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Artificial intelligence in social networks: allies in the detection of suicidal tendencies

In Spain, the taboo associated with mental problems and the difficult access to psychological consultations make it very difficult to help people who suffer from depression or who have eating disorders. A public health problem exceeding 3,000 victims a year which, according to the World Health Organization, has an emotional impact on at least six people associated with each victim. In this article, a multidisciplinary research group presents the STOP project ((Suicide prevention in social Platforms), whose objective is to search for and analyze patterns of suicidal behavior by applying Artificial Intelligence to social networks.

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Suicide is a serious public health problem that causes more than 3,000 victims a year in Spain. In addition, the World Health Organization states that each suicide intimately impacts at least six other people. **The taboo associated with this phenomenon, the scarce education in mental health, and the difficult access to psychological consultations** are among the main reasons why people with mental problems do not receive an adequate diagnosis or treatment. In contrast to this, Social networks have been shown to be effective means of detecting problems such as depression or eating disorders, which in very extreme cases can lead to suicidal ideation.

The STOP (Suicide prevention in social Platforms) project, led by Dr. Ana Freire, a

researcher at the Department of Information and Communication Technologies at the Pompeu Fabra University in Barcelona, surges with the aim of **analyzing social networks in search of suicidal behavior patterns**. Around 8,000 tweets are published each second, these tweets contain very valuable information for different research fields, including those related with the study of mental health issues. In this case, we train artificial intelligence algorithms so that they can distinguish patterns of high risk and low risk of suicide, this is done with completely anonymized data that is labeled by experts in mental health.

In the context of this project, as researchers, psychologists and psychiatrists from the Pompeu Fabra University, the Center for Computer Vision of the Universitat Autonoma de Barcelona and the Hospital Universitari Parc Taulí in Sabadell, **we have jointly developed a multidisciplinary research project** in which, by analyzing the text, images, and activity of Twitter users, suicidal behaviors can be detected with an 85% of accuracy. This contribution, based on artificial intelligence techniques, has been published in the prestigious Journal of Medical Internet Research (JMIR) and is available for consultation.

We believe that this is the first publication that: 1) deals with this problem by analyzing text in Spanish while considering the posting history of each user; 2) generates an exhaustive methodology for the collection of data related to suicide with the intervention of mental health experts, and 3) performs the analysis of images, text and the activity of users. The main contribution of this work is that for the development of the predictive models we explore images, along with aspects that are normally considered by specialists in the diagnosis process such as: the analysis of the interactions between users, sleeping patterns, and the existence of risk factors.

This work has allowed us **to learn about the elements that characterize groups at "high suicide risk" and "risk-free" groups**: the first group tends to speak more in first person, use terms that express denial and terms related to feelings, among which anxiety stands out. It has also been observed that they tend to have fewer friends (accounts that they follow), they write texts with fewer characters and are more active on weekends and at night. This collaboration has also made it possible to demonstrate that there may be a certain correlation between the content of the images shared by users on social networks, and their mental health conditions, according to Dr. Jordi González, researcher at the Center for Computer Vision (Universitat Autònoma de Barcelona), and collaborator of the STOP project along with his team.

Dr. Ricardo Baeza-Yates, also author of the work, highlights the importance of algorithms such as the one recently published, for finding new factors that can assist on the definition of effective diagnoses, and that can contribute to stop considering suicide as a taboo subject in our society.

As a project, STOP has started **a crowdfunding initiative to expand its research** to other mental health issues such as eating disorders.

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