DSA5203 Assignment3

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1. Requirements and README

In this project, we mainly use the following python packages:

```
matplotlib==3.3.2
torch==1.13.1
torch==2.0.0
torchvision==0.15.1
tqdm==4.65.0
tqdm==4.50.2
```

We use colab with GPU to train our model. To run our code, please put three files "data_loader.py", "DSA5203_Assignment3", and "model.pkl" under the same root.

2. Discussion on code

In this project, we use a pre-trained ResNet-152 model, trained on the ImageNet dataset, for image classification. ResNet-152 utilizes skip connections, enabling the network to learn residual functions and mitigate the vanishing gradient problem. Here are some tricks:

- **Data augmentation:** We crop all the input images to size of 224×224 and apply random horizontal flips with probability of 0.5 for the training samples. This technique aims to increase diversity in the training set and reduce overfitting by exposing the model to more varied examples of the same class. Besides, we also

normalize the input pixels such that the model can converge a little bit faster.

- **Choice of model parameters:** In this project, we use the SGD optimizer with default parameters to train our model. To prevent overfitting, we train for 8 epochs, which has been found to be effective in balancing model performance and generalization.

3. Experiment results

Accuracy on training dataset: 0.990

Accuracy on validation dataset: 0.907

Accuracy on testing dataset: 0.940