Neural Networks and Deep Learning Project Report: [CIFAR-100 Image Classification]

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Dataset Chosen: CIFAR-100

Objective:

The objective of this project is to develop a convolutional neural network (CNN) for image classification. The CNN will be trained on a large dataset of images and will be able to classify new images into one of a predefined set of categories

CNN Architecture:

Layer	Type	Output Shape
conv2d_1	Conv2D	(None, 32, 32, 64)
conv2d_2	Conv2D	(None, 32, 32, 64)
max_pooling2d_1	MaxPooling2D	(None, 16, 16, 64)
dropout_1	Dropout	(None, 16, 16, 64)
conv2d_3	Conv2D	(None, 16, 16, 128)
conv2d_4	Conv2D	(None, 16, 16, 128)
max_pooling2d_2	MaxPooling2D	(None, 8, 8, 128)
dropout_2	Dropout	(None, 8, 8, 128)
conv2d_5	Conv2D	(None, 8, 8, 256)
conv2d_6	Conv2D	(None, 8, 8, 256)
max_pooling2d_3	MaxPooling2D	(None, 4, 4, 256)
dropout_3	Dropout	(None, 4, 4, 256)
conv2d_7	Conv2D	(None, 4, 4, 512)
conv2d_8	Conv2D	(None, 4, 4, 512)
max_pooling2d_4	MaxPooling2D	(None, 2, 2, 512)
dropout_4	Dropout	(None, 2, 2, 512)
flatten	Flatten	(None, 2048)
dense	Dense	(None, 2000)
dropout_5	Dropout	(None, 2000)
dense_1	Dense	(None, 1000)
dropout_6	Dropout	(None, 1000)

Layer	Type	Output Shape
dense_2	Dense	(None, 500)
dropout_7	Dropout	(None, 500)
dense_3	Dense	(None, 100)

We have used **Data Augmentation** to artificially increase the size of a training dataset by creating new training examples from existing ones. These extra images were used as validation dataset and also helps us to increase the accuracy of the result.

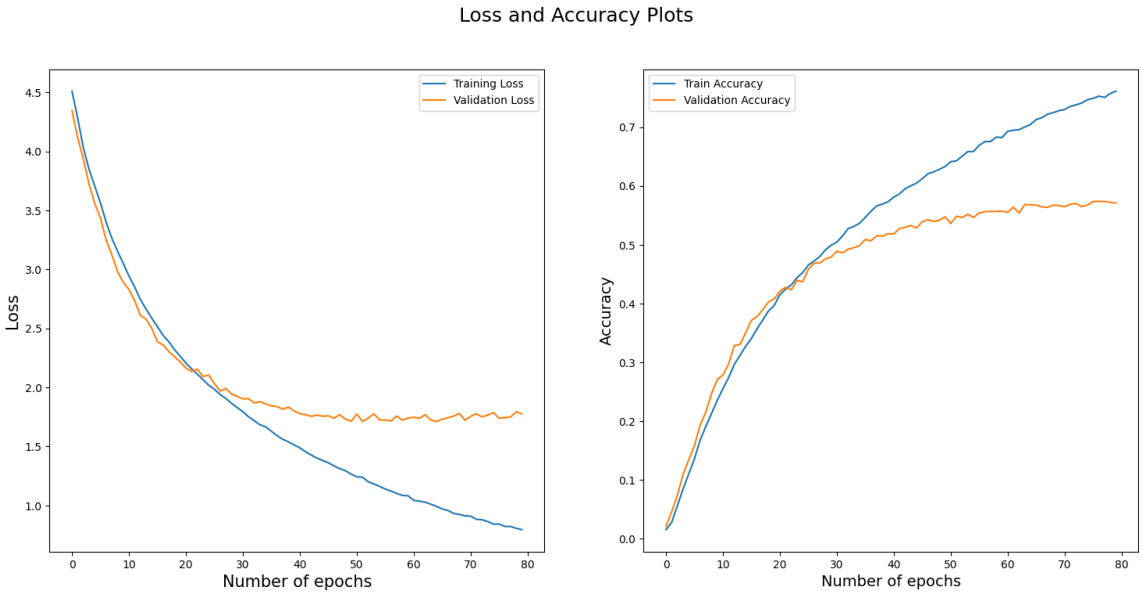
Results:

Validation Accuracy: 57.52 %

Test Accuracy: 56.93 %

Validation Loss: 1.75

Test Loss: 1.75



Conclusion

This project has successfully developed a (CNN) for image classification trained on CIFAR-100 and was able to achieve an accuracy of 56.93%. This is a good result, given the complexity of the task. The CNN was able to correctly classify a wide variety of images, including animals, objects, and scenes. The project also investigated the use of data augmentation to improve the performance of the CNN.