Manarat International University

Department of CSE

Course Name: **Neural Networks and Fuzzy Systems**

Course Code: **CSE-433**

Contestants Name & ID:

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Git Source Repository

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Introduction:

The CIFAR-10 dataset is a collection of images that are commonly used to train computer vision algorithms. It is one of the most widely used datasets for deep learning research. The CIFAR-10 dataset contains 60,000 32x32 color images in 10 different classes which are airplanes, cars, birds, cats, deer, dogs, frogs, horses, ships, and trucks. There are 6,000 images of each class.

This lab project offers a Kaggle competition on this dataset for the MIU students to implement deep learning algorithms which have been taught on both courses in a cool real-world project. The competition challenges you to predict the labels of total 300,000 images on this dataset using only 60,000 labeled images for training.

Data Preprocessing (augmentation, normalization techniques):

Augmentation:

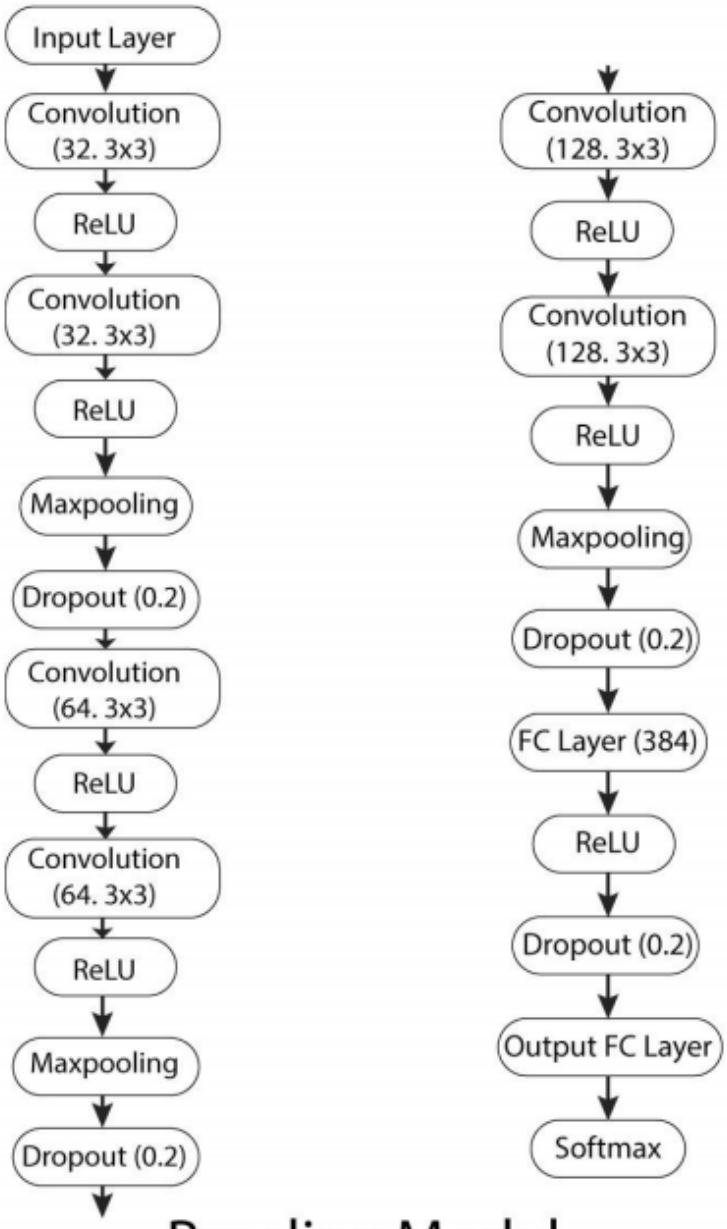
We used data augmentation for increase our training data set. We zoomed in our images in range=0.2, rotation our images in range=15, width shift range=0.1, height shift range=0.1

Normalization:

Normalization is a process that changes the range of pixel intensity values. To normalize the images, we have divided image pixel by 255.0, 245.0 and 265.0, then subtracted by 0.5 and multiplied by 1.5 and 2.0. By normalization we get the image range into -1 to +1.

Network Architecture:

We have used Baseline CNN Model. In Baseline CNN Model we use ReLU.



Baseline Model

Training Procedure:

In this contest there are 50000 train sample and 300000 test samples and total 10 number of classes. The image size is 32*32 and 3 image channels. So, image shape is 32*32*3. In this cause use 0.001 learning rate for train the images, as our

machine has 8 GB of ram so we take image batch size 500. To train the images we use around 60 to 100 epochs but for using early stopping our program had stopped at 35/36 epoch and we had use 15 patience.

As we have use used ReLU in our baseline model we used convoc2D (32) where pooling size is 2, 2 and dropout is 0.20. Secondly, we have used (64) where pooling size and dropout are same. We have also used L2 regularize (.01) and then used softmax activation function. Here we train our data set around 5 times. And got 82% accuracy.

Result:

Submission	Result	Model
First submission	0.81710	Baseline CNN model 60 Epoch (Early stop) Normalization: Divided image pixel by 255.0, subtracted by 0.5 and multiplied by 2.0
Second submission	0.79070	Baseline CNN model 50 Epoch (Early stop) Normalization: Divided image pixel by 245.0, subtracted by 0.5 and multiplied by 1.5
Third submission	0.79070	Baseline CNN model 60 Epoch Normalization: Divided image pixel by 245.0, subtracted by 0.5 and multiplied by 1.5
Fourth submission	0.79070	Baseline CNN model 60 Epoch (with Early stop) Normalization: Divided image pixel by 255.0, subtracted by 0.5 and multiplied by 1.5
Fifth Submission	0.82390	Baseline CNN model 100 Epoch (with Early stop) Normalization: Divided image pixel by 265.0, subtracted by 0.5 and multiplied by 2.0

Conclusion:

If we use more model like 6 layered convolution neural network then we believes that our result will increase. And if we had a higher computational power then we can achieve better results.

Overall, we've come to a better understanding of how image classification works and what parameters and elements are crucial to each.