



Mental health analysis of students using Sentiment recognizer

Sector - Healthcare

Analyzing the mental health of students through their social media posts and counseling chatbot for early detection of depression and anxiety issues.

Team Name: ALPHA_AI

Institution : IIT Madras

Team Members: Pruthvi Raj R G

Om Shri Prasath

Adithya Swaroop S

Nikhil Mattapally

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Overview

Stress in students is a worrying factor and many times it leads to Depression or hypertension and in a few cases students may take drastic steps. This can be avoided by early detection in their behavior and assessment of it. As the majority of students are active in social media we can use the data generated(text and images) by them for early detection of symptoms.

We have divided our problem into two parts, one is the early alerting system which is done by analyzing social media posts and the other one is self-inspection tool which helps to analyze one's mental health. Analyzing the mental health of students through their social media posts and counseling chatbot for early detection of depression and anxiety problems



Technological Stack

01

AI BACKEND

Models - BERT(state of the art model for NLP) , LSTM(Long Short-Term Memory).

Libraries - Intel-Numpy, Intel-Tensorflow, Daal4py, Pandas, Keras, Gensim, NLTK.

02

DEPLOYING AND HOSTING

Language - Intel® Distribution for Python.

Servers - Intel® Xeon® Scalable Processors

03

FRONTEND

Development tools - Android Studio

Language - Java




Working details

Using the Sentiment analyzer module we can get the category to which a sentence belongs to. For the prototyping phase we have built a classifier with LSTM architecture, using a database of tweets. When the posts of a student/persons is repeatedly found to be negative (stress, suicidal, guilt, depression, anger, hate etc.) we ring an alarm bell to the person concerned. We can also analyze the comments made by others on the user's post to find abnormal emotions expressed. This is especially useful in case for parents to take care of children when they are 'online'. When we encounter images, it will not be easy to understand the meaning of it. We plan to use the image description available online to understand the image using the same model.

ML MODEL

It is built using Daal4Py to optimize the Sklearn library that we are using. We cleaned the textual data using Regular Expressions, The model architecture consists of 100 LSTM cells stacked together. We have included Dropout layers to reduce overfitting. The model is trained using 1.2 million Twitter data. We had initially thought of implementing Bert architecture for this(due to its ability to understand contextual information); however due to the complexity of the data, we are forced to train on huge amount of data. Hence we plan to use intel's accelerated tools for speeding up our training and testing.



The second module that we have developed is a counseling chatbot. The bot will ask several questions to determine the mental state of the person taking the test. We have used the questionnaire recommended by international standards. The chatbot can take separate test for depression and anxiety (It will automatically determine which test to take based on the reply by the user). The chatbot calculates a final score based on the answers, higher score meaning more chance of having an issue. It also asks the user to visit a doctor if the risk is high.

This analysis can be used a preliminary report to help the psychologist to get an initial insight into the mind of the patient. This will also help him drive the conversation in the right direction from the beginning itself. This will save time during the counselling session.



Further Improvements

Further improvements can be made 2 main areas of our work

1. Improving Sentiment analysis model
2. Enabling real time classification in chatbot

For Sentiment analysis we have to used a 100 unit LSTM instead of BERT because with training data around 1.3 million sentences for which we faced trouble training it.

So we are planning to use Intel optimized BERT module and Intel Xeon Processors which reduces the training time.This can allow us to improve the complexity of our model by classifying different types of illness

like Anxiety and depression separately which can make us to better diagnose the illness.

This improved performance can also be used to enable real time classification of text . This results in a more detailed report from chatbot allowing us to perform a better diagnosis.

Some design improvements which we propose are adding a professional support section in our app so that we can make further treatment affordable and available to everyone.

Another improvement is to send the chat report to the parents in case of parental control for better understanding to the parents of the child.

Intel products used :

1. Intel® Distribution for Python for complete program development using Python.
2. Intel® Data Analytics Acceleration Library for speeding up libraries like sklearn.
3. Intel® Optimized frameworks for accelerating our model built in tensorflow and torch.
4. Intel® MKL for accelerating Numpy.
5. Intel® Xeon® Scalable Processors for deploying the sentiment analysis server as it needs to handle lot of queries.(plan)
6. Intel® OpenVINO toolkit for deploying tensorflow/pytorch model on the edge(plan).
7. Intel® Parallel Studio XE for development and optimization of code.

