

## Research Article

# Intelligent Malaysian Sign Language Translation System Using Convolutional-Based Attention Module with Residual Network

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The deaf-mutes population always feels helpless when they are not understood by others and vice versa. This is a big humanitarian problem and needs localised solution. To solve this problem, this study implements a convolutional neural network (CNN), convolutional-based attention module (CBAM) to recognise Malaysian Sign Language (MSL) from images. Two different experiments were conducted for MSL signs, using CBAM-2DResNet (2-Dimensional Residual Network) implementing “Within Blocks” and “Before Classifier” methods. Various metrics such as the accuracy, loss, precision, recall, *F1*-score, confusion matrix, and training time are recorded to evaluate the models’ efficiency. The experimental results showed that CBAM-ResNet models achieved a good performance in MSL signs recognition tasks, with accuracy rates of over 90% through a little of variations. The CBAM-ResNet “Before Classifier” models are more efficient than “Within Blocks” CBAM-ResNet models. Thus, the best trained model of CBAM-2DResNet is chosen to develop a real-time sign recognition system for translating from sign language to text and from text to sign language in an easy way of communication between deaf-mutes and other people. All experiment results indicated that the “Before Classifier” of CBAMResNet models is more efficient in recognising MSL and it is worth for future research.

## 1. Introduction

Malaysia Sign Language (MSL), or Bahasa Isyarat Malaysia in Malay, was founded in 1998 when the Malaysia Federation of the Deaf (MFD) was established [1]. It is the primary sign language in Malaysia. It is used for daily communication for the deaf-mute community, including deaf people, people with hearing impairments, and physically unable to speak. The MSL has grown in popularity among deaf leaders and participants.

Generally, the American Sign Language (ASL) has had a significant influence on Malaysian Sign Language. Although there are a few similarities between the MSL and Indonesian Sign language, both are perceived differently. Otherwise, the foundation of Indonesian Sign language was based on MSL. The communication is accomplished by interpreting the meaning of the signer’s hand gestures and, on occasion, by using appropriate facial expressions. In 2013, about 58700 people from the Malaysian population used the MSL [2].