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Speech paralinguistic analysis for disease management: Contribution of Artificial Intelligence from neurological diseases perspective

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The complex human speech production process involves not only speech organs but also other vital human body systems including the respiratory system and the brain-centered cognition system. Therefore, deficits in any of them can cause changes in speech patterns. Accordingly, analysis of speech to derive insights into underlying health conditions has gained popularity in the search for low-cost, non-invasive, non-intrusive biomarkers. Literature includes several key reviews on speech analytics for healthcare purposes (Cummins et al., 2018; Deepa, 2022; Fagherazzi et al., 2021), but limited articles discuss the evaluation of artificial intelligence (AI) contributions. Therefore, I aim to discuss the contribution of AI in speech paralinguistic analysis for clinical decision-making in disease management. I conducted a Systematic Literature Review, including related peer-reviewed journal articles and conference proceedings that had been published in English from January 2010 to December 2022, and applied data sciences approach to analyze speech for healthcare purposes. The study accessed 6 academic electronic databases including Scopus, IEEE Xplore, Google Scholar, MedLine via PubMed, Springer, and ScienceDirect using optimized search strategies. The study collected 5368 articles for screening and the study selection process yielded 393 articles based on inclusion criteria. A clear evaluation of the research field was apparent with increasing articles over the years. Neurological diseases were of the highest interest following psychiatric disorders and respiratory diseases. A significant number of studies investigated clinical datasets collected as part of the study. This presentation will discuss the exploration of different AI techniques on clinical speech datasets to support clinical decision-making in neurological diseases. The findings of this research will unveil opportunities and strategies for applying advances in AI techniques in speech paralinguistic analysis in clinical decision-making.

Keywords
Speech analytics; healthcare purposes; artificial intelligence

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