Symptomatic Diagnosis and Prognosis of Psychiatric Disorders through Personal Gadgets

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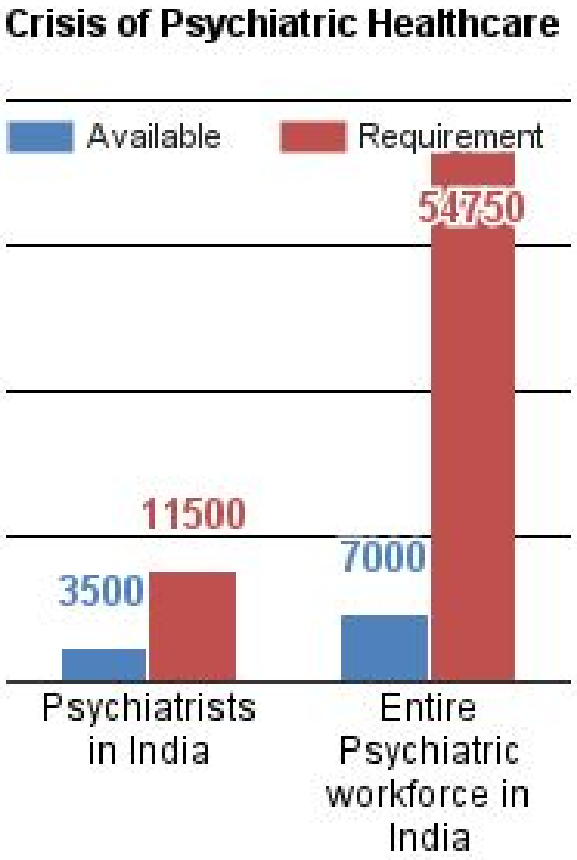
Motivation

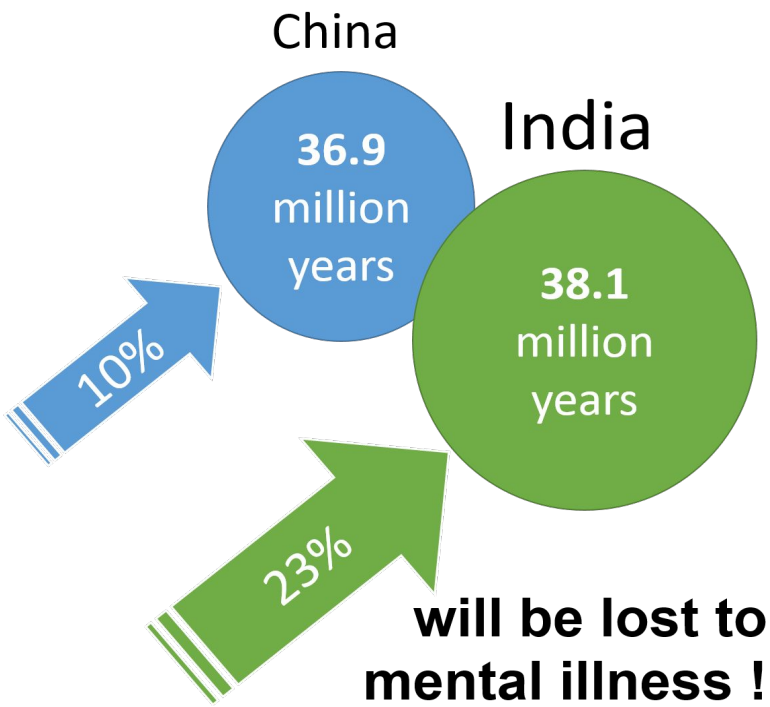


Mental disorder has been shrouded as a stigma and disregarded as a secondary issue to physical health.

It has become a major contributor to morbidity, disability and at times, fatality.

*As per Union Ministry of Health & Family welfare in India, there are just **3500** psychiatrists for **1.3 billion people**.*

By 2025, do you know how many years of healthy life



By 2025, **36.9m** years of healthy life will be lost to mental illness in China (10% increase), and **38.1m** in India (23% increase).

In U.S., one in every five adults (i.e. **43.8 million or 18.5%**) experiences mental illness in a given year as per National Institute of Mental health.

Challenges

Acknowledge the Problem at Individual’s level

Inaccessibility of Immediate Care

Reporting Symptoms and Asking Questions

Tracking Recovery

Discovering Symptomatic Patterns

Approach

Data generated through daily interaction with technology has subtle patterns to indicate one’s psychological state.

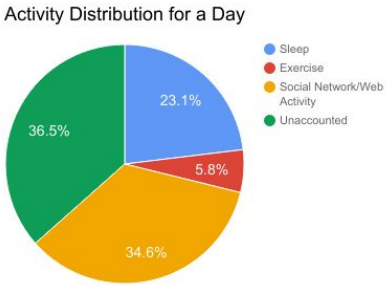
We propose a system to continuously capture this data and look for anomalies

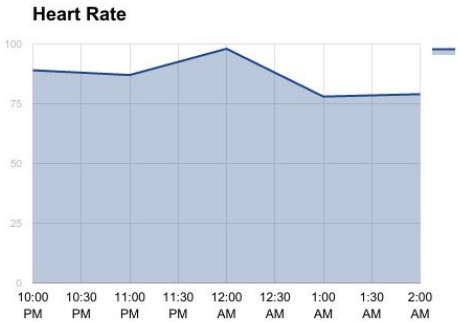
1. Speech input :- Tone analysis
2. Social Network activity/Web Search :- Sentiment Analysis
3. Health Band's :- Heart rate data Stream

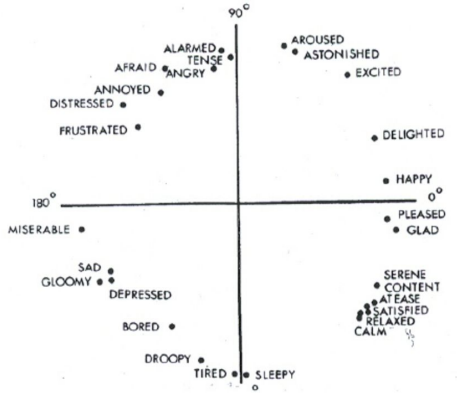
Proposed Solution

1. Raw data Analysis

Recorded data is presented as is in a easy to understand visualization.





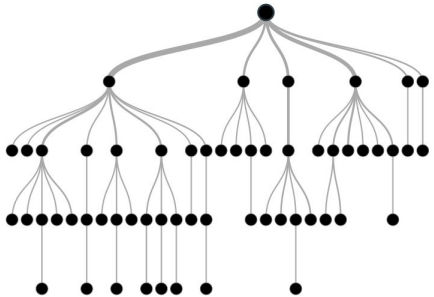


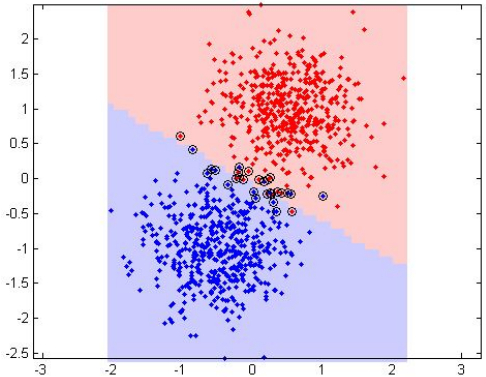
Russell's “Circumplex Model of Affect”

2. Information Inference

Data collected from multiple users are compared and contrasted to look for anomalies, compensating missing values and enhancing the confidence level of prediction.

Ensemble of Several machine learning techniques used to aid the prediction of potential psychiatric disorder based upon symptoms.





Aspects of measuring Mental Health

Aches

Pains Obesity

Lethargic Chronic-Fatigue

BODY-SENSATIONS

Agitation Difficulty-concentrating

Disturbed-Sleep

Breathing-difficulty

Crying

Lack.of.Confidence

Alienation

unable.to.settle

BEHAVIOR

Withdrawal.from.society

Neglect.of.responsibilities

Guilt Anxiety

Irritable

Mood-Swings

EMOTIONS

Helplessness

Hopelessness

Sadness

Self-criticism

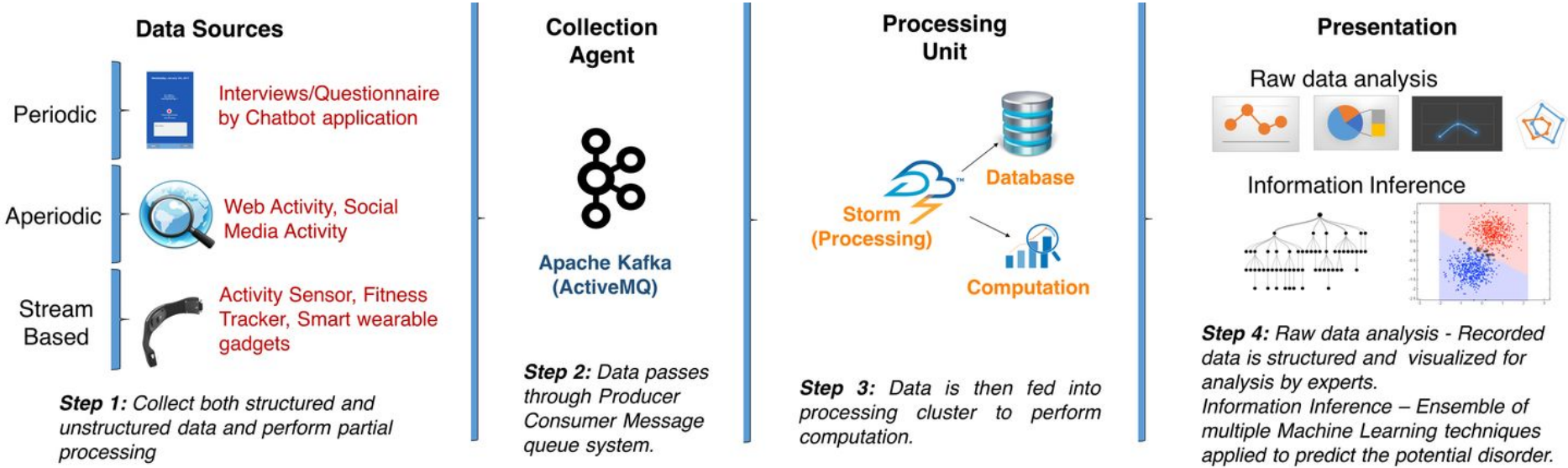
Indecisiveness

THOUGHTS

Confusion Death

Suicide

Proposed solution

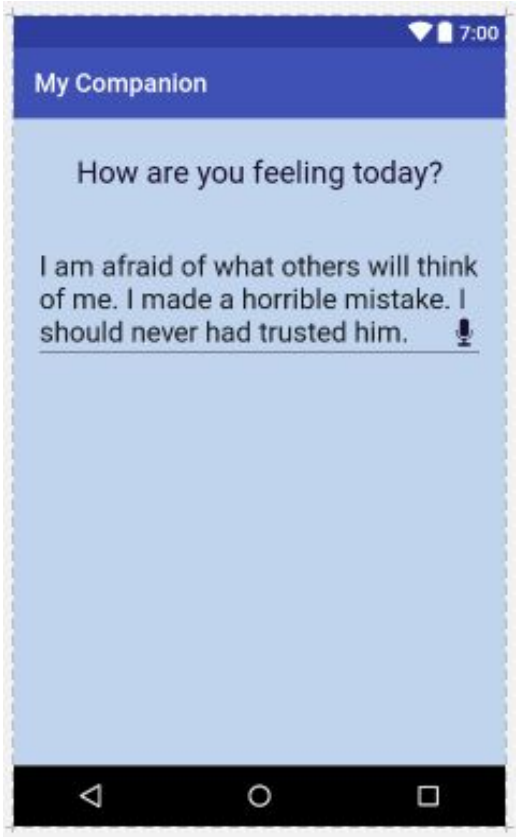


Methodological Framework for Emotional Journal (MeEJ) Process Pipeline

HCI Concerns

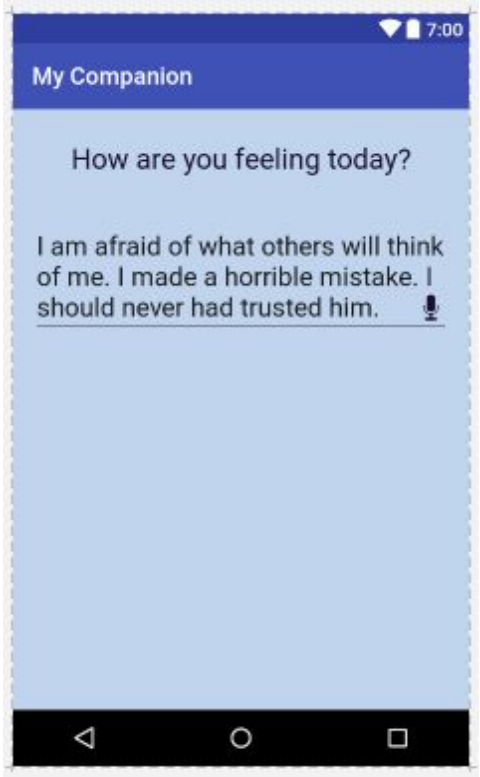
User Control and Freedom

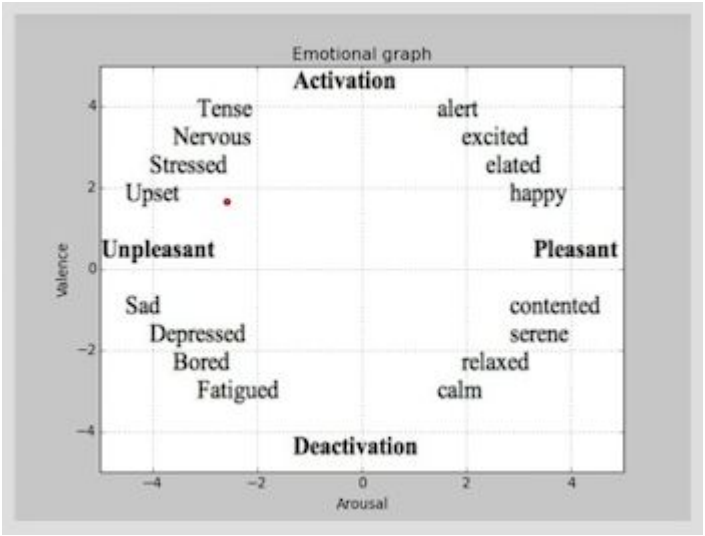
Prototype


7:00
My Companion
How are you feeling today?
I am afraid of what others will think of me. I made a horrible mistake. I should never had trusted him.


7:00
My Companion
How are you feeling today?
I am happy that finally my hard work paid off :)

Analysis





Russell's Circumplex model of Affect
We have utilized this model to predict the emotional state through Chabot (emotional Journal) application.

Use case

Schizophrenia

Positive (Psychotic)	Negative	Disorganization
• Delusion • Hallucinations • Ego Disorder	• Social Withdrawal • Blunted Effect	• Incoherent Thoughts and Behavior

Possible ways to track symptoms of Schizophrenia

Symptom	Identifiable Data Sources
Hear threatening voices, Delusions, Difficulty in experiencing pleasure & focus	Chatbot Application, Web and Social Media Activity
Motor immobility	Smart wearable gadgets
Depression Mania	Voice tone analysis

Contributions

The key contributions of our work:

- Identification of data sources from day-to-day life which can reveal symptoms of psychiatric disorders
- Design of methodological framework for processing the collected data.

We aim to achieve the following objectives:

- Affordable primary diagnosis for mental healthcare to people.
- Accessibility to quality diagnosis, especially for those who are reluctant or unprivileged to approach a good psychiatrist.

Q & A