Multi-layer Perceptron Classifier for CIFAR-10

The data has been obtained from keras.datasets.

The training data is further split into training and validation data and finally evaluated on the test data provided, with a motive to improve the accuracy of the model. The effect of changing parameters on loss and accuracy by modifying the following parameters is described as follows:

Five models with different parameters were built, out of which the performance of top 3 models have been listed below:

Model 1: Optimizer Used: SGD

No. of epochs	Batch size	Network Architecture	Learning Rate	Activation Function	Dropout Rate
30	32	6 Hidden layers with Dense layers having 512 units	0.01	Relu and Softmax	0.2

Validation Accuracy:43.36%
Test Accuracy:45.59%

Model 2: Optimizer Used: SGD

No. of epochs	Batch size	Network Architecture	Learning Rate	Activation Function	Dropout Rate
28	32	4 Hidden layers with Dense layers having 1024 and 512 units	0.014	Relu and Softmax	0.2

Validation Accuracy:64.61%
Test Accuracy:55.28%

Model 3: Optimizer Used: Adam

No. of epochs	Batch size	Network Architecture	Learning Rate	Activation Function	Dropout Rate
40	128	4 Hidden layers with Dense layers having 512 units	0.014	Relu , tanh and Softmax. (With Dense layer having kernel regularizer)	0.3

Validation Accuracy:41%
Test Accuracy:40%

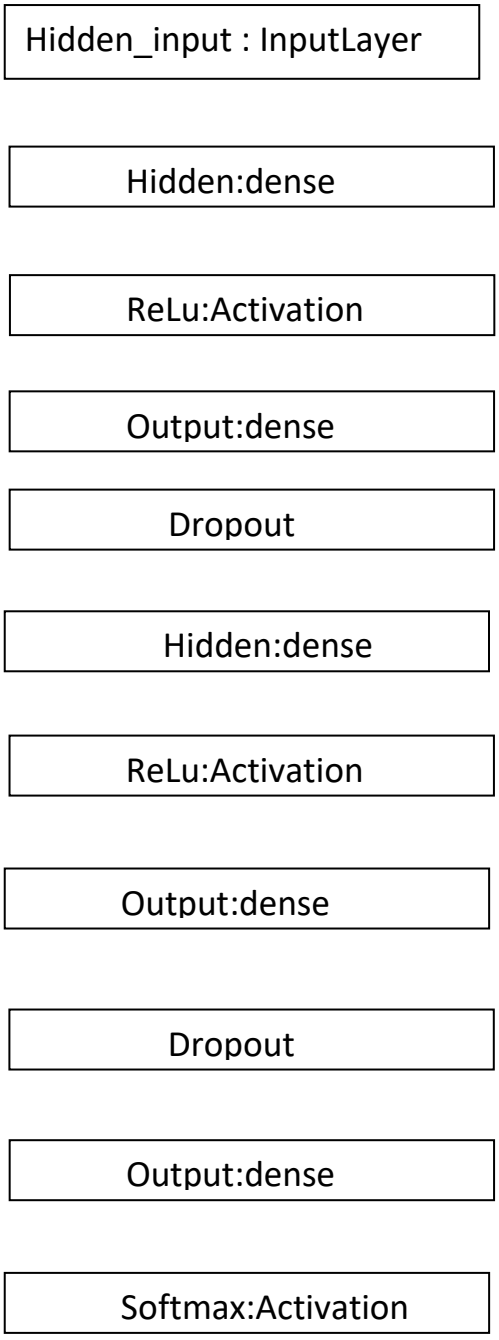
Conclusion

As per the results, Model 2 gives better performance, so the model with the following values of the parameters will be chosen:

No. of epochs= 28
Batch Size= 32
Learning Rate=0.014
Activation Function=Relu and Softmax
Dropout Rate=0.2
Network Architecture=4 Hidden layers with two Dense layers having 1024 and 512 units and two Dropout layers

Model 2 with two Dense Layers having 512 units each and two Dropout Layers gives validation accuracy of 53% and test accuracy of 50%

Following is the pictorial representation:



Possible ways to improve the model performance:

(a)Increase the number of epochs

(b)Adding more dense and dropout layers