



UNDERGRADUATE THESIS

AN EARLY SCREENING SYSTEM FOR STRABISMUS USING A CONVOLUTIONAL NEURAL NETWORK WITH THE YOLOv8 ARCHITECTURE

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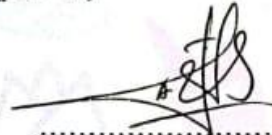
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ABSTRACT

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ABSTRACT

Strabismus, or crossed eyes, is an ophthalmological condition that requires early detection to prevent permanent visual complications. This study aims to develop an early strabismus screening system based on computer vision using a deep learning approach via the YOLOv8 architecture. Unlike conventional methods that rely on manual geometric calculations, this system employs a two-stage cascaded inference pipeline to optimize visual assessment. The first stage implements the YOLOv8 model to perform spatial localization and segmentation of the eyelid area to reduce background noise. These image segments are then fed into the second-stage YOLOv8 model, which acts as a classifier to evaluate the anatomical characteristics of the iris and sclera in each eye independently. The system is integrated into a web-based application (Flask) with two functional modes: live camera scanning guided by a Region of Interest (ROI) and a static image upload mode. Performance testing of the model on strabismus test data yielded a precision score of 0.906, a recall of 0.884, and an mAP50 of 0.92. The system's visual output presents conditional bounding boxes that distinguish between normal physiological status (green) and pathological strabismus (red) for each eye area. This study demonstrates that the use of Vision AI can provide an objective, transparent, and spatially valid self-screening tool prior to further clinical examination by an ophthalmologist.

Keywords: Strabismus, Eye Screening, Object Detection, Deep Learning, CNN.

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LIST OF NOTATIONS

TP	:	True Positive (Squint Prediction is correct)
FP	:	False Positive (Wrong squint prediction)
FN	:	False Negative (Squint not detected)
STRABISMUS	:	Crossed Eyes
CNN	:	Convolutional Neural Network
Dataset	:	A data collection
Disclaimer	:	Statement warning
Real Time	:	Directly
Interface	:	Interface Display
YOLO	:	You Only Look Once
Cropping	:	Cut