Headache Medicine

Direct clinical applications of natural language processing in migraine: a literature review

Eduarda Maia Lima; Rayndrick Kelryn Assis Lima; Raynrich Kevin Assis Lima; Isabela Cacau Sousa Santos; Pedro Roa Appio; Carolina Helen Soares de Macêdo; Helvécio Neves Feitosa Filho; Nithyananda Araújo Furtado; Caio Kacem Carate

Universidade de Fortaleza, Fortaleza - CE - Brazil.

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Introduction

The evaluation of complaints related to headaches in medicine heavily relies on detailed histories provided by patients, where doctors assess the descriptions of their headaches. In this context, Natural Language Processing (NLP) stands as a technique that structures and processes linguistic data into quantifiable units. Moreover, the emergence of disruptive digital health technologies is revolutionizing the healthcare sector. Within the realm of migraine medicine, NLP has been employed to explore the potential of machine learning (ML) applications concerning patients' narratives regarding their migraine experiences.

Migraine is a prevalent and debilitating neurological disorder. Studies examining social media posts related to migraine complaints have unveiled the presence of "informative" or "expressive" posts. Depending on their content, whether positive or negative in tone, it has become possible to identify patients with clinical recurrence or concerns related to medication adherence, among other factors. From a public health perspective, this enables a collective analysis of clinical situations that are often overlooked.

Objective

Hence, we conducted a literature review with the objective of assessing studies that have applied natural language processing (NLP) in the context of migraine patients.

Methods

The search was conducted in PubMed/MEDLINE and EMBASE in September 2023. The search terms used included "NATURAL PROCESSING LANGUAGE," "ARTIFICIAL INTELLIGENCE," "MACHINE LEARNING," "DEEP LEARNING," "MIGRAINE DISORDERS," and "MIGRAINE." We included studies on the application of NLP in migraine and excluded articles in languages other than English, conference abstracts, and systematic review articles.

Results

The search yielded numerous studies that applied NLP in the context of migraine. One study employed NLP to automatically classify written self-reported narratives by migraine patients and found that ML algorithms show promise in classifying these narratives with high performance. Another study reviewed the use of deep learning in clinical NLP and noted its increasing acceptance as a baseline for NLP research within the medical community. A third study developed a versatile NLP framework for analyzing migraine- related content from social media. A fourth study applied basic NLP analyses to a corpus of over 200,000 abstracts published on PubMed under the medical subject and demonstrated that topic modeling can identify pain-related topics effectively.

Conclusion

The search results underscore the potential of NLP and ML algorithms in classifying patients' self-reported narratives, comprehending the experiences of individuals with migraine through social media, and identifying pain-related topics. Furthermore, the growing acceptance of deep learning in clinical NLP suggests that this technology can play a significant role in enhancing the understanding and management of migraine.

Keywords: Artificial Intelligence; Machine Learning; Deep Learning; Migraine Disorders.