From Click to Clinic: Evaluating an AI-Driven Web Tool for Amblyopia Risk Detection in Children

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Abstract:

This pilot study assessed the feasibility, diagnostic performance, and demographic consistency of an AI-powered web application designed to screen for amblyopia risk among children aged 3 to 10 years in Morocco—a setting where routine pediatric vision screening remains scarce. The tool integrates two components: an AI-driven photo analysis to detect signs of strabismus, and a validated eight-question parental survey targeting known amblyopia risk factors such as eye rubbing, family history, abnormal head posture, and failed school screenings. A risk score out of 9 was generated for each child, with scores ≥6 indicating high risk. The study included 105 children, all of whom were clinically evaluated by an ophthalmologist for confirmation. The AI system achieved a sensitivity of 99.0%, specificity of 100.0%, and a perfect positive predictive value (PPV) of 100.0%, with particularly strong performance in high-risk cases (100% accuracy for scores 6–9). Strabismus detection based on AI image analysis reached 89% accuracy. No statistically significant differences were observed across age, gender, or urban/rural background, underscoring the tool's reliability across diverse populations. By offering automated, smartphone-accessible, and multilingual screening directly to parents, this platform represents a cost-effective, scalable, and user-friendly solution for early amblyopia detection in resource-limited settings—potentially transforming how school-based vision care is delivered in Morocco and similar contex.

Keywords:

Amblyopia screening, artificial intelligence, pediatric vision, web-based application, strabismus detection, early detection, low-resource settings, preventive eye care, Morocco.