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An Artificial Intelligence Based Approach for The Automated Diagnosis of Autism: *Implications for Sustainable Youth Education Policies*

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ABSTRACT

Autism spectrum disorder is one of the most pervasive neurodevelopmental disorders among children and adolescents with important educational implications. Equitable access to diagnosis is integral to achieve sustainable development goals in developing nations, where poverty and lack of medical institutions create stark inequalities in the accessibility of diagnosis for autism, and for education policies for young children. Yet, autism and similar neurobehavioral disorders remain widely underdiagnosed—particularly in the developing world—as a result of both societal stigmas on youth neurological disorders and deficient medical practices. The current diagnosis paradigm for autism is inaccurate and inaccessible, hindering the administration of proper treatment. A more accurate and accessible method of detection is necessary to ensure that all children are diagnosed and given proper treatment regimens to fulfill their economic potential and receive targeted education policy. This research proposes a novel machine learning-based method to analyze pupil-dynamics data as an objective biomarker to characterize autism, and then applies it to create educational equity. A voting-ensemble classification algorithm and meta-learner were developed and yielded the most optimal 20-fold cross-validation metrics on a declassified dataset. The ensemble model classified autism with .912 recall, 0.925 precision, and 0.900 AUROC, far greater than clinical diagnostic accuracy. This model was implemented in a diagnostic web application that captures pupil biometrics in real-time and allows for youth to receive targeted treatment and educational support. The impacts of this work are significant in the developing and rural world to ensure equitable access to medical and education services, especially for neglected and stigmatized neurobehavioral disorders such as autism. This application is the first to use pupil-size dynamics as a biomarker, and offers a time-efficient, accurate, and accessible approach to diagnose autism in developing nations and rural areas to steer targeted education policy that allows youth with autism to achieve their economic and social potential.

Keywords: Education Development, Autism, Pupillometry, Equitable Access

Theme: Educational and healthcare equity in the developing world and rural areas