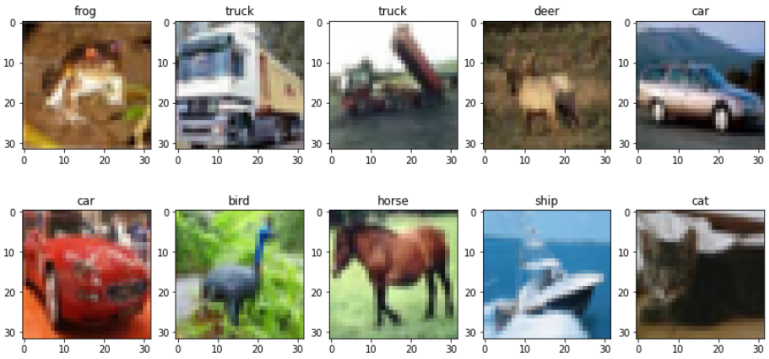
EE 228 Homework 3 report

Q1:

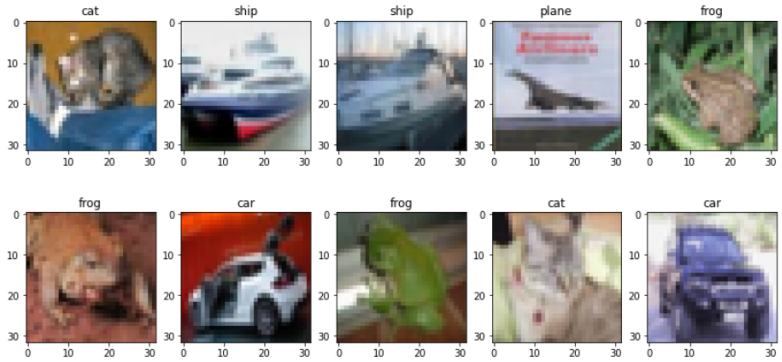
Todo:

Download data, split date into training set and test set,
Convert to one_hot label,
Normalize features,
Build CNN architecture (ResNet20)

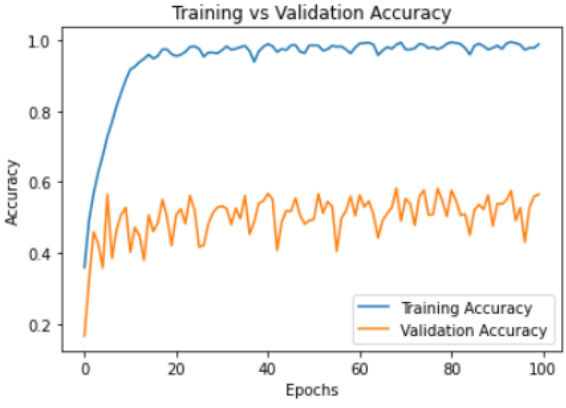
Training set:

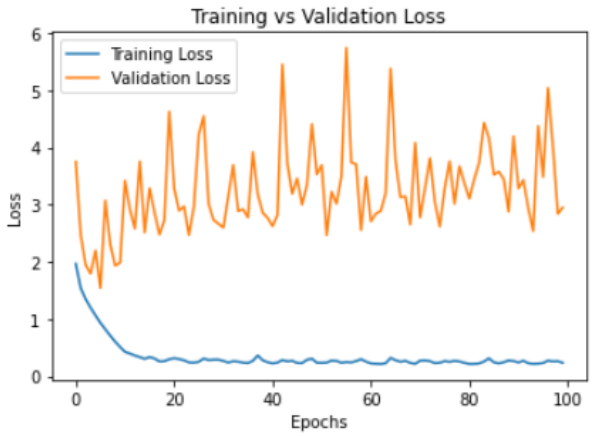


Test set:



Result:





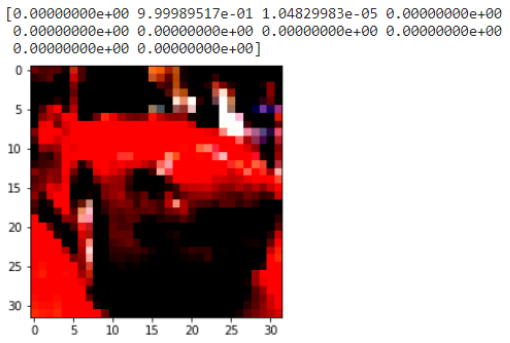
Max test accuracy: 0.5827000141143799

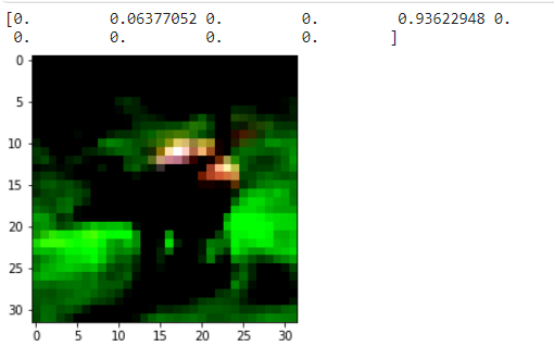
Q2: Mixup

- Alpha = 0.2

Renderings:

Train_set[5], label:car



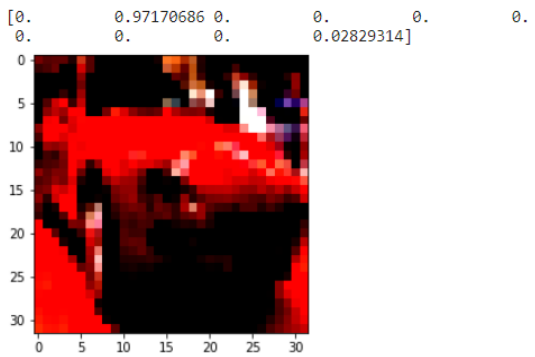


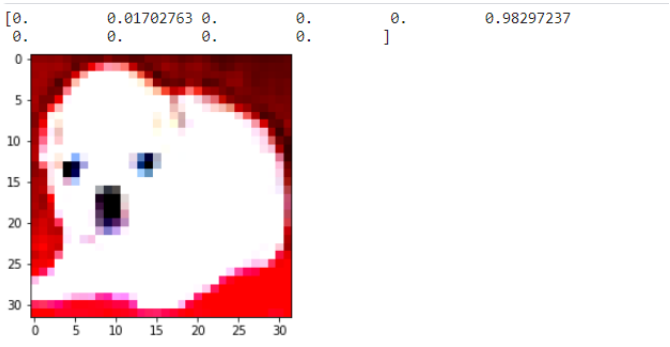
Result:

Max test accuracy: 0.6818000078201294

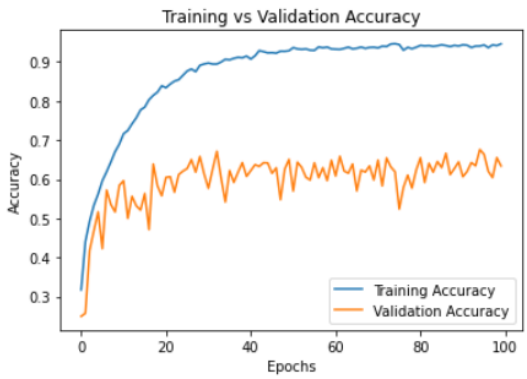
- Alpha = 0.4

Renderings:





Result:

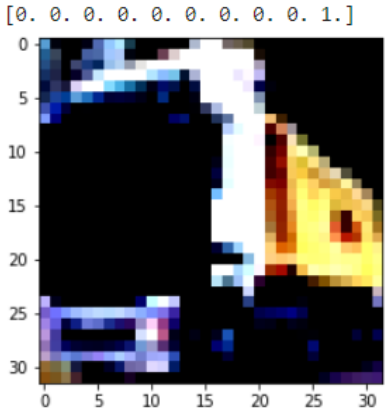


Max test accuracy: 0.6759999990463257

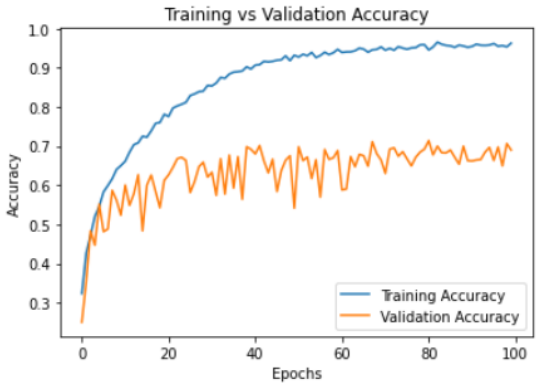
From the results, we can see that the result is better than without augmentation, and the test accuracy rate is significantly improved. Compared to these two results, I think alpha = 0.4 performed better than alpha = 0.2.

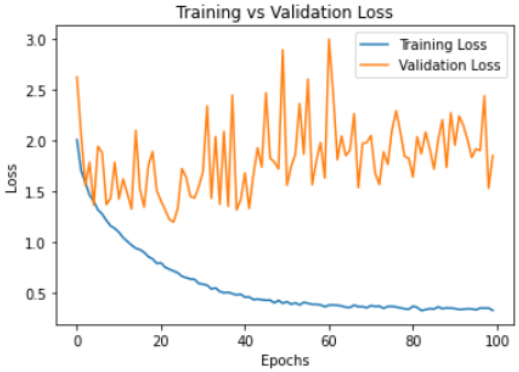
Q3: Cutout

Renderings:



Result:



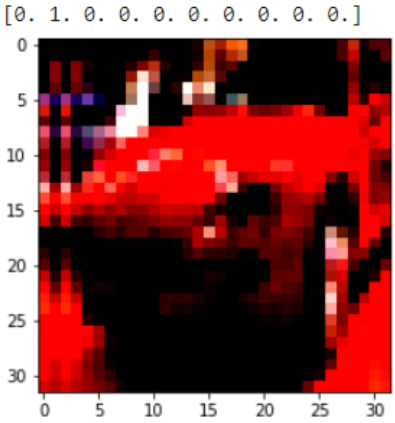


Max test accuracy: 0.7139000296592712

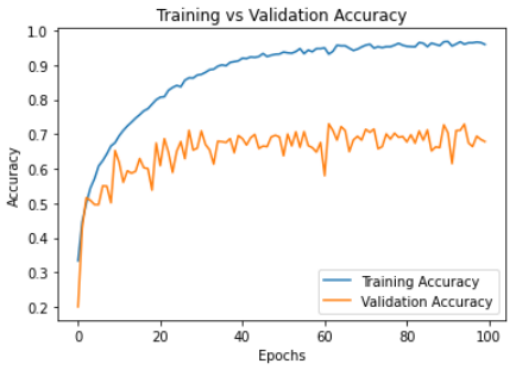
From the results, we can see that the cutout augmentation also improves the test accuracy, and I think this method works better than Mixup.

Q4: Standard

Renderings:



Result:



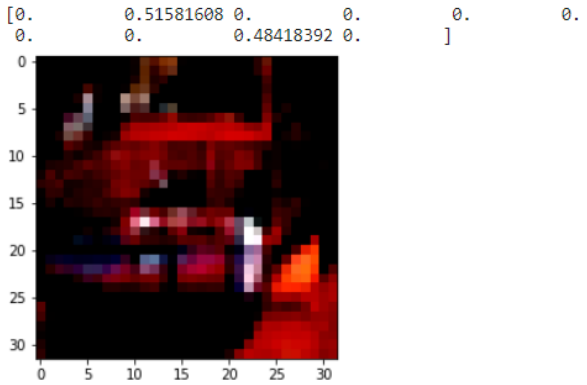
Max test accuracy: 0.7301999926567078
Max training accuracy:0.9684000015258789

From the results, we can see that the Standard augmentation also improves the test accuracy, but I realize this method makes the model overfit more serious. Test loss does not drop significantly.

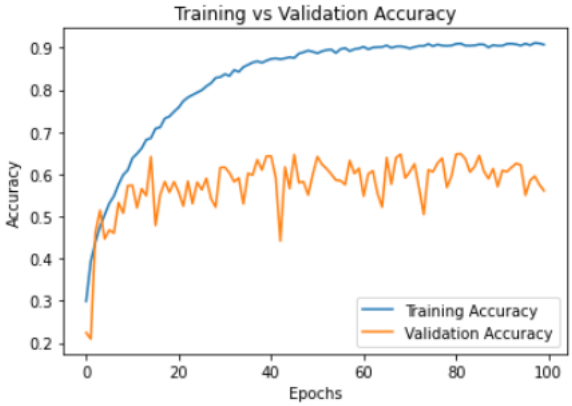
Q5: Combination

First apply **standard** and **cutout** augmentations on the training images and then apply **mixup** to blend them.
I used alpha = 0.4

Renderings:



Result:



Max test accuracy: 0.6485000252723694
Max training accuracy:0.9114000201225281

According to the result, I don't think combining all augmentation can improve the result further. Conversely, the test accuracy decreased.

Q6:

From the results we can see that all these 4 data augmentations can **improve the test accuracy** significantly, and the cutout method works better than others. The test accuracy can reach 0.73.

According to the training accuracy, it seems that data augmentations do **not have a great influence on the training accuracy**.

To evaluate the convergence of the model, we need to compare training and test loss speed and trend. However, I think my model is overfitting because the training loss decreased significantly with the increase of epoch and is very stable but test loss didn't decrease and is unstable.

Also I realize the best augmentation for my model is cutout augmentation. Contrary to my imagination, the combination method does not increase the test accuracy.