Shaastra AI Challenge 2018 - Phase I Ideation

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Theme and Problem Statement

> Theme : AI in Healthcare

> Problem Statement : Inaccuracy and Uncertainty in diagnosing mental health diseases like stress, depression and anxiety.

> Existing Solution : They are diagnosed by means of abstract methods such as Quiz, Questionnaire or Discussion with the patient.

Inspiration for the Problem

Sarah Taylor to miss World T20 with anxiety condition

ESPNCRICINFO STAFF

Sep 28, 2018 3 Minute Read

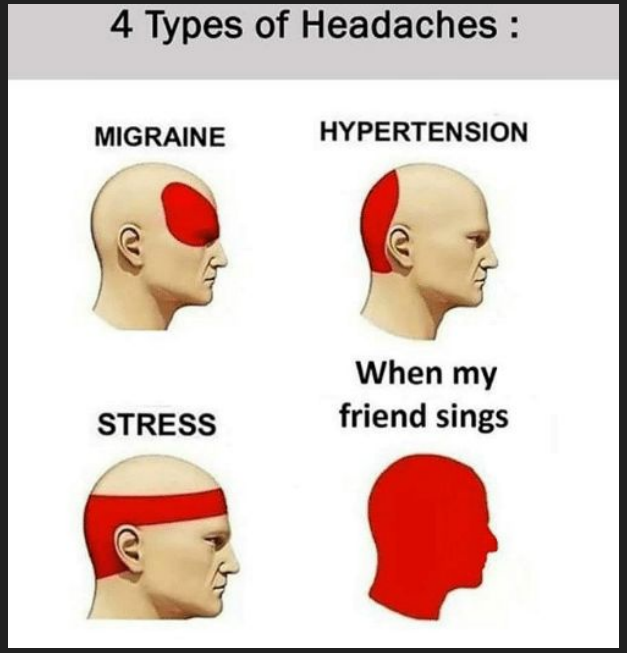
Sarah Taylor pulled off a sensational stumping
Getty Images

Sarah Taylor, the England wicketkeeper, will miss the Women's World T20 in the Caribbean in November due to the ongoing treatment of the anxiety issue that has caused her to take regular time away from the game in recent seasons.

Gravity of the Problem

- “Nearly 9 in 10 Indians suffer from stress. In fact, the recently-released findings of the 2018 Cigna 360 Well-Being Survey - Future Assured, conducted by Cigna TTK Health Insurance, show that stress levels are higher in Indian compared with other developed and emerging countries, including the United States, the UK, Germany, France, China, Brazil and Indonesia.”
- “According to Moneycontrol, the survey further revealed that 95 per cent of Indian millennials between the age group of 18-34 are stressed compared to the global average of 86 per cent. Making matters worse, one in eight Indians have serious trouble in dealing with stress but nearly **75 per cent of the Indian respondents said they don't feel comfortable talking to a medical professional about their stress.** Consultation cost was cited as one of the biggest barriers to seeking professional help.”- Article Published on Business Today dated 9th of July 2018

Inspiration for our solution

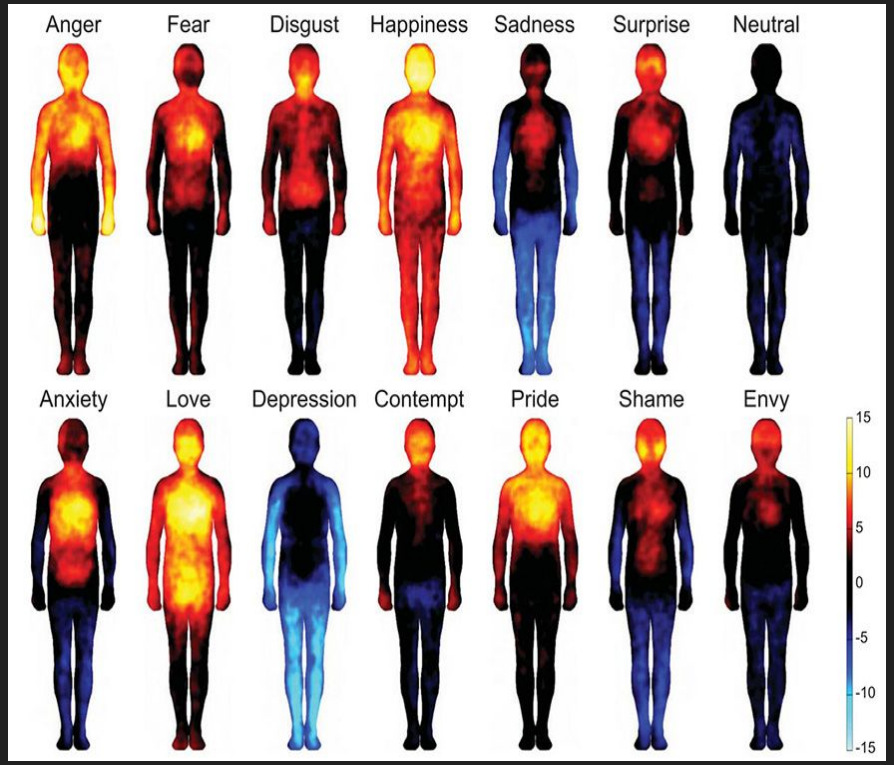


This meme gave us a spark for a solution to cash in on.

Our Solution

“Detection of Mental Health diseases with accuracy by means of generating a body heat map of the patient with the help of a thermal camera and applying techniques of image processing and Deep Learning image classification models to measure the magnitude of the detected disease.”

Science behind the Solution



Note: warm colors indicate regions of increased sensation while blue and black areas represent decreased sensation.

A group of biomedical engineers from Aalto University researched 700 volunteers from Finland, Sweden and Taiwan in order to map human bodily sensations connected with certain emotions.

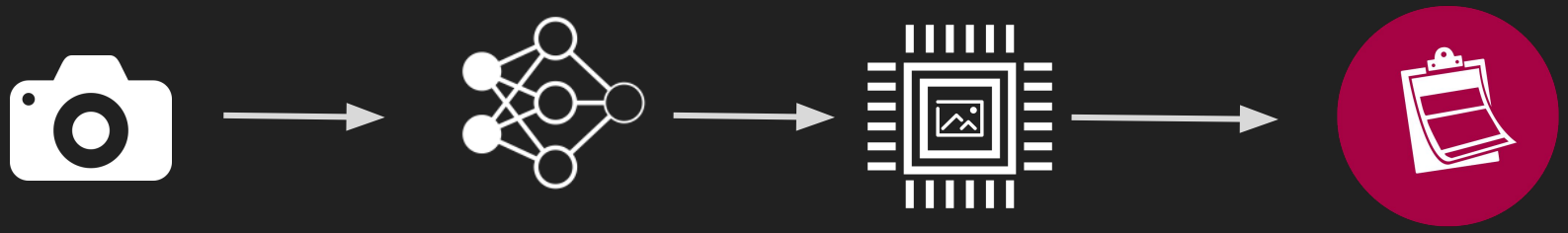
The results show that happiness and depression, as expected, are the most contrasting emotional states – love increases the bodily activation most of all, and depression – decreases it the most. The least activating emotions in the head area are sadness, neutral and depression. The most approach-related emotions, such as love, anger, happiness and pride activate the arms, while the chest area is activated experiencing most of the emotions, except for neutral emotion and the state of depression.

The complete results are published in the journal Proceedings of the National Academy of Sciences.

Technology (AI) behind the Solution

- Datasets of 100s of such Labelled Body Heat Maps can be collected and feed into the Image Classifying model empowered by Convolutional Neural Networks for training.
- The trained model will thus be able to map the given unlabelled body heat map to its corresponding mental health condition with the help of the concept of Deep Learning.
- The magnitude of the thus identified condition can be computed by means of Image Processing with the help of the colour scale.

Flow of the solution



STEP 1

The body heat map of the mentally diseased people is captured by an IR Thermal Camera

STEP 2

The Captured Image is sent into a Convolutional Neural Network for the mapping of the given heat map into its corresponding mental conditions

STEP 3

The heat map is then sent into a image processing function where the pixels matching the given colour scale determine the intensity of the condition

STEP 4

Accurate Results of the Diagnosis

Our Toolkit


Keras
TensorFlow
NVIDIA
scikit-image
image processing in python
amazon
web services
pandas
$y_i t = \beta' x_{it} + \mu_i + \epsilon_{it}$
NumPy
OpenCV

Reference Links

1. Supporting Information
2. Heat Maps Article
3. Stress among Indians - Survey and Stats
4. Global Mental Health Stats
5. Research on Stress among Indians