Machine Learning And Natural Language Processing In Mental Health: A Systematic Review

Aziliz LE GLAZ, Dr. Deok-Hee KIM-DUFOR ; Dr. Jordan DEVYLDER ; Ryan TAYLOR ; Pr. Michel WALTER;
Dr. Sofian BERROUGUET; Dr. Christophe LEMEY.

Brest University Hospital, Psychiatry Department
Contact: aziliz.leglaz@chu-brest.fr

OBJECTIVES

To identify **clinical knowledge** and perspectives in psychiatry regarding the combined use of machine learning (ML) and natural language processing (NLP) techniques

What is machine learning?

ML is part of artificial intelligence that enables computer systems to learn examples and create algorithms based on large quantities of data that leads to high quality decision making.

What is natural language processing?

NLP is part of artificial intelligence and linguistic, with the analysis and synthesis of natural language and speech.

METHODS

PRISMA guidelines

5 data bases: Pubmed, Scopus, Science direct, PsycInfo, Cochrane Library.
(natural language processing) AND (machine learning) AND ((psychiatry) OR (mental health) OR (mental disorder))
Inclusion criteria: psychiatric theme, written in English, about clinical use of ML and NLP
Exclusion criteria: studies written before 2010, use of ML and NLP for de-identification

RESULTS

- 33 selected studies, 63% published after 2016
- 1st topic: depression and suicide
- 3 population categories: psychiatry department inpatient, patient admitted to psychiatric emergency, social network users

Advantages	Example of clinical application
Extraction of large quantities of information and data	Extraction of diagnosis criteria: autism (Leroy et al.), PTSD (He et al)
Classification of large amount of data	Quantify suicide risk (Fernandes et al.) or psychosis severity (Goodwin et al.)
Faster analysis	Epidemiological monitoring (Leroy et al.), coding psychotherapy session (Tanana et al.)
New data, exploring an « everyday clinic »	Social network data (Facebook, Tweeter, forum) (Mowery et al).
Detecting new digital markers and risk factor	Unknown association of drugs (Chary et al)
Semantic and syntactic analysis	Speech modification in MDMA users (Baggott et al) Specificity of adults with autism spectrum disorders' speech (Luo et al) Predict later psychosis onset in youth at clinical high-risk for psychosis (Bedi et al)

DISCUSSION

Heterogeneous studies (objectives, methods, various databases)
Almost any controlled double-blind randomized pattern

What about:
Data protection? Consent for data analysis?
Psychosis prediction: which medical care?
How to announce?
Transference and doctor-patient relationship?

CONCLUSION

- ML combined with NLP techniques:
- 1) Establish valuable clinical patterns using high quantities of data
 - 2) Have to improve methodological issues
 - 3) Is a new paradigm in psychiatric research

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