

**INTELLIGENT LECTURE RECORDING USING HUMAN AND GESTURE
RECOGNITION**

L.W. Amarasinghe and R.D. Nawarathna*

*Department of Statistics and Computer Science, Faculty of Science, University of Peradeniya,
Peradeniya, Sri Lanka
ruwand@pdn.ac.lk

Today, e-learning platforms are used for knowledge transfer through electronic media to address several learning contexts, ranging from conventional classroom delivery to online and offline distance learning. This study proposes a system to capture and record a lecture with all student and teacher interactions and screen sharing using artificial intelligence techniques. The recording is performed using multiple PTZ cameras and microphones connected wirelessly. In the human detection module, an IP camera setup is used to detect and track the lecturer. Specific hand gestures are defined for the lecturer to capture the audience, the whiteboard, and the computer screen view. The gesture recognition module recognises these special hand gestures using a trained TensorFlow Lite MobileNetV2-based SSD deep learning model with a 0.5 depth multiplier included in the Google MediaPipe model. The deep learning model evaluates 21 3D coordinates of the hand to identify gestures. Multiple camera setup automatically moves towards the lecturer, audience and computer view according to the identified hand gesture. The recording module performs the recording of the video and saves it in the cloud. The proposed system also includes a Learning Management System (LMS) and an archive of lecture videos that the students can view. The human detection and hand gesture modules were evaluated using 100 people and the hand gesture datasets since the whole system is dependent on the accuracy of those modules. The hand gesture dataset includes three types of hand gestures made using both left and right hands. The human detection module achieved an accuracy of 90% with a Haar classifier-based model. Also, an average precision of 95.7% for palm detection and an accuracy value of 90% were achieved for gesture detection, respectively. The performance of the human and hand gesture detection methods indicates that intelligent video recording with student and teacher interactions can be achieved.

Keywords: Deep learning, Gesture recognition, Human detection, Intelligent video capturing, PTZ Camera Control