

Athuru Mithuru: A comprehensive digital platform for predicting learning disorders in children

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Early detection of learning disorders in children is critical, yet traditional assessment methods are often time-consuming, lack child engagement and scalability, particularly in low-resource settings like Sri Lanka. To address this gap, 'Athuru Mithuru,' a comprehensive Sinhala-language digital platform, is introduced to predict four key learning disorders: Dyspraxia, Dyscalculia, Dysgraphia, and Dyslexia—in children aged seven to ten. This platform combines Sinhala language content, game-based assessments and real time behavioral analysis to create a child-friendly and accessible alternative to traditional diagnosis methods. This web application was built using React and Tailwind CSS for responsive design and Firebase for secure data handling. 'Athuru Mithuru' integrates space-themed environment and interactive games that record gameplay metrics including accuracy, response time and mouse activity. A machine learning model process handwriting samples captured via webcam to assist in Dysgraphia prediction. The platform analyzes collected data to generate confidence-based disorder predictions. These results are delivered to teachers and parents through detailed reports. Initial usability evaluations revealed high engagement among children and ease of use for non-technical users. The System Usability Scale (SUS) score was well above the average benchmark of 68, indicating strong usability and positive user experience across both children and teachers. Technically, the system ensures cross-platform performance. The machine learning model used for handwriting analysis was evaluated using the F1 score to confirm its predictive accuracy. As an additional outcome, this system contributes to future academic research by generating new, publicly shareable datasets for underrepresented disorders such as Dyslexia, Dyspraxia, and Dyscalculia. By combining localized language support, machine learning and child-centric design, 'Athuru Mithuru' demonstrates a successful model for accessible, accurate and scalable early learning disorder prediction, paving the way for timely interventions in Sri Lankan classrooms and beyond.

Keywords: *Learning disorders, Early detection, Machine learning, Sinhala web application, Children*