12-12-2021

Machine Learning and AI in detection of mental illnesses - A Literature Review

Smriti Srivastava
University of North Texas, smriti.srivastava@unt.edu

Pranay Prateek
University of North Texas, Denton, pranay.prateek@unt.edu

TREO
Technology, Research, Education, Opinion

Machine Learning and AI in detection of mental illnesses

A literature review paper

Smriti Srivastava smriti.srivastava@unt.edu ; Pranay Prateek pranay.prateek@unt.edu

As per WHO, Suicide is the second leading cause of death among 15-29-year and every 5th American is diagnosed with a mental illness. The numbers are much worse in underdeveloped countries. A quick google scholar search of "mental illness and machine learning", yields search results from multiple disciplines like medicine, psychiatry, Computer Science, and engineering. However, we could find only one article in IS basket of 8 journals which contributes to the emerging field of application of machine learning techniques and artificial intelligence in improving mental health by early detection of symptoms of mental illnesses (Chau et al., 2020). Since IS is inter-disciplinary, there are a plethora of opportunities for IS researchers to contribute significantly to this nascent area. The goal of this study is to review existing research across IS discipline and other neighboring disciplines on applications of ML algorithms and AI in mental health outcome research. Our aim is to provide a starting point for IS researchers who are interested in making a positive contribution towards mental health and the overall well-being of society.

The article presents a quantitative synthesis and qualitative narrative of papers published in leading journals across disciplines like Computer Science, Psychiatry, Engineering, and Medicine. We start by combining keywords like "depression and machine learning", "AI in Mental Health" in Google Scholar. We then select the articles which seek to predict, classify, or subgroup mental illnesses like Depression, Suicide Ideation, Bipolar Disorder, schizophrenia, and other psychiatric illnesses. We include only those articles which report AI and ML applications in understanding, detecting, or diagnosing mental illnesses and have excluded those which describe neuroscience and neurobiology.

Four data domains are identified – Sensors (audio, body, accelerometer); text (social media and psychiatric records, suicide notes); structured data (questionnaires, electronic health records), and multi-modal system use (chatbot, robot interaction, self-reports). We have devoted a special section on articles that use social media posts as their primary data source. For each of the listed articles, we have identified the primary goal, data source, study cohort, statistical technique used, performance metric, key findings and gaps. If we leverage today's available technologies, we can obtain continuous, long-term monitoring of the unique bio-psycho-social profiles of individuals that impact their mental health and hopefully prevent future suicides.

References

Luo J, Du J, Tao C, Xu H, Zhang Y. Exploring temporal suicidal behavior patterns on social media: Insight from Twitter analytics. *Health Informatics Journal*. June 2020:738-752. doi:10.1177/1460458219832043
Chau, Michael; Li, Tim M. H.; Wong, Paul W. C.; Xu, Jennifer J.; Yip, Paul S. F.; and Chen, Hsinchun. 2020. "Finding People with Emotional Distress in Online Social Media: A Design Combining Machine Learning and Rule-Based Classification," *MIS Quarterly*, (44: 2) pp.933-955