



Software

# INTEL PYTHON HACKFURY2

Mental health analysis of students using  
Sentiment recognizer

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# Introduction



- Stress is the physical and mental response of the body to demands made upon it. It is the result of our reaction to outside events, not necessarily the events themselves.
- Numerous dead lines, multiple examinations and peer pressure can push students into a vicious cycle of severe stress.

# The Problem



- Stress in students many times leads to psychological effects like problems with cognitive functioning, anxiety and depression.
- In a few cases, students may even take drastic steps.
- Cigna 360 Well-Being survey revealed that 95 percent of Indian millennials between the age group of 18-34 are stressed. One in eight Indians has serious trouble in dealing with stress. This is even worse in youngsters as they are not used to it.



# Proposed Idea

- Consequences can be avoided by early detection of stress and assessment of mental health.
- Social media activity provides an insight into the mental state of the student
- Classroom behavior is also a valuable tool as students spend significant amount of their time in classes.
- We use the data generated by them for early detection of symptoms and offer assistance at the right time.

# Our Solution

## Functional Modules:

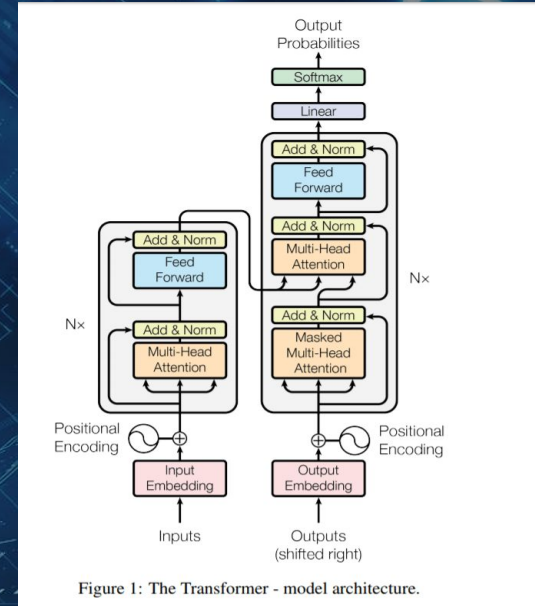
1. **Sentiment Analysis Model** - To understand the sentiment in the posts.
1. **Behaviour Analysis Model** - To understand the classroom behaviour of students.
1. **Chatbot** - To enable continuous emotional support and evaluation of students mental health.



# Sentiment Analysis Module

- A deep learning based module which can classify sentences into categories ie. Negative and Positive(prototype)
- Uses transformer architecture(BERT) for classification task.
- Trained on twitter data on Intel NLP architect.

NLP  ARCHITECT



# Behavioral Analysis Module

- A computer vision based module which can detect the attentiveness, emotion and drowsiness of students.
- Built using Intel OpenVINO toolkit. Standard models taken from Intel-OpenVINO model zoo.

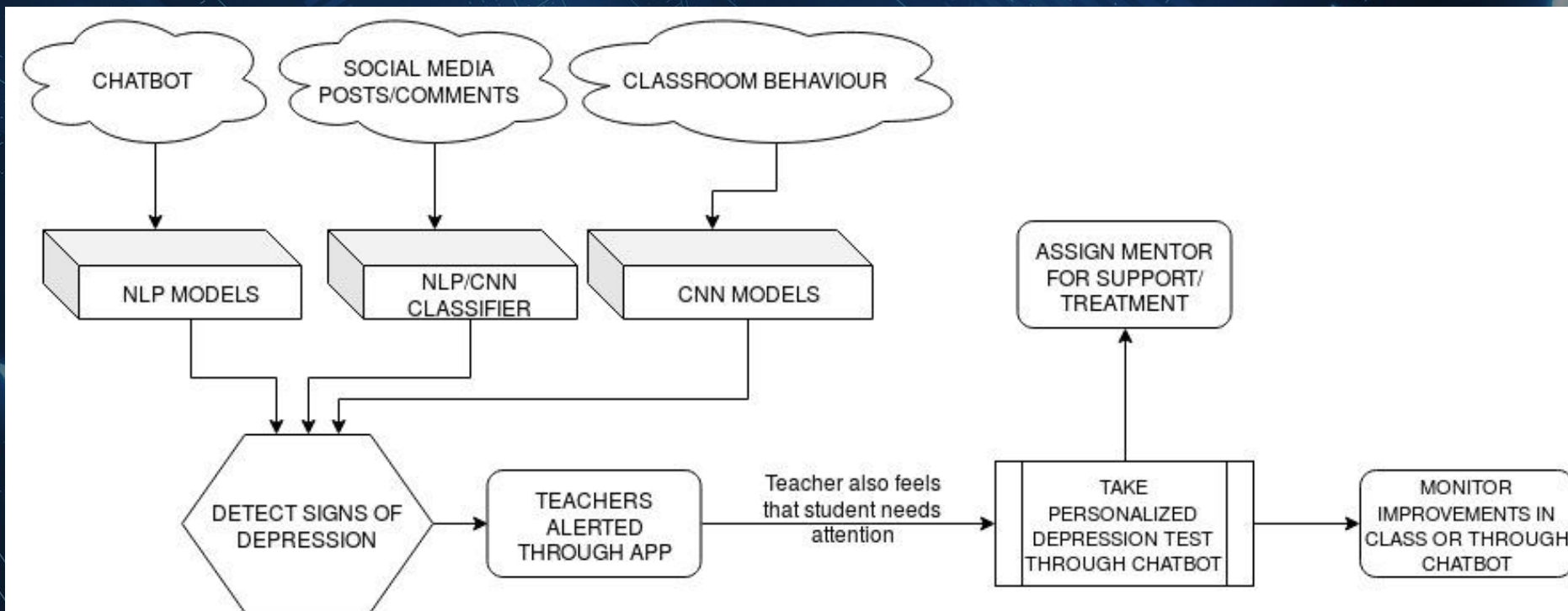




# Chatbot

- Conversational agent which provides emotional support during distress by thought provoking activities and administers standard tests for analyzing mental state of student.
- Uses sentiment analysis model for understanding students responses, later aggregates them to generate a final risk score.

# Control flow





# Advantages of Intel tools

1. NLP architect provides a quick and easy way for prototyping state of the art architectures.

LSTM based architecture - Training set - , Training time and accuracy.

Bert based architecture implemented using NLP architect - Training set - , Training time and accuracy.

1. Open VINO has a plethora of pretrained models, OpenVINO provides high throughput along with quick inference on heterogeneous platforms like CPU, Intel Stick etc..
2. OpenVINO can be deployed on edge i.e. in mobiles . reduces privacy risk and inference time.

# Demo - 1 Sentiment Analyser

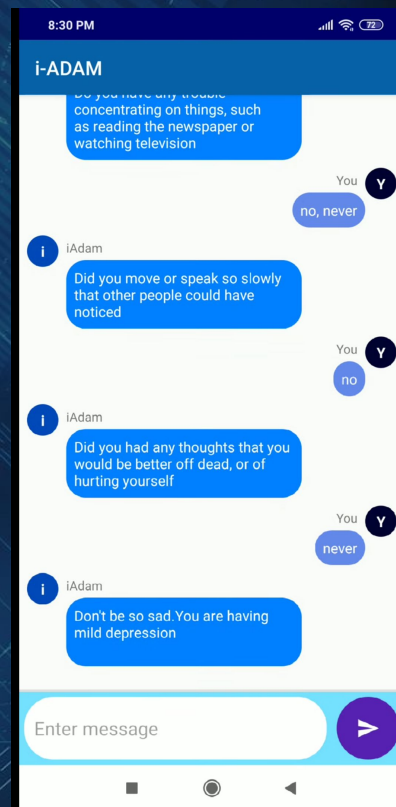
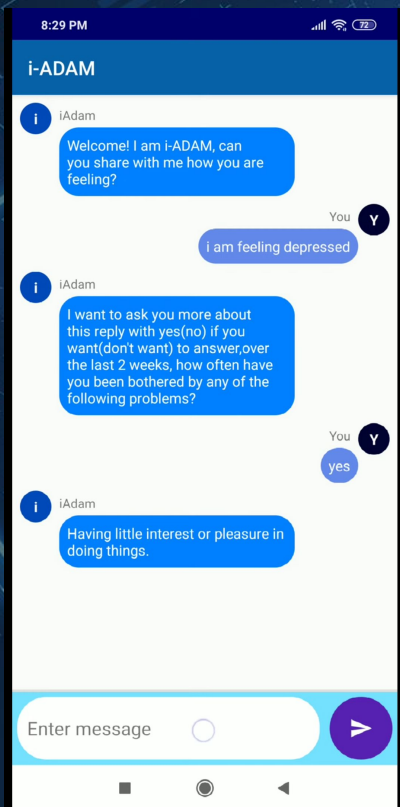
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nikhil@nikhil-Vostro-3546: ~/IntelHack
File Edit Tabs Help
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file /tmp/twitter/pytorch_model.bin
10/20/2019 11:42:59 - INFO - nlp_architect.models.transformers.sequence_classification - Writing example 0 of 500
10/20/2019 11:42:59 - INFO - nlp_architect.models.transformers.base_model - ****
* Running inference *****
10/20/2019 11:42:59 - INFO - nlp_architect.models.transformers.base_model - Batch
size: 8
Inference iteration: 100%|██████████| 63/63 [02:15<00:00, 2.16s/it]
10/20/2019 11:45:15 - INFO - nlp_architect.models.transformers.sequence_classification - ***** Eval results *****
10/20/2019 11:45:15 - INFO - nlp_architect.models.transformers.sequence_classification - acc = 0.846
(intelnlp) nikhil@nikhil-Vostro-3546:~/IntelHack$
```



# Demo -2: OPENVINO Behaviour Analysis

# Demo-3 Chatbot





# Further Improvements

- Adding finer classes into sentiment recognizer model. I.e Anger, guilt, suicidal etc.
- Likes, comments and images can also be used for sentiment analysis.
- Behavioural model can be used for live feedback of class for teachers.
- Reports of psychologists can be analyzed and a machine learning based solution can be built for administering tests.
- Integration of study planners into chatbot for further ease of stress.