Image Classification Using Deep Learning on CIFAR-100 Dataset

By

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Image classification

How Computer Image recognition inspired from Biological neurons:

- Our eyes can recognize image features and locate or store a picture in the brain using past experiences same way machine can also train by accessing and learning from data

Why:

- Image classification applications are used in many areas, such as medical imaging, object identification in satellite images, traffic control systems, brake light detection, machine vision, and more

CIFAR 100

- Number of the class: 100 with 20 super classes
- 600 images per class
- Size:60000 32*32

Problem statement

- How to classify and label images using CNN
- Evaluate the model efficiency
- Improvement the model performance

Methodology

Preprocessing

Apply the model

Evaluation Model

Prediction

Pre-processing

- Divide the dataset into a 80/20 train-test
- Normalization in range (0_1)
- Resizing the training data

Models

1) Base CNN
2) Resnet

Model Performance

We can notice sudden decrease in the loss for the first 20 epochs and later the loss decreases gradually. Mainly because Stochastic gradient decent performs worse when they come closer to optimized point.

ResNet Model

accuracy			0.72	10000
macro avg	0.73	0.72	0.72	10000
weighted avg	0.73	0.72	0.72	10000

Average accuracy by ResNet model for all the class categories

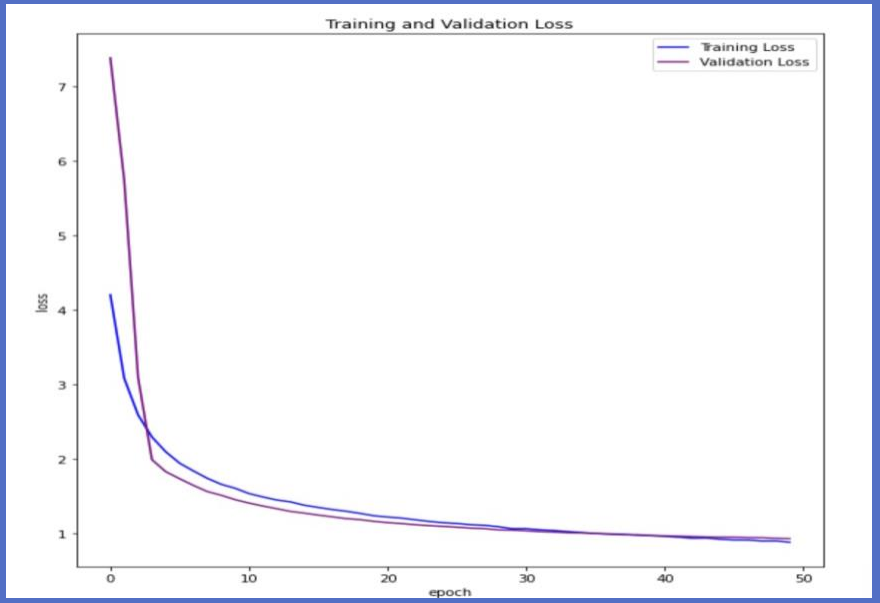
Base Model

accuracy			0.52	10000
macro avg	0.57	0.52	0.53	10000
weighted avg	0.57	0.52	0.53	10000

Average accuracy for Base model for all the class categories

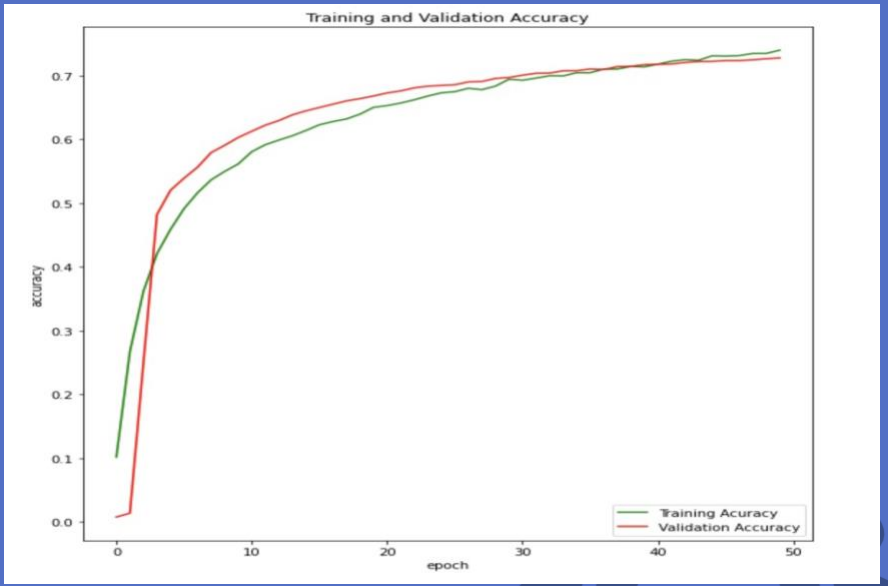
Results

- Sudden decrease in the loss for the first 20 epochs
- Mainly because Stochastic gradient decent.



Loss vs epochs

- Accuracy of training and validation graph starts to rise from somewhere around 10%
- Once the accuracy reaches more than 50%, accuracy starts to rise slowly

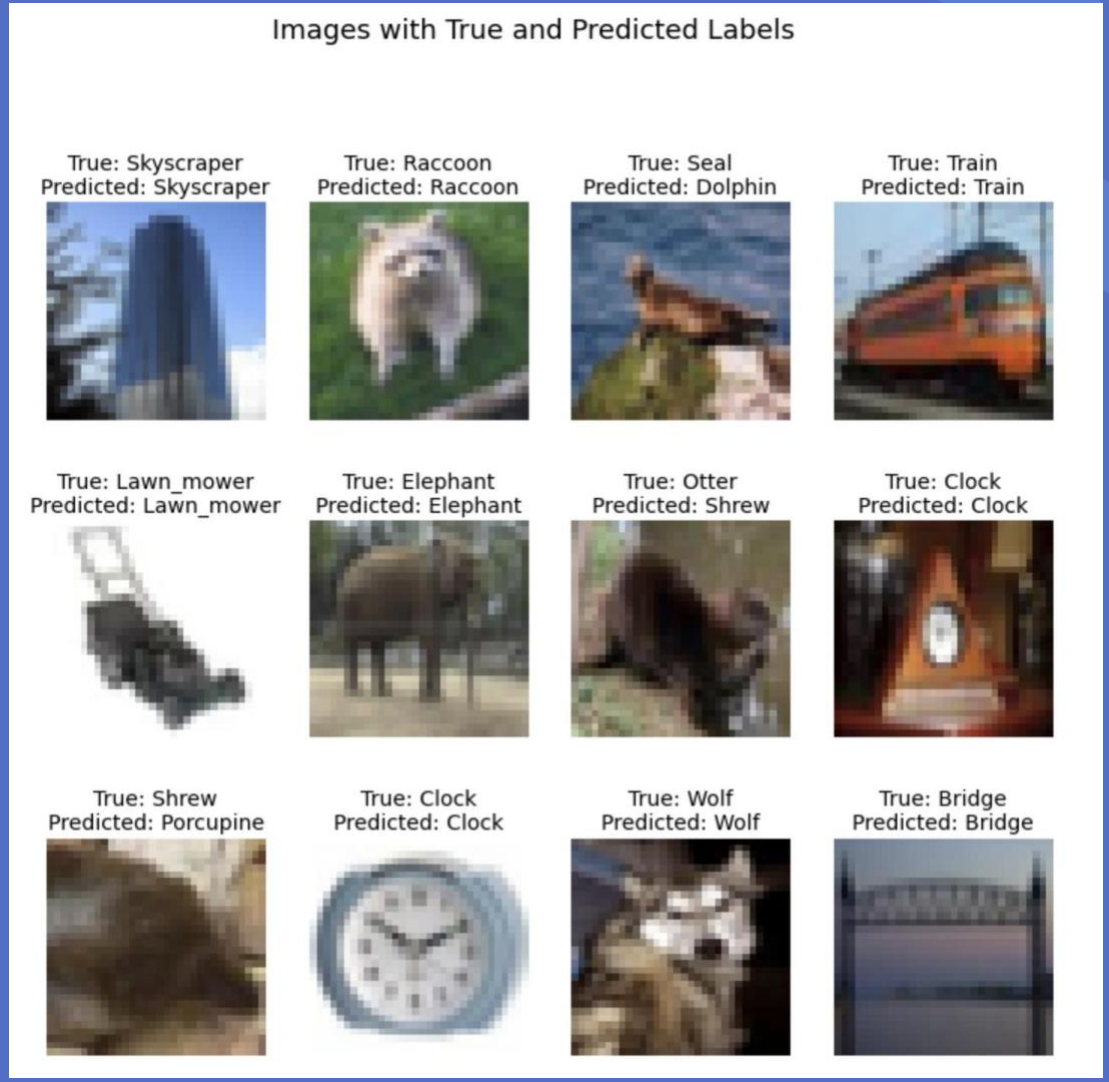


Accuracy vs epochs

Conclusion

- The 100 classes along with the small amount training data availability for each class does affect the performance of the model

- The Resnet performance might marginally improve without hardware restrains to run model for more epochs



Thank You!