

Abstract

Title: Deep Learning-Based Detection of Student Behavior in Classroom Environments

Graduate Student: Nguyen Trung Hieu

Supervisor: Dr. Kim Dinh Thai

Understanding student behavior is really important for improving teaching and keeping students safe in the classroom. But let us be honest it is not easy for teachers to watch everything that is going on all the time as It takes a lot of time. The teachers might miss something or see things differently. This research is about creating a system that can automatically recognize what students are doing like raising their hands sleeping, reading or discussing with each other, etc. This research using computer vision techniques to make this system work.

The study will use YOLOv12 (You Only Look Once) architecture as baseline and try to improve it using difference methods. The difficulty of the research is dealing with the problem of the environment where study being partially obscured by furniture or each other, the different of lighting conditions, angles or small objects is mixed in crowded space. The research use SCB5 dataset with preprocessed images to fine-tune the model and achieve and model which is balanced between accuracy and real-time processing speed.

The main goal of this thesis is to see how YOLOv12 works compared to older versions like YOLOv8 and YOLOv11 and improve it. It aim to create a system that gives teachers information that they can actually use. Ultimately the target of the research is to make a system that can detect student behavior reliably and show how artificial intelligence can help teachers manage their classrooms. This research is part of making education smarter. It can help both teachers and students, in modern classrooms.

Keywords: Deep Learning, Student Behavior Detection, YOLOv12 Computer Vision, Classroom Monitoring, Smart Education.