AI Mental Health Insights Generator

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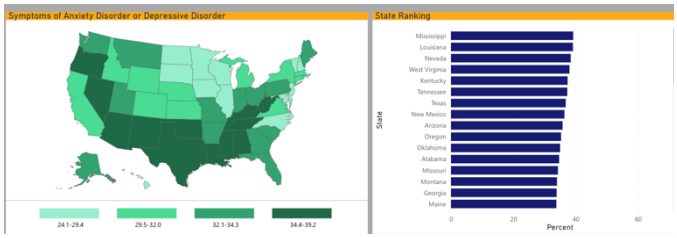
***Abstract*—**This paper presents a study on developing an AI-powered mental health insights generator for working individuals and students to track and improve their mental health and well-being. The study investigates how machine learning (ML) techniques can be used to analyze various data sources, including work or school related stressors, schedule, and physical activity, to provide insights and recommendations. Data for the study were collected using mobile apps, wearables, and online surveys from working individuals and students interested in tracking their mental health and well-being. The data were used to train the mental fitness tracker using state-of-the-art ML algorithms. Results show that the mental fitness tracker provides insights and recommendations that improve the mental health and well-being of working individuals and students.

Keywords— mental fitness tracker, machine learning, working individuals, students, personalized recommendations.

INTRODUCTION

Mental health and well-being are critical for overall health and productivity, particularly for working individuals who are often faced with high levels of stress and pressure. Digital tools, such as mental health apps, have become increasingly popular, and advancements in AI technology have made it possible to develop intelligent mental fitness trackers that can help individuals track and improve their mental health. This paper investigates the development of an AI-powered mental fitness tracker for working individuals and students to track and improve their mental health and well-being. The study aims to investigate how machine learning (ML) techniques can be used to analyze various data sources, including work or school related stressors, work schedule, and physical activity, to provide personalized insights and recommendations.

Center of Disease Control and Prevention (CDC) have generated statistics from surveys to understand what percent of population shows anxiety or depression [8]. Here is statewide distribution as of Feb 2023. As you can see around 30-40% of population shows signs of anxiety disorder or depression or both.



The COVID-19 pandemic is driving enormous demand for virtual mental health care services. Also accessing physical care in remote areas of America and lack of qualified doctors continues to remain challenging.

Wearable devices like the Apple Watch or Google phone can monitor certain aspects of mental health by collecting data on physical health and behavior, which can then be used to provide personalized assistance and support [5]. Here are a few examples:

Heart rate variability (HRV): Wearable devices like the Apple Watch can measure HRV, which is a measure of the variability between successive heartbeats. Research has shown that HRV can be used as an indicator of stress and anxiety, and changes in HRV can be used to monitor mental health. The Apple Watch has a built-in HRV feature that allows users to track their HRV over time and receive personalized feedback on their stress levels.

Sleep monitoring: Wearable devices like the Apple Watch can also monitor sleep patterns, which can be used to detect and monitor symptoms of mental health conditions such as depression and anxiety. By tracking sleep patterns, wearable devices can provide personalized recommendations for improving sleep hygiene and overall mental health.

Activity tracking: Wearable devices like the Google phone can track activity levels, which can be used to monitor symptoms of mental health conditions such as depression and anxiety. By tracking activity levels, wearable devices can provide personalized recommendations for improving physical activity and overall mental health.

Mindfulness and meditation: Wearable devices like the Apple Watch can also provide support for mindfulness and meditation, which are effective strategies for managing stress and anxiety.

In addition, research [7] suggest that Music Therapy can promote wellness, reduce stress and promote physical rehabilitation. Music therapists are often hired in schools to provide music therapy services listed on the Individualized Education Plan for mainstreamed special learners. Music learning is used to strengthen nonmusical areas such as communication skills and physical coordination skills which are important for daily life.

The goal of this paper is to analyze mental health patterns by geographic locations and strongest predictors of mental health issues at workplace and school. The paper will also explore the correlations of music listening habits and its effect on mental health.

This paper is split into several sections. Section I outlines related work that has previously been done regarding parking detection from the driver's perspective and their respective findings. Section II details the three datasets we will be utilized in the paper, along with guidelines for object annotation. Section III describes the approach and metrics we'll be using to compare the performance of each dataset. Section 5 and 6 detail the results and analysis of the experiments and room for future work.

I. Related Work

One study [1] published in the Journal of Medical Internet Research in 2021 explored the use of a virtual mental health assistant to improve the mental health outcomes of young adults with depression and anxiety. The study used a chatbot-based intervention to provide personalized mental health support to participants. The intervention was found to be effective in reducing depression and anxiety symptoms, improving self-efficacy and motivation, and increasing engagement with mental health services.

Another study [2] published in the Journal of Telemedicine and Telecare in 2020 evaluated the effectiveness of a virtual mental health assistant designed to provide support for people with post-traumatic stress disorder (PTSD). The study found that the virtual assistant was effective in reducing PTSD symptoms, improving quality of life, and increasing engagement with mental health services.

Teletherapy provides have seen a decent increase in the need for virtual mental health support [4]. Ginger [3] offers mental health coaching, teletherapy and psychiatry. Usage of Ginger's text-based mental health coaching was up 159%.

The Apple Watch has a built-in Breath app that guides users through deep breathing exercises to help reduce stress and improve mental well-being.

II. Data sets

Music and mental Health Survey Results: The dataset used in this analysis, comes from self-reported music listening habits in. Data was collected from a survey posted in Reddit forums, Discord servers, social media platforms, and advertised in libraries, parks, and other public locations. The data is from 2022 [6]

Workplace Mental Health Survey 2014: This dataset is from a 2014 survey that measures attitudes towards mental health and frequency of mental health disorders in the tech workplace [9]. It contains responses of employees to questions like coworker interaction, interaction with supervisor, wellness program at work.

III. Approach

The goal of this paper is to determine if we can analyze and detect mental stress and generate enough insights that assists in stress reduction. An ML model will be trained to predict if the person needs a treatment and if yes what kind of treatment a person would need to improve mental health. ML model will take in answers to mental survey by the user. The survey includes questions like work life balance, wellness programs, age, gender, relationship with supervisor and colleagues, PTOs, remote work options, physical health (height, weight, preexisting conditions, family history) etc.

Here are critical elements needed to build the systems described using 6D framework.

Decomposition: The goal of this project to achieve new insights on how stress impacts health of working individuals and what can be done to reduce the stress

Domain Expertise: The questions in mental health survey have been designed based on stress patterns noticed by psychologists who deal stress related disorders. The goal is to attempt to find root cause, validate it, correlate it with worker's profile and use it to generate new insights for the people with similar profile.

Data: The mental health data will be collected from mental health and survey conducted in 2014 to analyze impact of work-related incidents and its impact on worker's stress. We would need to clean the data and transform it for training ML algorithms that can predict insights. Additional data will be collected from musical therapy survey that correlates the impact of music therapy on stress.

Design: The solution would consists of web based front end that asks users a set of questions and provides insights into what they can do to reduce the stress. A machine learning model will be trained using labelled mental health survey data and music therapy data and the model will be deployed as a service. The web front end will call the model over HTTP using REST protocol and pass the questions submitted by the user, get the insights from the model and displays the insights to the user .

Diagnosis: TBD

Deployment: TBD

IV. Experiments

Each dataset was manually annotated using following the guidelines outlined previously and 2 experiment sets were run against a standard ML model. To further improve precision, all models were trained with the random flag on. Rather than having a fixed dimension, this improves precision by randomly changes the network image size by factors of 32 every 10 iterations to expose the model to more variation.

V. Results

A. Experiment I

TBD

B. Experiment II

TBD

VI. Conclusion

TBD

References

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