

INPLASY PROTOCOL

To cite: Ehiabhi et al. A Systematic Review of Machine Learning Models in Mental Health Analysis Based on Multi-Channel Multi-Modal Biometric Signals. Inplasy protocol 202320003. doi: 10.37766/inplasy2023.2.0003

Received: 01 February 2023

Published: 01 February 2023

Corresponding author:
Jolly Ehiabhi

jie17@msstate.edu

Author Affiliation:
Mississippi State University.

Support: None.

Review Stage at time of this submission: Completed but not published.

Conflicts of interest:
None declared.

A Systematic Review of Machine Learning Models in Mental Health Analysis Based on Multi-Channel Multi-Modal Biometric Signals

Ehiabhi, J¹; Wang, H².

Review question / Objective: A systematic review of Mental health diagnosis/prognoses of mental disorders using Machine Learning techniques with information from biometric signals. A review of the trend and status of these ML techniques in mental health diagnosis and an investigation of how these signals are used to help increase the efficiency of mental health disease diagnosis. Using Machine learning techniques to classify mental health diseases as against using only expert knowledge for diagnosis. Feature Extraction from signal gotten from biometric signals that help classify sleep disorders.

Rationale: To review the application of ML techniques on multimodal and multichannel PSG datasets got from biosensors typically used in the Hospital. To help professionals grasp the steps of using machine learning to classify mental health diseases.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 01 February 2023 and was last updated on 01 February 2023 (registration number INPLASY202320003).

INTRODUCTION

Review question / Objective: A systematic review of Mental health diagnosis/prognoses of mental disorders using Machine Learning techniques with information from biometric signals. A review of the trend and status of these ML

techniques in mental health diagnosis and an investigation of how these signals are used to help increase the efficiency of mental health disease diagnosis. Using Machine learning techniques to classify mental health diseases as against using only expert knowledge for diagnosis. Feature Extraction from signal gotten from

biometric signals that help classify sleep disorders.

Rationale: To review the application of ML techniques on multimodal and multichannel PSG datasets got from biosensors typically used in the Hospital. To help professionals grasp the steps of using machine learning to classify mental health diseases.

Condition being studied: Sleep disorders and Mental health diseases.

METHODS

Search strategy: Keywords search on some literature databases. The keywords used for this literature search were based on the goal of this research. Keywords used for this search are as follows; ("EEG" OR "ECG" OR "EOG" OR "EMG" OR "PSG") AND "Machine Learning" AND "mental health."

This search was carried out on Databases, such as Science Direct, IEEE Xplore, MDPI, PubMed and some other article databases not as popular for this can of research work as the four mentioned.

Participant or population: Data are from Children, male and female. all the data studied are obtained from human.

Intervention: Machine learning and Artificial Intelligence in Mental health diseases.

Comparator: Expert Judgement and use of Traditional methods of classification of mental health issues.

Study designs to be included: Using The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).

Eligibility criteria: Publications have to be between 2017 and 2023, with few articles outside this date range. To build a good understanding of the research questions, we also added 25 articles published between the years 2000 to 2016. This range of years was selected based on references from other similar research. Articles must have at least one or more of the Keywords. Articles must have been published in any of

the recognized literature database websites. All selected papers must be written in English. All papers are either research work, survey, or review of the application of ML on PSG data and classification of mental health issues using machine learning techniques.

Information sources: Science Direct, IEEE Xplore, MDPI, PubMed and some other article databases not as popular for this can of research work as the four already mentioned.

Main outcome(s): Found 204 articles that meet our criteria and answer our research questions in terms of material presentation, method and results.

Data management: Zotero was used to manage article and project work.

Quality assessment / Risk of bias analysis: Peer review was conducted by 3 different practioneers in this field of studies.

Strategy of data synthesis: The process of methodologies for Biometric signal processing has been divided into four stages in this work: 1. data acquisition 2. preprocessing 3. feature extraction 4. classification.

Subgroup analysis: None.

Sensitivity analysis: none.

Language restriction: No.

Country(ies) involved: United States.

Keywords: system review; multichannel multimodal biometric signals; machine learning; mental 12health.

Dissemination plans: The article will be published in one of the open access database, preferable MDPI.

Contributions of each author:

Author 1 - Jolly Ehiabhi - Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing an

original draft, Writing – review & editing,
Visualization, and Project administration.
Email: jie17@msstate.edu
Author 2 - Haifeng Wang - review & editing
and Supervision.