CS577-Assignment 4

Multi Class Classifier

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1.Problem Statement :

Classification of CIFAR 10 images. This is multi class classification problem which we are going to solve by implementing various conv neural networks.

2.Proposed Solution :

We will design a Conv neural network in Python with Keras and then train the network on train and validation data. Finally we will evaluate performance of the network on test data.

3.Implementation details :

- We first load the data the CIFAR 10 data from the below link.
  https://www.cs.toronto.edu/~kriz/cifar.html
- Alternatively you load CIFAR10 data from the keras.

- Then we are going to One Hot Encode the labels of the dataset.
- We split the Iris data in Train , Test and validation Set using train_test_split() method in 8:2 ratio.
- Then we normalized the features.
- We designed neural network with 5 convolution layers.
- Activation used in the hidden layers is Relu and Activation used in the output node is Softmax.
- We used various Categorical Cross Entropy as loss function and RMS PROP Optimizer to evaluate the network that are discussed in the results section.
- Now we train our network with train data and observed its performance . Results are discussed in below section.

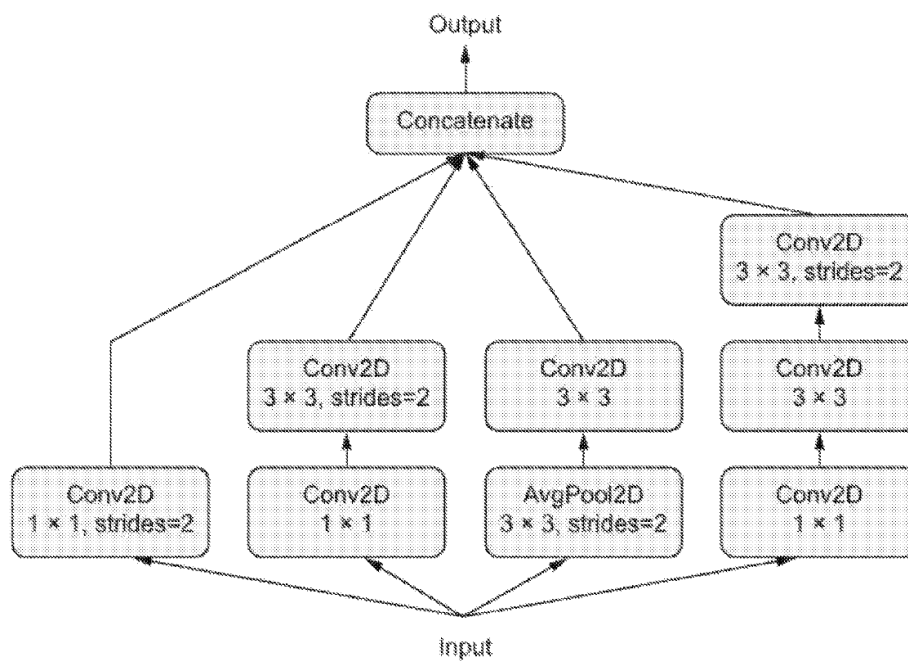**4. Results and discussion:**

Basic CNN Architecture :

Traning and Validation Accuracy

Traning and Validation Loss
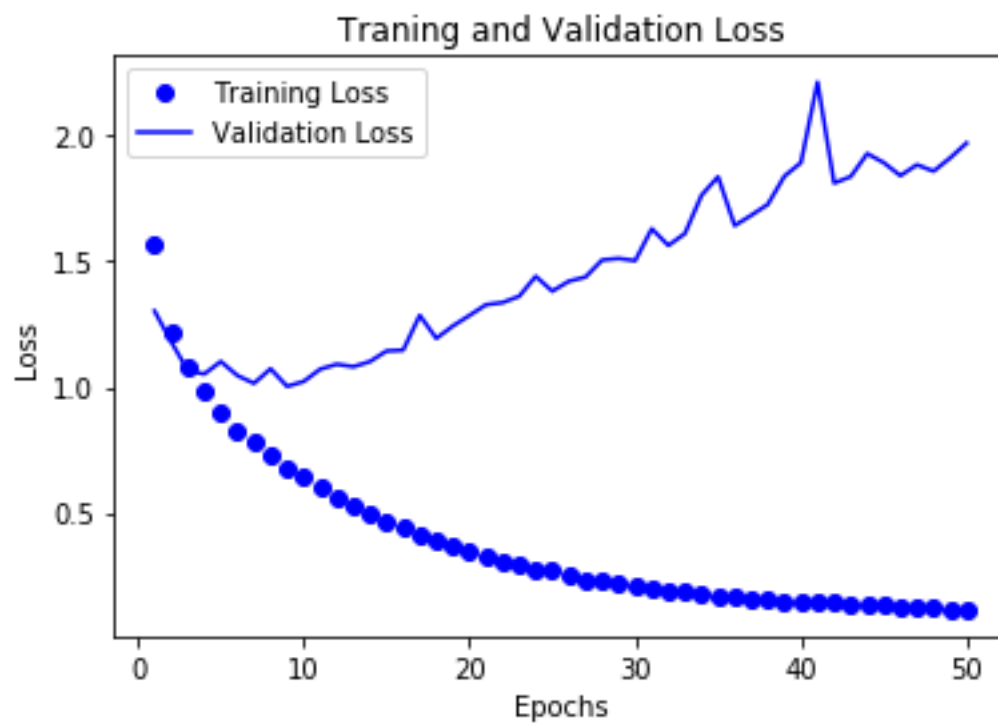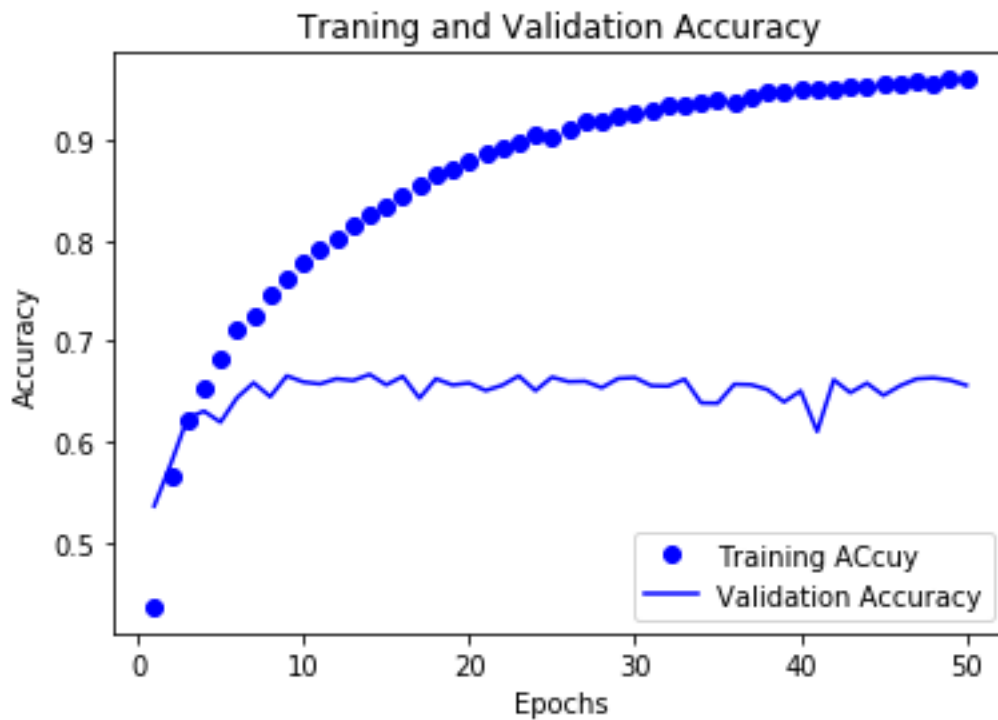
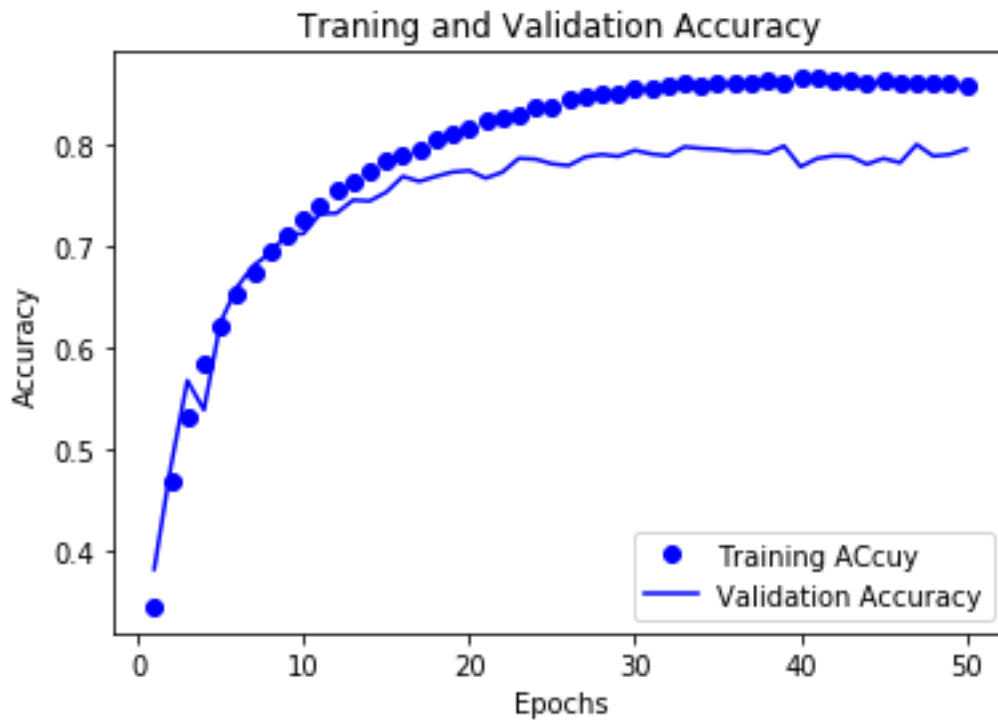**After 10 epochs accuracy do not change hence taking 10 epochs as our final epoch value.**

Evaluation on The test Data :
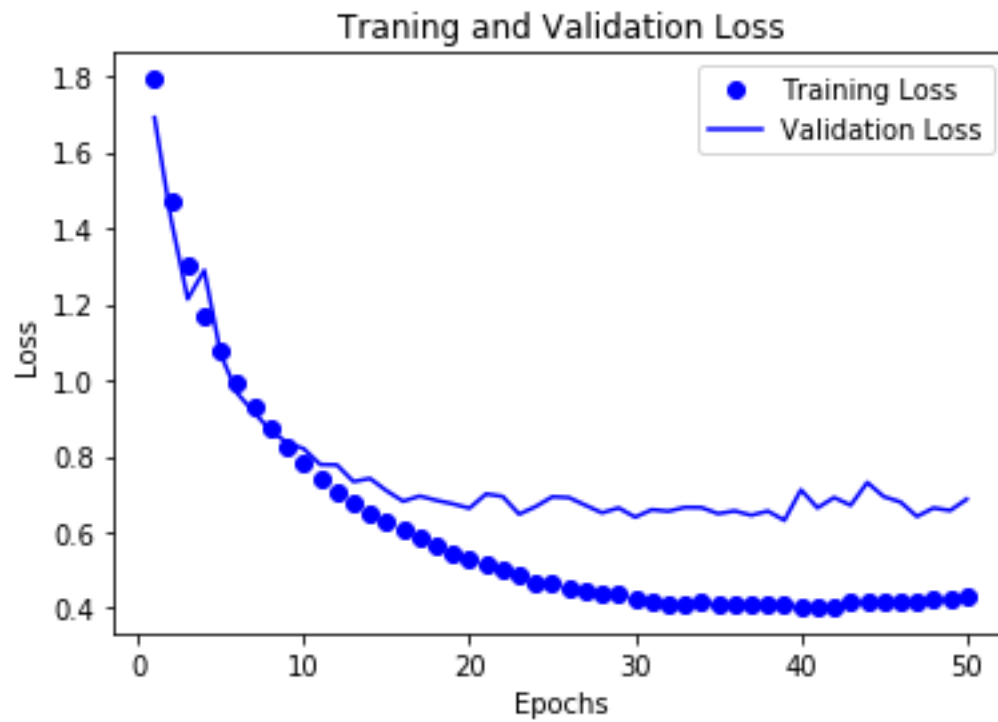
```
Test Results
Loss : 1.0708184329032897
Accuracy : 0.6624000072479248
```

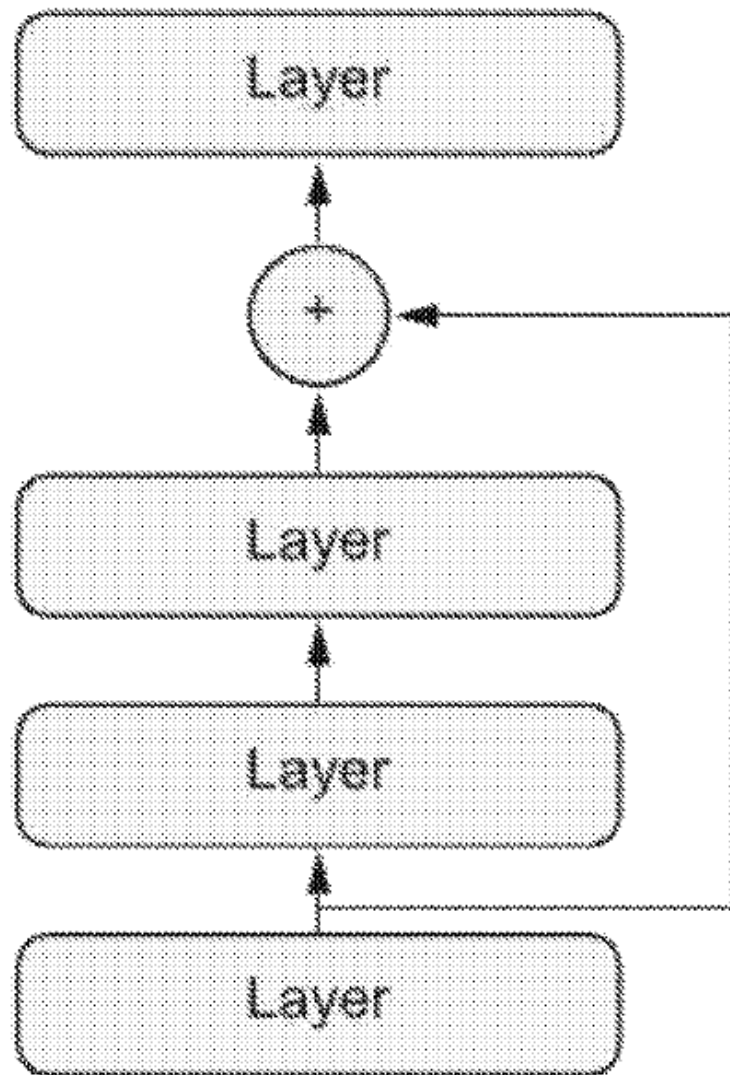# After Adding Inception block:

Architecture of Our Inception Block

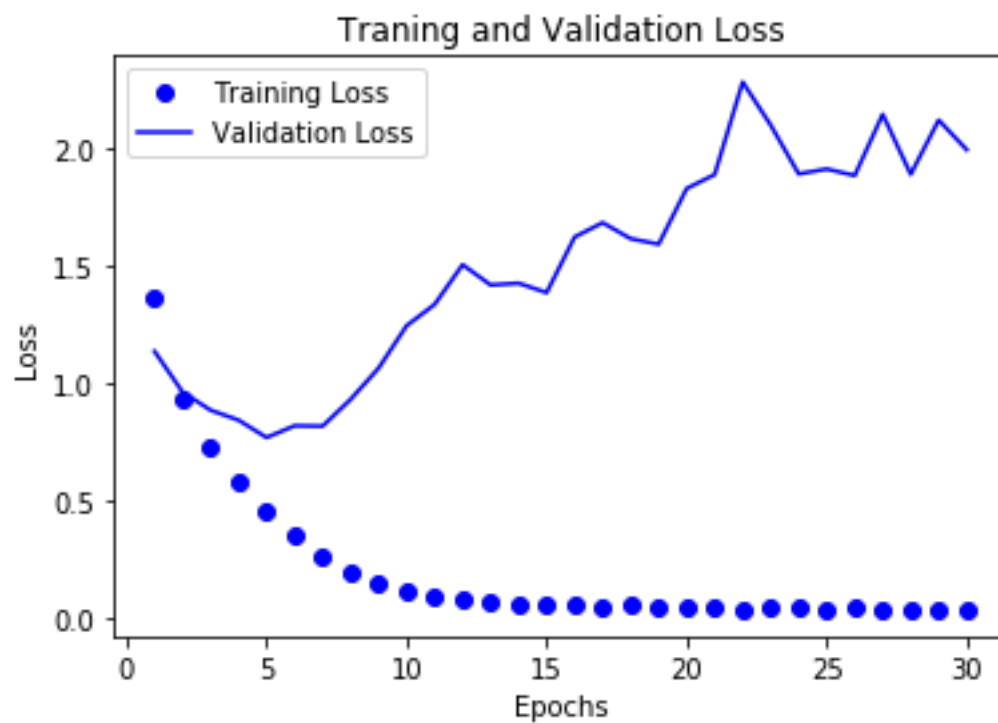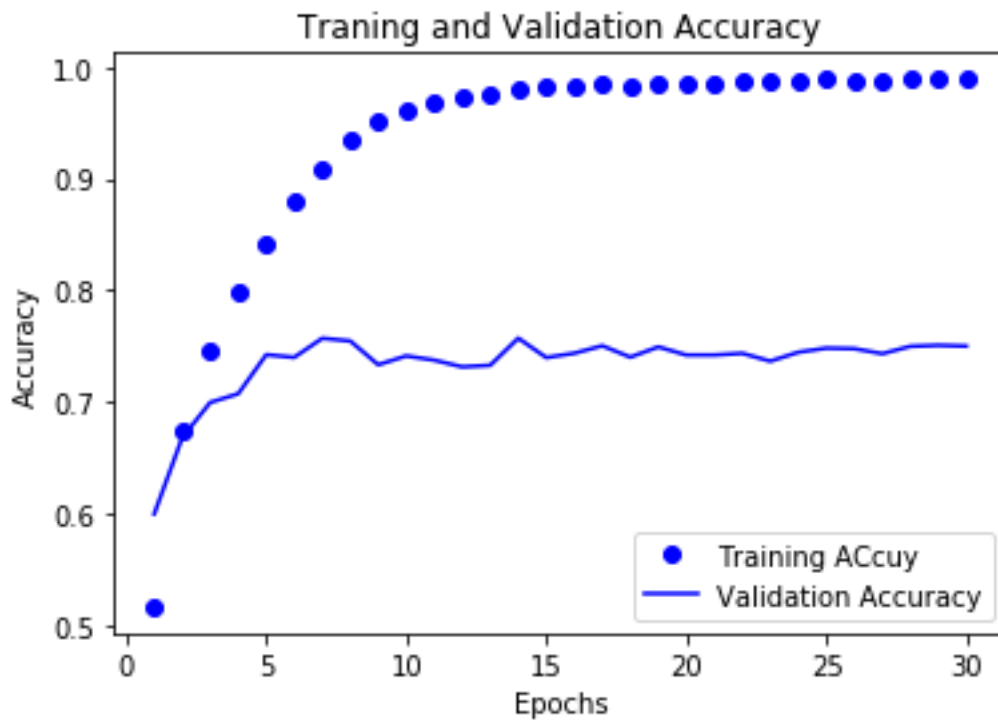Traning and Validation Loss

Epochs : 30

Evaluation on Test data:

```
Test Results
Loss : 0.6340525390625
Accuracy : 0.791100025177002
```

After Adding Residual Block we get below Graph:

Architecture of Residual Block

Traning and Validation Accuracy

Traning and Validation Loss

Epochs : 8

Evaluation Test Results:

```
Test Results
Loss : 1.0479996159553528
Accuracy : 0.7318999767303467
```