

Landmark Recognition Model for Smart Tourism using Lightweight Deep Learning and Linear Discriminant Analysis

ABSTRACT

Scene recognition algorithm is crucial for landmark recognition model development. Landmark recognition model is one of the main modules in the intelligent tour guide system architecture for the use of smart tourism industry. However, recognizing the tourist landmarks in the public places are challenging due to the common structure and the complexity of scene objects such as building, monuments and parks. Hence, this study proposes a super lightweight and robust landmark recognition model by using the combination of Convolutional Neural Network (CNN) and Linear Discriminant Analysis (LDA) approaches. The landmark recognition model was evaluated by using several pretrained CNN architectures for feature extraction. Then, several feature selections and machine learning algorithms were also evaluated to produce a super lightweight and robust landmark recognition model. The evaluations were performed on UMS landmark dataset and Scene-15 dataset. The results from the experiments have found that the Efficient Net (EFFNET) with CNN classifier are the best feature extraction and classifier. EFFNET-CNN achieved 100% and 94.26% classification accuracy on UMS-Scene and Scene-15 dataset respectively. Moreover, the feature dimensions created by EFFNet are more compact compared to the other features and even have significantly reduced for more than 90% by using Linear Discriminant Analysis (LDA) without jeopardizing classification performance but yet improved its performance.