Computer Vision:

Task1:

The final accuracy of the Lenet model was: Validation Accuracy = 58.61%

Task2:

I trained a DCGAN on Cifar10 and generated 2000 images with 200 of each class and when I trained it again on the same LeNet model the

Accuracy = 57.57%

So over 100 epochs the accuracy slightly decreased as the images that we added through DCGAN were of poorer quality and it was expected that these images will lower the accuracy. The DCGAN takes noise as input and generates images based on training data, these images generated aren't the same as the original images and as the DCGAN has its own accuracy in generating these images a model with lesser accuracy was expected. If we increase the number of images generated by DCGAN in the dataset it will further decrease the accuracy.

Task 3: After 100 epochs

1. Height and width shift: Validation Accuracy = 69.90%
2. Horizontal and vertical flip: Validation Accuracy = 66.42%
3. Zoom and shear: Validation Accuracy = 64.35%

The best is Height and width shift as it moves the picture horizontally and vertically thus moving the image from the centre and providing more diverse cases to train on. Because in real life cases the object may not be centred or may be cut from some places. Therefore, it was expected that height and width shift work the best,

A close second was horizontal and vertical flip as it inverts the images along the horizontal and vertical axis thus inverting the object. It is not good as the hight and width shift as it only flips the object without changing its position in the centre and thus providing less real-life cases for training

Zoom and shear was last as it only enlarges the image and rotates it by an angle,

All of these cases were an improvement from the data that was not augmented as each of these provides some extra information to train on which helps in increasing our overall test accuracy.

Bonus 1:

I got a test accuracy of 65% combining a few different data augmentation techniques, its accuracy is an average of the accuracies of different techniques used in it.

Though still Height and width shift has the best validation accuracy