Image Classification System for Tiny ImageNet

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Abstract

The goal is to showcase how Convolutional Neural Network(CNN) algorithms such as ResNet18 and data augmentation techniques helps in building image classification system. Our classification model achieves 46.71% validation accuracy and 59.79% training accuracy on the Tiny ImageNet dataset [1].

Introduction

Tiny ImageNet has 200 image classes, where every class has the following: 500 training images, 50 Validation Images and 50 test images. In fact, it is similar challenge as of the ImageNet Large Scale Visual Recognition Challenge(ILSVRC). We used image augmentation methods to train the images to avoid overfitting. We modified ResNet and built custom architecture [2].

Experiments

We resized the original image size from 64x64 to 16x16 and 32x32 for training the model. However, we validated the model on 64x64. We built a wider deep neural network because we have small training dataset and want to perform scene detection. Hence, We modified the ResNet-18 architecture with the 3 building blocks such as ([32,64,128]x3), ([64,128,256]x3) and ([128,256,512]x3).

Result and Discussions

We used 6 different kinds of image augmentation variations. We first trained on 32x32 for 10 epochs, then we trained on 16x16 for 5 epochs, and then on 64x64 for 5 epochs. We repeated this, and hence the total was more than 400 epochs.

Input → Block 1 → Block 2 → Block 3 → 64 CONV 1x1 → Global Average Pooling
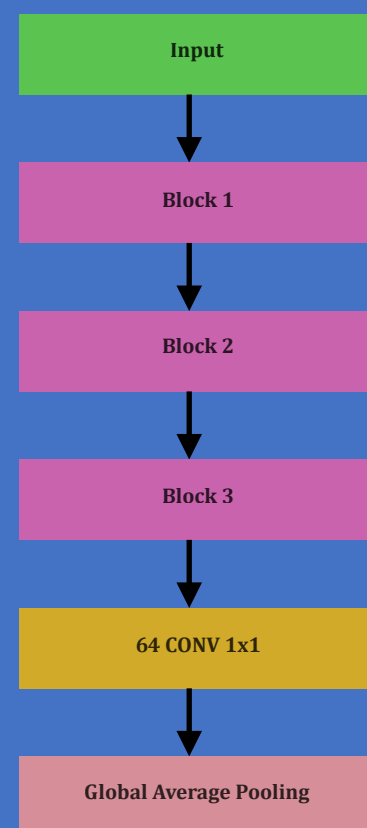
Conclusions

We trained our network from scratch and the model achieves a validation accuracy of 46.71%. For future work, we expect to apply hard negative mining for classifying hard images.

References

[1] https://tiny-imagenet.herokuapp.com/
[2] Wu et al, "Tiny ImageNet Challenge", Stanford University