SKIN CANCER IMAGE CLASSIFICATION

Structured Abstract

Context

Skin cancer is one of the most common malignancies in humans. Early detection would require less medical intervention and there is a better survival rate if detected early. With the aid of machine learning we would be able to train deep learning models and build automated system to classify skin lesions Images.

Objective

Using the HAM1000 data set from Kaggle we are trying to build predictive deep learning model using Convolutional Neural Network (CNN) to classify the skin cancer images.

Method

The entire project was implemented in python on Google collab which is built in a pipeline structure with Tensorflow and Keras modules. The implemented Convolutional Neural Network (CNN) models are VGG16 and ResNet50V2, which can classify 7 different types of skin cancer lesions.

Results

The models were trained with and without augmenting the images and assigning the class weights to tackle the problem class imbalance. ResNet50V2 had better prediction accuracy across the classes with the image augmentation implemented which is about 73 % and 83% without image augmentation. Accuracy creates an illusion of model performing well but it is better to have balance with other metrics such as F1-score, precision and recall to measure the model performance which justifies our use case. We could try to improve our model by exploring other algorithms as the ones we have implemented do not have promising results.

Novelty

This project implements two CNN model with transfer learning approach and tweaking and experimenting with different hyper parameters on VGG16 and ResNet50v2 architecture. Encouraged by the outcome, we would improve the prediction and classification accuracy by building our own models in future.

	Resnet50V2 with img Augmentation	Resnet50V2 without img Augmentation	VGG16 with img Augmentation
Cancer Classes		**f1-scores**	
akiec	0.00	0.06	0.05
bcc	0.03	0.02	0.06
bkl	0.11	0.14	0.08
df	0.00	0.05	0.00
mel	0.11	0.12	0.10
nv	0.59	0.61	0.47
vasc	0.01	0.05	0.02

Fig1: F1-scores for different combinations of models trained

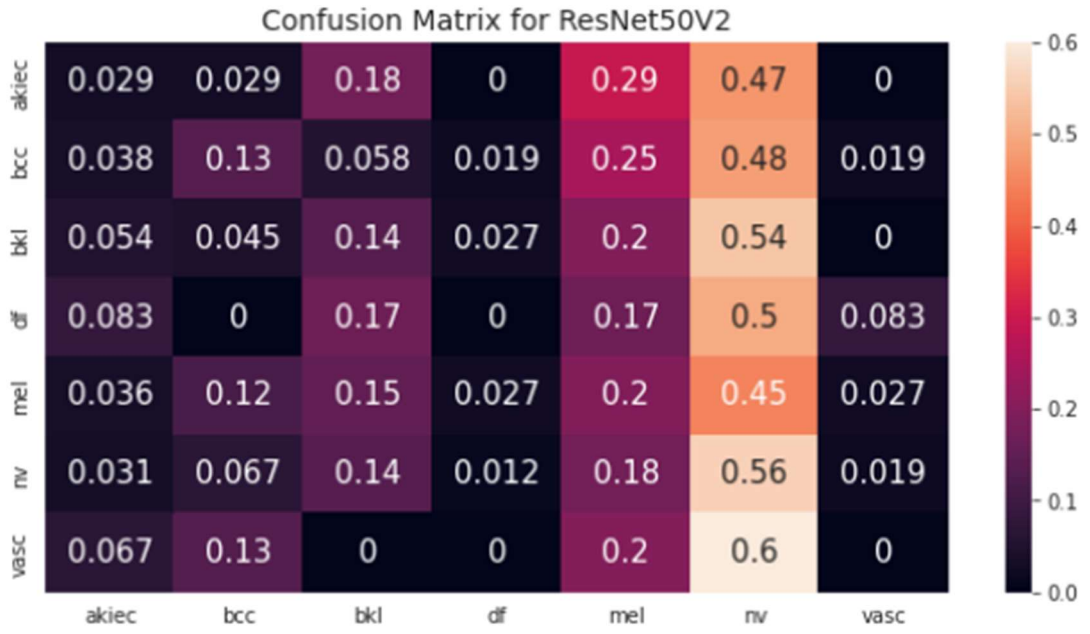

Fig2: Confusion matrix for ResNet50V2 model trained without image augmentation