IMAGE AUGMENTATION FOR CNN MODEL

DATASET: CIFAR-10

What is Data Augmentation?

- Process of taking images that are already in a training set and manipulating them to create many altered versions of same image.

Advantages

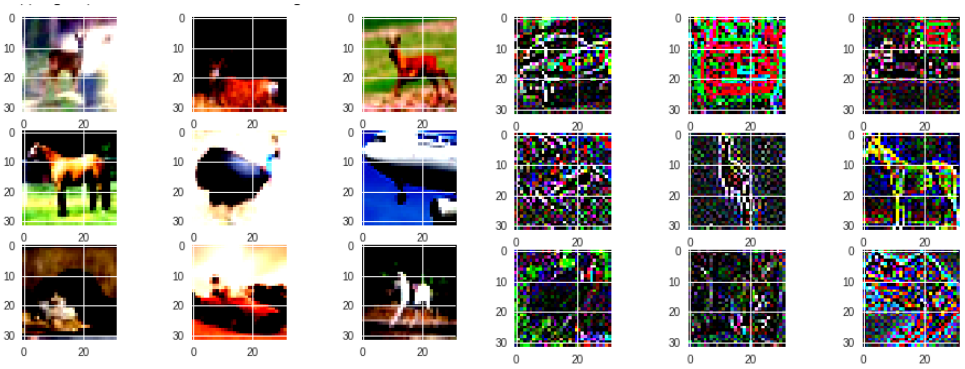
- Overcome high expense of collecting training images.
- Expose model to wider variety of coloring/lighting situations making it more robust.

Types of Data Augmentations Available:

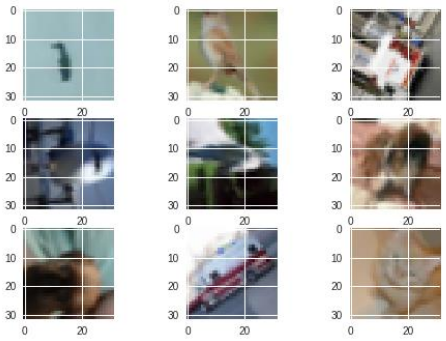
- Feature Standardization
- ZCA Whitening
- Random Rotations/ Shifts
- Flips
- Translation
- Lightening Conditions
- Perspective transforms
- Contrast Stretching
- Adaptive Equalization

Sample of Data Augmentation applied to CIFAR10 dataset

Feature Standardization **ZCA Whitening**

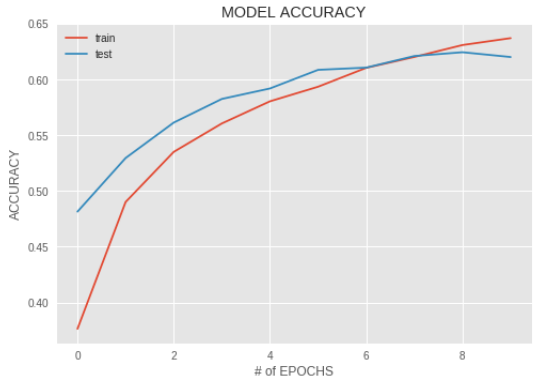


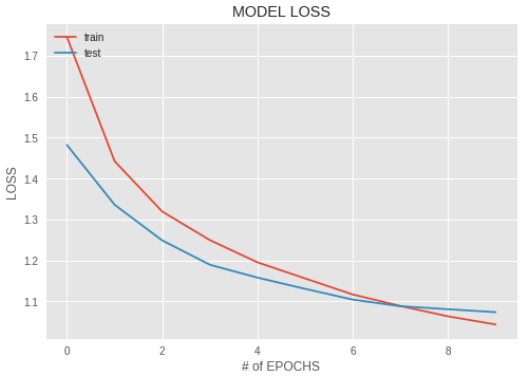
Random Rotations



Random Shifts

Model Performance Before Data Augmentation






```
Test data loss: 1.0732233697891236
Test data accuracy: 62.019999999999996
```

Model Performance Post Data Augmentation

```
print('Test data loss:', acc[0] )
print('Test data accuracy:', acc[1] * 100)
```

```
Test data loss: 1.2492859506607055
Test data accuracy: 62.129999999999995
```

DIFFERENCES OBSERVED:

Metric	Model Without Data Augmentation	Model with Data Augmentation	Methods to Overcome Problem is any
Model Loss	It is lower	It is slightly higher when compared to model without Data Augmentation	Increasing the batch size and number of epochs could help model with Data Augmentation to improve
Model Accuracy	It is lower than the other Model	It increases when compared to Model without Data Augmentation	Increasing number of epochs could increase the Model Accuracy even more in the case of Image Augmented Model
Model Training Time	Time taken with GPU is 3.5 minutes	Time taken with GPU is 200 minutes	Machine with higher computational power is required for Model with Data Augmentation

INFERENCE:

- Model training time is increased when Data Augmentation is applied. It takes more than twice when compared to model without data augmentation.
- Time constraint is very important while choosing a model type. According to the computational power of the machine and the accuracy gap between the two models is to be observed prior choosing the right model.
- It not only benefits the classification task but also improves the state of algorithm.
- It also helps in situation where data available is unbalanced.
- Transformed Images can be saved to file for later use as well.