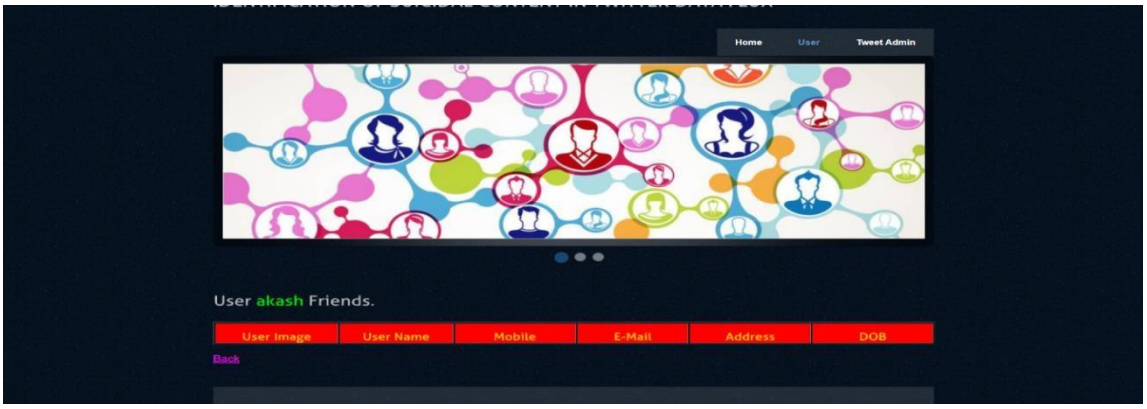
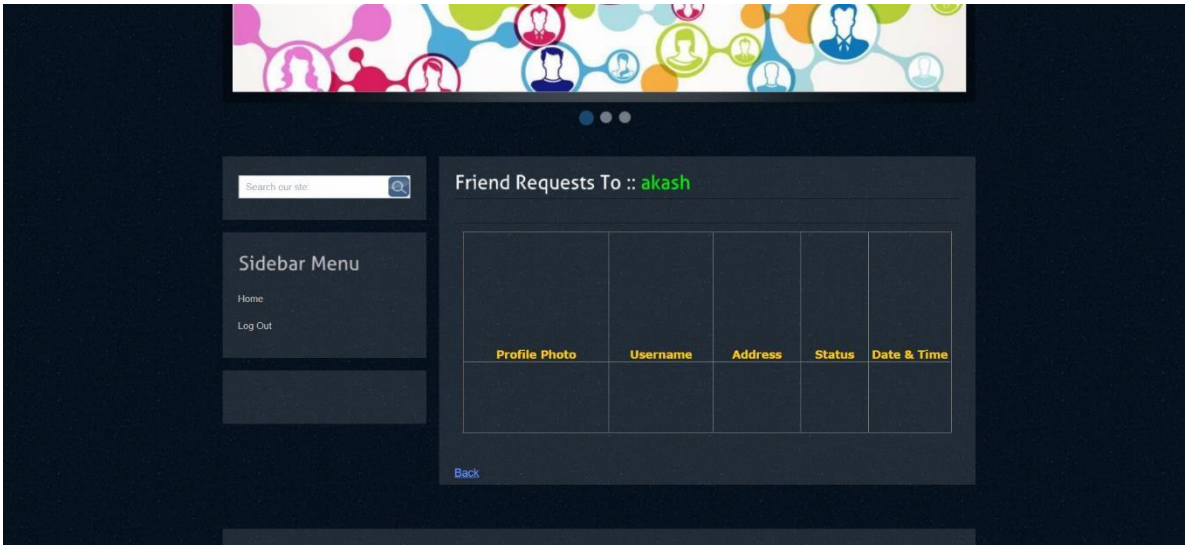
7.OUTPUT EXPERIMENTS







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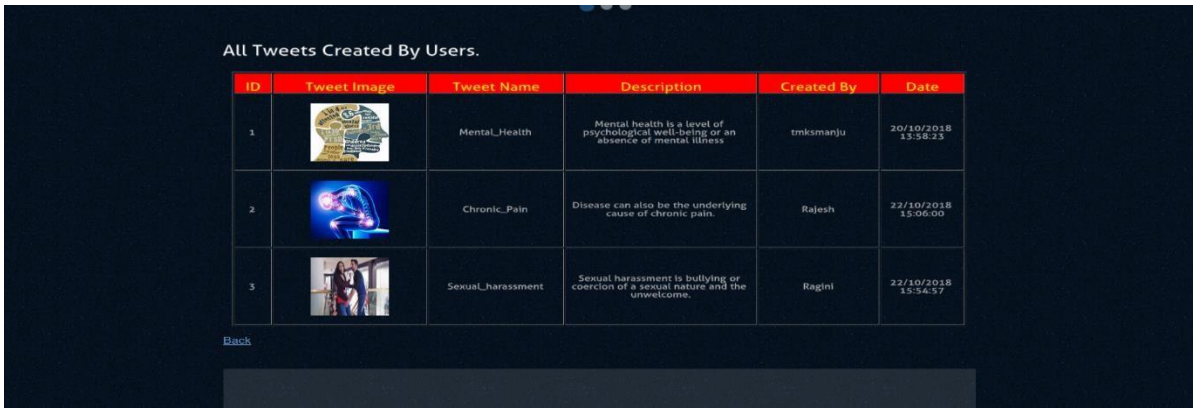

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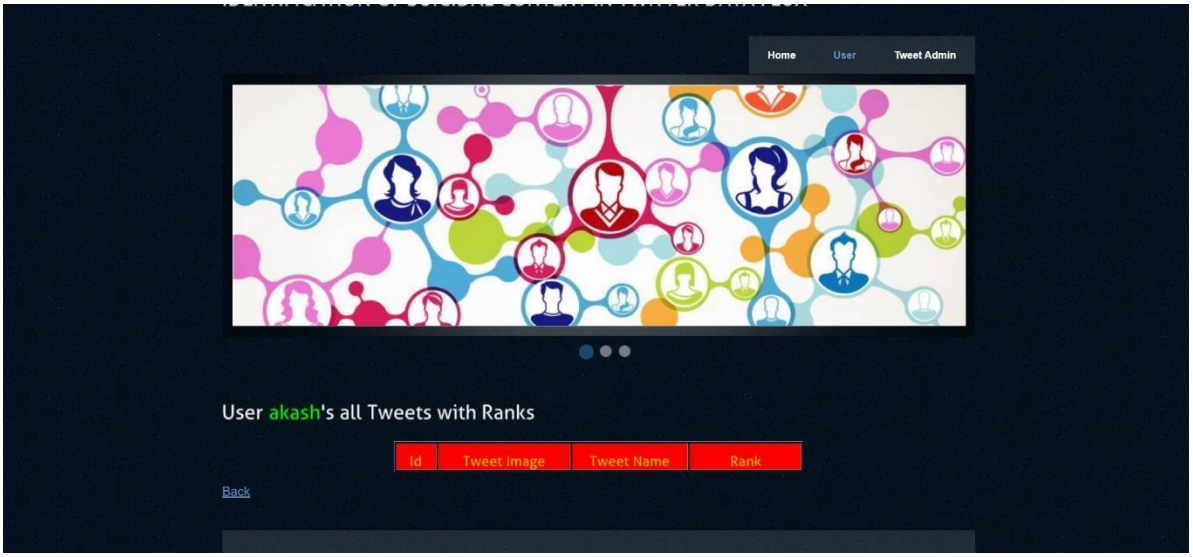

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8.CONCLUSION

In this paper, we designed and evaluated a novel approach to monitor the mental health of a user on Twitter. Building off existing research, we worked to translate and quantify suicide warning signs in an online context (user-centric and post-centric behavioral features). In particular, we focused on detecting distress-related and suicide-related content and developed two approaches to score a tweet: anNLP-based approach and a more traditional machine learning text classifier. To detect changes in emotional well-being, we considered a Twitter user's activity as a stream of observations and applied a martingale framework to detect change points within that stream. Our experiments show that our NLP text-scoring approach successfully separates out tweets exhibiting distress-related content and acts as a powerful input into the martingale framework. While the martingale values "react" to changes in online speech, the change point detection method needs improvement. We were able to detect the true change point for one validation case, but the approach needs to be more robust with respect to parameter setting and positive changes in speech. For future research, we plan to further explore the impact of martingale parameters on the change detection effectiveness. We also hope to expand the approach to include image processing and other social media outlets in order to assess the effectiveness in other settings. Another interesting perspective is to consider more fine-grained emotion classes such as anger, sadness, fear, etc., instead of considering four levels of distress. However, overall, we believe our initial work presents an innovative approach to detecting suicide-related content in a text stream setting.

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9.FUTURE SCOPE

The future scope of identifying suicidal content in Twitter data streams is promising, with advancements in natural language processing (NLP) and machine learning (ML) techniques. Here are some detailed points:

1. Advanced NLP Algorithms: Continued development of NLP algorithms can help in better understanding the nuances of language, including identifying subtle signs of distress or suicidal ideation in tweets.

2.Contextual Analysis: Improving algorithms to consider the context of tweets, such as user history, interactions, and the broader conversation, can enhance the accuracy of identifying potentially suicidal content.

3.Multimodal Analysis: Integrating text, image, and video analysis techniques can provide a more comprehensive understanding of user behavior and content, enabling better detection of suicidal indicators across different types of media shared on Twitter.

4.Real-Time Monitoring: Implementing real-time monitoring systems that can analyze tweets as they are posted can enable timely intervention and support for individuals expressing suicidal thoughts or behaviors.

5.Collaboration with Mental Health Professionals: Collaboration between data scientists, NLP experts, and mental health professionals can lead to the development of more effective algorithms that are sensitive to the complexities of mental health and can provide appropriate resources and support to individuals in distress.

6.Ethical Considerations: Addressing ethical concerns regarding user privacy, consent, and the responsible handling of sensitive data is crucial in the development and deployment of algorithms for identifying suicidal content on Twitter.

7.Global Perspective: Considering cultural and linguistic differences in expressions of distress and suicidal ideation is important for creating algorithms that are effective across diverse populations and languages.

By focusing on these areas, the future of identifying suicidal content in Twitter data streams holds promise for providing support and resources to individuals in need, ultimately contributing to suicide prevention efforts.

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