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Depression Analysis Via Social Media

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Abstract— Stress and Depression is one of the most widely recognized and handicapping mental issue that relevantly affects society. Automatic health monitoring systems could be crucial and important to improve depression and stress detection system using social networking. Sentiment Analysis alludes to the utilization of natural language processing and content mining approaches planning to recognize feeling or opinion. Full of feeling Computing is the examination and advancement of frameworks and gadgets that can perceive, decipher, process, and mimic human effects. Sentiment Analysis and deep learning techniques could give powerful algorithms and frameworks to a target appraisal and observing of mental issue and, specifically of depression and stress. In this paper, the application of sentiment analysis and deep learning methodologies to depression and stress detection and monitoring are discussed. In addition, a fundamental plan of an incorporated multimodal framework for stress and depression checking, that incorporates estimation investigation and full of feeling processing strategies, is proposed. In particular, the paper traces the fundamental issues and moves comparative with the structure of such a framework.

Keywords— stress and depression; ehealth; sentiment analysis, social media, deep learning.

I. INTRODUCTION

Social media is arguably the richest source of human generated text input. Opinions, feedbacks and critiques provided by internet users reflect attitudes and sentiments towards certain topics. This paper presents a knowledge-based system, which includes an emotional health monitoring system to detect users with possible psychological disorders specially depression and stress. Symptoms Of these psychological disorder are usually observed passively. In this situation, author argue that online social behaviour extraction offers an opportunity to actively identify psychological disorder at an early stage. It is difficult to identify the disorder because the psychological factors considered in standard diagnostic criteria questionnaire cannot be observed by the registers of online social activities.

Depression and stress is one of the most common and disabling mental disorders, and has a relevant impact on society. Currently, methods for depression and stress detection and diagnosis rely on self-reporting coupled with the health care practitioners informed assessment. The provision of effective health monitoring systems and diagnostic aids could be crucial and important to improve health professional's work and lower healthcare costs. Sentiment and deep learning technology could help to tackle these objectives by providing effective tools and systems for objective assessment. Such tools and systems do not aim to replace the psychologist or psychiatrist but they could support their decisions.

II. Related Work

Renata L. Rosa, Gisele M. Schwartz, Wilson V. Ruggiero, and Dem´ostenes Z. Rodr´iguez - Online social networks (OSN) provide relevant information on users' opinion about different themes. Thus, applications, such as monitoring and recommendation systems (RS) can collect and analyze this data. This paper presents a Knowledge-Based Recommendation System (KBRS), which includes an emotional health monitoring system to detect users with potential psychological disturbances, specifically, depression and stress.

Guang Yang, Haibo He, Fellow, IEEE, and Qian Chen - Sentiment analysis on microblog posts has been studied in depth, sentiment analysis of posts is still challenging because of the limited contextual information that they normally contain. In microblog environments, emoticons are frequently used and they have clear emotional meanings. They are important emotional signals for microblog sentimental analysis. They address this issue by constructing an emotional space as a feature representation matrix and projecting emoticons and words into the emotional space based on the semantic composition.

III. Proposed Work

A. Problem Defination

To design a system to find depressed users via social media network and to find positive and negative comments using sentiment analysis.

B. Proposed System

The first step in the system involves data collection, where a diverse dataset of social media posts and user details is gathered from various platforms. This dataset needs to be carefully curated to include a representative mix of posts from individuals with and without depression. It is essential to maintain a balanced dataset to ensure accurate training and evaluation of the deep learning model.

Once the data is collected, the next step is preprocessing. This involves cleaning the data by removing noise, irrelevant information, and personally identifiable details. Textual data can be normalized through techniques like stemming or lemmatization, making it more suitable for analysis. The preprocessing step ensures that the data is in a suitable format for the subsequent stages.

Feature extraction is then performed to derive meaningful representations from the preprocessed data. This can involve converting the text into numerical features using techniques such as word embeddings or bag-of-words representations. Additionally, relevant user-related features like posting frequency, engagement metrics, or social network characteristics can be extracted to provide a holistic view of the users and their behavior.

With the extracted features in hand, a deep learning model is developed using Java and deep learning libraries such as Deeplearning4j or DL4J. The model's architecture can vary based on the specific requirements, but popular choices for text classification tasks include recurrent neural networks (RNNs) or convolutional neural networks (CNNs). These models are trained using the preprocessed data, and their parameters are optimized iteratively to minimize the loss function.

The trained model is then evaluated using a testing dataset to assess its performance. Common evaluation metrics such as accuracy, precision, recall, and F1 score are calculated to gauge the model's ability to detect depression accurately. The system's effectiveness in identifying individuals with depression is measured based on these metrics.

A. Dataset Description

Social Media Posts: The dataset would include a collection of posts made by users on various social media platforms such as Twitter, Facebook, or Instagram. These posts can be in the form of text, images, or videos. They should cover a range of topics and reflect users' thoughts, emotions, and experiences.

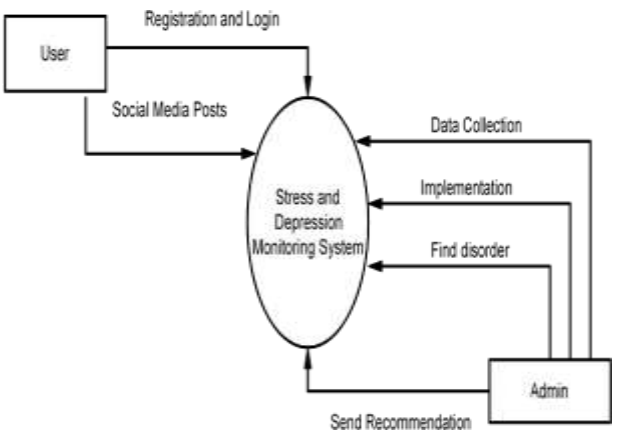
User Information: Along with the posts, the dataset would contain relevant user information. This may include demographic details such as age, gender, location, and occupation. Additionally, information about the users' social network connections, posting habits, and engagement metrics (e.g., likes, shares, comments) can also be included.

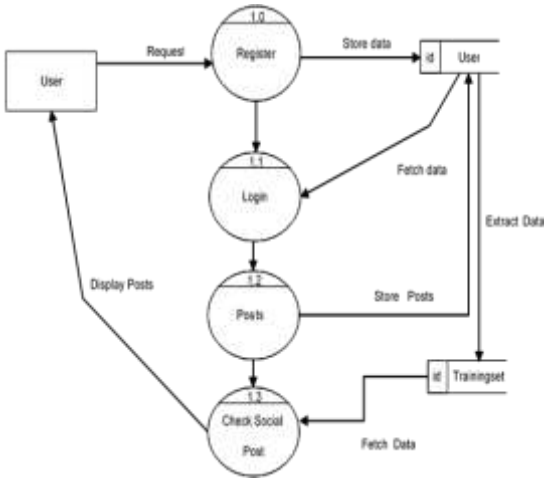
Labels or Annotations: Each post in the dataset needs to be labeled or annotated to indicate whether the user has depression or not. These labels can be assigned based on clinical assessments, self-reported information, or other reliable indicators of depression. It is crucial to have a balanced dataset with a representative number of posts from users with and without depression to ensure accurate model training and evaluation.

Preprocessing Metadata: The dataset may include preprocessing metadata that describes any transformations or cleaning steps applied to the raw data. This metadata can help ensure reproducibility and allow researchers to understand the data preprocessing steps taken.

B. Analysis of model

1. Data flowdiagram





B1. Support Vector Machine

Step1: SVMs maximize the margin around the separating hyperplane.
Assume linear separability for now:
in 2 dimensions, can separate by a line
in higher dimensions, need hyperplanes
Can find separating hyperplane by linear programming (e.g. perceptron):
separator can be expressed as ax + by = c
Step2: The decision function is fully specified by a subset of training samples, the support vectors.
Step3: Quadratic programming problemStep4: Text classification method
For example,
Consider that you have 3 set of labels (0, 1, 2) and series of 0s and 1s indicate what label they belong too. We will train a *LINEAR SVM* classifier based on this training data. I will also show how you can save this model for future reuse so that you don't need to train them again. The test data will also comprise of a series of 0s and 1s and now we need to predict the label from the label set = {0, 1, 2}.
A combination of these 0s and 1s in the feature vector along with the known label will be the training input to our SVM classifier. It should be noted that the label in the feature vector should be numeric only for the SVM classifier. Hence, I use 0 for positive, 1 for negative and 2 for neutral labels.
4) Performance Evaluation: The evaluation can be done based on following factors:

i) Performance matrices such as TPR FPR Precision Recall etc.

ii) Impact of spam to Non-spam ratio

iii) Impact of Different Sampling method

iv) Investigation of time related data

CONCLUSION AND FUTURE WORK

In this proposed system, automatically identifying potential online users with depression and stress is threatening people's health. Thus users suffering from depression can be identified and they might be helped before they take any drastic steps which might have a long lasting impact. Using the data of the social networks of the real world as a basis, we study the correlation between the states of psychological disorder of users and their social interaction behaviour we recommend the user for health precautions to send by mail for user interaction

Furthermore, we intend to continue to explore new problems from the point of view of a social network service provider improve the well-being of OSN users without compromisinguser participation.

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