

## AI Powered Eye Tracking for Attention Analysis in Classroom Videos

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### Abstract

Effective teaching depends on student attention; but, manual evaluation presents major difficulties. This work presents an artificial intelligence-driven eye tracking system using remote gaze estimate for classroom video analysis. Integrating facial features, eye-region details, and temporal cues, this multi-stream deep neural network estimates three-dimensional gaze direction and classifies attention. This work reports a dual-task loss that simultaneously maximises attention classification and gaze error. Evaluations on standard benchmarks (MPligaze, Gaze360, TabletGaze) and real classroom data show a mean angular gaze error of less than 3.5° for frontal views and approximately 10° in wide-angle settings, so attaining over 90% accuracy in attention classification, surpassing previous methods. This research improves automated classroom analytics meant to support tailored learning and offer instructional comments.

### Keywords

Eye Tracking, Attention Analysis, Convolutional Neural Network, LSTM, Classroom Videos.