AI Applications in Medical Diagnostics: A Neurologist's Perspective

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Abstract

Medical AI can potentially become a powerful tool to enhance data driven precision medicine, including real time decision support, diagnosis, therapeutic interventions, drug discovery, and prediction of disease risks. Medical AI has a lot of idiosyncrasies including data collection from different sources, settings, diverse patient populations. Collection of de-identified data is time consuming and subject to regulatory oversight. Integration into the clinical workflow can be even more challenging. Health care is a unique environment with "low tolerance" for errors. Nonetheless, many medical specialties have been early adopters of AI technology (Radiology, Pathology, Cardiology, Dermatology, Ophthalmology).

In the field of neurology, there are AI based tools with proven deployment and efficiency in detecting stroke on brain imaging (CT/CTA). AI driven brain volumetric assessment techniques have been used in multiple sclerosis and dementia. There is evolving research in autonomous EEG interpretation with high sensitivity and specificity. AI-assisted ophthalmic imaging techniques are being developed to detect thinning of the retina nerve fiber layer (RNFL), in a number of neurodegenerative diseases.

Raman Spectroscopy holds a promise for early detection of neurodegenerative diseases (Alzheimer disease, Parkinson disease) by analyzing biofluids (blood, CSF, saliva) and tissue to identify key biomarkers related to these diseases (α-synuclein, amyloid-β, tau, dopamine).

Effective and ethical development and implementation of AI in the medical space requires close collaboration between AI scientists and clinicians to ensure that technology is scalable, unbiased, and patient-centered. AI's power in the medical field must not replace but augment human judgement.