



# Suicide and self-harm prediction based on social media data using machine learning algorithms



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## ARTICLE INFO

## ABSTRACT

### Article history

Received April, 04, 2023

Revised April, 11, 2023

Accepted May, 06, 2023

### Keywords

Social networking

Machine learning

Algorithms

Suicide

Self-harm

Online social networking (SN) data is a context and time rich data stream that has showed potential for predicting suicidal ideation and behaviour. Despite the obvious benefits of this digital media, predictive modelling of acute suicidal ideation (SI) remains underdeveloped at now. In combined with robust machine learning algorithms, social networking data may provide a potential path ahead. Researchers applied a machine learning models to a previously published Instagram dataset of youths. Using predictors that reflect language use and activity inside this social networking, researchers compared the performance of the out-of-sample, cross-validated model to that of earlier efforts and used a model explanation to further investigate relative predictor relevance and subject-level phenomenology. The application of ensemble learning approaches to SN data for the prediction of acute SI may reduce the complications and modelling issues associated with acute SI at these time scales. Future research is required on bigger, more diversified populations to refine digital biomarkers and assess their external validity with more rigor.

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## 1. Introduction

The term "social media" refers to an online platform that enables social interaction, such as Facebook, Twitter, YouTube, and Instagram [1]. [2] assert that social media is fundamentally defined by three critical concepts which are cognition, communication, and cooperation. These concepts endow social media with a variety of various forms of sociality, including information, facts, and knowledge, activities, relationships, communities, and partnerships [2]. The numerous forms of sociality that social media supports allowing the platform to serve a variety of critical roles for its users, notably communication, relationship creation and maintenance, and thus a platform for providing knowledge [3]. These features are highly valued by social media users, particularly young adults. Youth are classified as ardent social media users in a variety of research conducted globally [3].

Malaysian youth are likewise reported to be avid social media users. While there is no debate about the use of social media [4], it is also necessary to exercise caution regarding the medium's hazards. Spam hoaxes, cyberbullying, online harassment, and sexting are just a few of the dangers [1]. Youth who use social media risk privacy assaults and depression [1]. These dangers can be avoided if youth possess an

acceptable level of social media competency. Presently, social media platforms such as Facebook and Instagram have become the primary sources of information for assisting people of modern society in adjusting to their new lifestyle. Indeed, the global population of social media users is predicted to reach 3.02 billion by 2021, and one of the important uses of social media may be to encourage healthy lifestyles and to enhance people's management of their health status [5]. In Malaysia specifically, a 2018 poll performed by the Malaysian Communications and Multimedia Commission (MCMC) discovered that many Malaysian internet users, particularly young users, shared content online via social media (61.8 percent). According to the survey, 97.3 percent of Malaysians use Facebook, making it the country's most popular social networking site, followed by Instagram, which has a user base of 57.0 percent [6]. And though the overall number of Facebook users in Malaysia is greater than the number of Instagram users, a January 2019 social media users' trend indicated that Instagram was more popular among Malaysian young users aged 18 to 24 years old, with 31.9 percent compared to 24.4 percent Facebook young users [7].

With machine learning and deep learning algorithms, this study will collect, and preprocess collected data sets from the social media. There will be a classifier that is a few of machine learning algorithms. The more variables a classifier can learn from, the greater, and the random forest evaluates the relative value of each characteristic in predicting the probability of any particular post displaying suicidal and self-harm purpose.

## 2. Method

### 2.1. Data Preparation

The data preparation phase is vital to the development of this study. This phase assembles datasets on suicide and self-harm on social media to meet specific needs. This phase is divided into two sections: data collection and data processing. The Fig. 1 below provides context for this period.

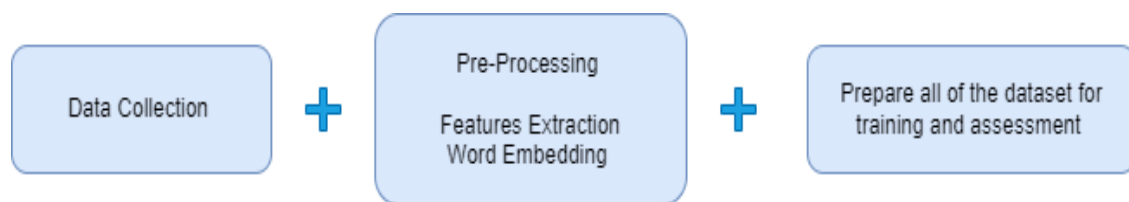


Fig. 1. Data Preparation

### 2.2. Datasets

To identify suicidal ideation, this study will develop classification models using an Instagram social media dataset in which users can express themselves through text, posts, links, or voting mechanism postings. They converse via comment threads related to each post [8]. [9] created the dataset for this investigation, which comprises of a list of suicide-indicative and non-suicidal posts. To protect users' privacy, personal information is substituted for a unique ID. Due to the users' proclivity for engaging in a variety of sub-Instagram's, each group is comprised of an equal number of messages generated from a variety of themes. This dataset includes only numeric values. As shown in Fig. 2, The table contains 59 columns and 28 rows, with each row representing a distinct sort of information.