Created by Murat Durmus
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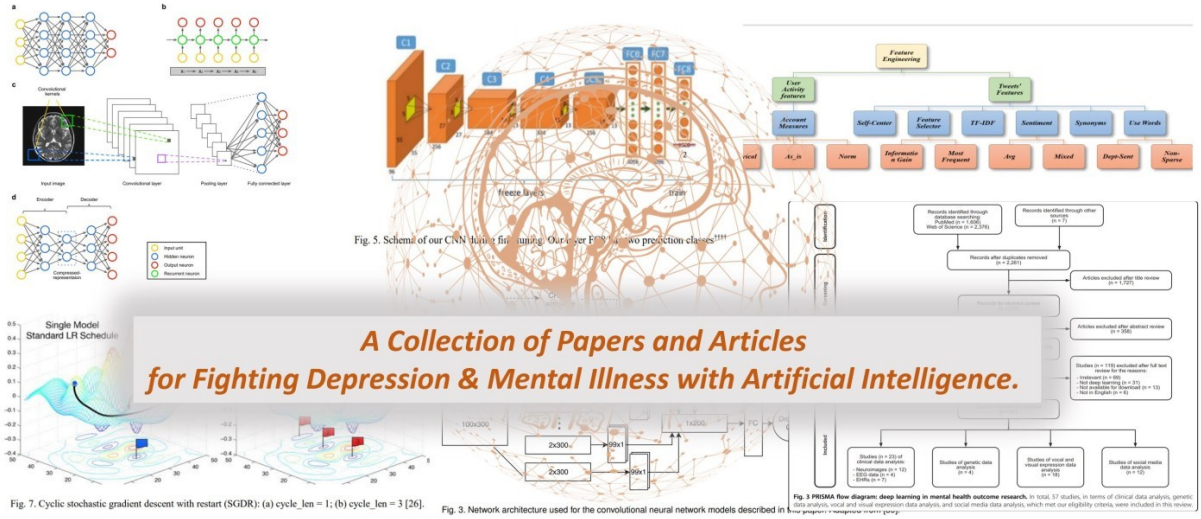
A Collection of Papers and Articles for *Fighting Depression* & Mental Illness with Artificial Intelligence.



Preface

"Mental illness is a grave issue. We must not underestimate and downplay it because the future of humanity depends on it."

~ Murat

Depressed, mentally unstable people suffer, especially in these times of social distancing. Even for healthy people, this time is a big challenge. We should increasingly develop technological possibilities and put them at the top of our list of problems to be solved. There is much talk of AI4Good. This is an area where AI can alleviate and even cure people's ever-increasing mental illness. We need to accelerate the transfer from research to practice and prioritize and promote significant mental illness, climate, sustainable and ethical business, inequality, etc.

"We look into an uncertain future with many challenges. We can only shape this future positively if we face it with a healthy and stable spirit. "

~ Murat Durmus

*"Mental health, defined by the World Health Organization (WHO), is "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community". The three core components of this definition are (1) well-being, (2) effective functioning of an individual, and effective functioning for a community. According to the WHO , mental health includes "subjective well-being, perceived self-efficacy, autonomy, competence, intergenerational dependence, and self-actualization of one's intellectual and emotional potential, among others". From the perspectives of positive psychology or of holism, mental health may include an individual's ability to enjoy life and to create a balance between life activities and efforts to achieve psychological resilience. Cultural differences, subjective assessments, and competing professional theories all affect how one defines "mental health" (source: **wikipedia**)*

According to **World Economic Forum**:

"Depression and anxiety disorders cost the global economy $1 trillion every year in lost productivity - and take a terrible human toll. " ~ WEF

In the following a collection of Papers/Articles for Fighting Depression & Mental Illness with Artificial Intelligence.

Papers

Machine Learning-based Approach for Depression Detection in Twitter Using Content and Activity Features

Social media channels, such as Facebook, Twitter, and Instagram, have altered our world forever. People are now increasingly connected than ever and reveal a sort of digital persona. Although social media certainly has several remarkable features, the demerits are undeniable as well. Recent studies have indicated a correlation between high usage of social media sites and increased depression. The present study aims to exploit machine learning techniques for detecting a probable depressed Twitter user based on both, his/her network behavior and tweets. For this purpose, we trained and tested classifiers to distinguish whether a user is depressed or not using features extracted from his/her activities in the network and tweets. The results showed that the more features are used, the higher are the accuracy and F-measure scores in detecting depressed users. This method is a data-driven, predictive approach for early detection of depression or other mental illnesses. This study's main contribution is the exploration part of the features and its impact on detecting the depression level

Source(pdf): **https://arxiv.org/ftp/arxiv/papers/2003/2003.04763.pdf**

Artificial Intelligence for Mental Health and Mental Illnesses: an Overview

Purpose of Review Artificial intelligence (AI) technology holds both great promise to transform mental healthcare and potential pitfalls. This article provides an overview of AI and current applications in healthcare, a review of recent original research on AI specific to mental health, and a discussion of how AI can supplement clinical practice while considering its current limitations, areas needing additional research, and ethical implications regarding AI technology

Source(pdf):https://escholarship.org/content/qt9gx593b0/qt9gx593b0_noSplash_d814b6b41c76cb874050695d2bf30ced.pdf

Methods in predictive techniques for mental health status on social media: a critical review

Researchers in computer science (CS) are using behavioral and linguistic cues from social media data to predict the presence of mood and psychosocial disorders. Since 2013, research can assess the presence of major depression1–3 , suicidality4–6 , eating disorders7,8 , and schizophrenia9 , among others with high accuracy (80–90%). In addition to mental disorders, these approaches are starting to assess related symptomatology, such as self-harm8 , stress10, and the severity of mental illness11 without the use of inperson, clinical assessment. These signals are taken from the posting and behavioral history of social media websites and apps, such as Twitter, Reddit, and Facebook12. In this article, we adopt the term mental health status (MHS) to capture both mental disorders and these related symptomatology

Source(pdf): **https://www.nature.com/articles/s41746-020-0233-7.pdf**

Deep learning in mental health outcome research: a scoping review

Mental illnesses, such as depression, are highly prevalent and have been shown to impact an individual's physical health. Recently, artificial intelligence (AI) methods have been introduced to assist mental health providers, including psychiatrists and psychologists, for decision-making based on patients' historical data (e.g., medical records, behavioral data, social media usage, etc.). Deep learning (DL), as one of the most recent generation of AI technologies, has demonstrated superior performance in many real-world applications ranging from computer vision to healthcare.

Source: **https://www.nature.com/articles/s41398-020-0780-3**

A Taxonomy of Ethical Tensions in Inferring Mental Health States from Social Media

Powered by machine learning techniques, social media provides an unobtrusive lens into individual behaviors, emotions, and psychological states. Recent research has successfully employed social media data to predict mental health states of individuals, ranging from the presence and severity of mental disorders like depression to the risk of suicide. These algorithmic inferences hold great potential in supporting early detection and treatment of mental disorders and in the design of interventions. At the same time, the outcomes of this research can pose great risks to individuals, such as issues of incorrect, opaque algorithmic

predictions, involvement of bad or unaccountable actors, and potential biases from intentional or inadvertent misuse of insights.

Source(pdf): **http://steviechancellor.com/wp-content/uploads/2019/03/taxonomy-prediction-mh-fat2019.pdf**

Automated speech-based screening of depression using deep convolutional neural networks

Early detection and treatment of depression is essential in promoting remission, preventing relapse, and reducing the emotional burden of the disease. Current diagnoses are primarily subjective, inconsistent across professionals, and expensive for individuals who may be in urgent need of help. This paper proposes a novel approach to automated depression detection in speech using convolutional neural network (CNN) and multipart interactive training. The model was tested using 2568 voice samples obtained from 77 non-depressed and 30 depressed individuals. In experiment conducted, data were applied to residual CNNs in the form of spectrograms—images auto-generated from audio samples. The experimental results obtained using different ResNet architectures gave a promising baseline accuracy reaching 77%

Source(pdf): **https://arxiv.org/ftp/arxiv/papers/1912/1912.01115.pdf**

Utilizing Neural Networks and Linguistic Metadata for Early Detection of Depression Indications in Text Sequences

Depression is ranked as the largest contributor to global disability and is also a major reason for suicide. Still, many individuals suffering from forms of depression are not treated for various reasons. Previous studies have shown that depression also has an effect on language usage and that many depressed individuals use social media platforms or the internet in general to get information or discuss their problems. This paper addresses the early detection of depression using machine learning models based on messages on a social platform. In particular, a convolutional neural network based on different word embeddings is evaluated and compared to a classification based on user-level linguistic metadata.

Source(pdf): **https://arxiv.org/pdf/1804.07000.pdf**

Detecting Depression Using a Framework Combining Deep Multimodal Neural Networks with a Purpose-Built Automated Evaluation

Machine learning (ML) has been introduced into the medical field as a means to provide diagnostic tools capable of enhancing accuracy and precision while minimizing laborious tasks that require human intervention. There is mounting evidence that the technology fueled by ML has the potential to detect, and substantially improve treatment of complex mental disorders such as depression. We developed a framework capable of detecting depression with minimal human intervention: AiME (Artificial Intelligence Mental Evaluation). AiME consists of a short human-computer interactive evaluation that utilizes artificial intelligence, namely deep learning, and can predict whether the participant is depressed or not with satisfactory performance. Due to its ease of use, this technology can offer a viable tool for mental health professionals to identify symptoms of depression, thus enabling a faster preventative intervention. Furthermore, it may alleviate the challenge of observing and interpreting highly nuanced physiological and behavioral biomarkers of depression by providing a more objective evaluation.

source(pdf): **https://aime-static.textpert.ai/pub/detecting-depression-using-ml.pdf**

A Collection of Papers & Articles on AI for Human Well-Being

Numerous AI initiatives are underway in the health sector. Some of these are aimed at promoting mental health and well-being. In the following, I would like to present some promising approaches/articles from this area.

source (LinkedIn pulse article): **https://www.linkedin.com/pulse/collection-papers-articles-ai-human-well-being-murat-durmus/**

Articles

Time: How Artificial Intelligence Can Help Pick the Best Depression Treatments for You

https://time.com/5786081/depression-medication-treatment-artificial-intelligence/

Forbes: The Incredible Ways Artificial Intelligence Is Now Used In Mental Health

https://www.forbes.com/sites/bernardmarr/2019/05/03/the-incredible-ways-artificial-intelligence-is-now-used-in-mental-health/?sh=6606e570d02e

Medium: Machine Learning in the Treatment of Depression

https://medium.com/swlh/machine-learning-in-the-treatment-of-depression-87dcd63f528d

Science Node: Detecting depression with AI

https://sciencenode.org/feature/Detecting%20depression.php

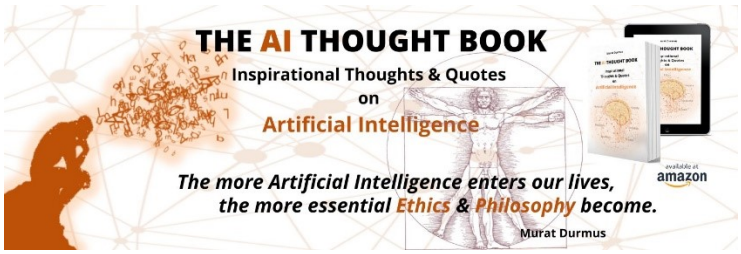
Health IT Analytics: Expanding Access to Mental Healthcare with Artificial Intelligence

https://healthitanalytics.com/news/expanding-access-to-mental-healthcare-with-artificial-intelligence

Artificial Intelligence in Healthcare - Promising Progress (Best Use Cases)

https://www.linkedin.com/pulse/artificial-intelligence-healthcare-promising-progress-murat-durmus/

This might be also of interest (my new Book):



(Amazon) THE AI THOUGHT BOOK: Inspirational Thoughts & Quotes on Artificial Intelligence (including 13 colored illustrations & 3 essays for the fundamental understanding of AI)

Download free excerpt: https://www.aisoma.de/the-ai-thought-book/

THOUGHT-PROVOKING QUOTES & CONTEMPLATIONS FROM FAMOUS PSYCHOLOGISTS

Link (Amazon): THOUGHT-PROVOKING QUOTES & CONTEMPLATIONS FROM FAMOUS PSYCHOLOGISTS