

Nascent Problem

INTERNSHIP QUESTION 2

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TABLE OF CONTENTS:

1. PROBLEM STATEMENT
2. APPROACH
3. IMPLEMENTATION
4. TESTING AND RESULTS
5. CONCLUSION

1. PROBLEM STATEMENT:

Mountain Bike and Road Bike Classification using CNN.

2. APPROACH:

MODEL ARCHITECTURE:

Input layer: features of 60×60 is given as input. It reshapes the size of features to $60 \times 60 \times \text{number of images}$.

Convolution layer #1: applies a $32 \times 5 \times 5$ filter with ReLU activation function on the input layer.
Args: inputs = input_layer, filters = 32, kernel_size = [5,5], padding = "same", activation = ReLU
Output: conv_1

Pooling layer #1: performs max pooling with a 2×2 filter and stride of 2.
Args: inputs = conv_1, pool_size = [2,2], strides = 2
Output: pool_1

Convolution layer #2: applies 64 5×5 filters, with ReLU activation function on pool layer output.
Args: inputs = pool_1, filters = 64, kernel_size = [5,5], padding = "same", activation = ReLU
Output: conv_2

Pooling layer #2: performs max pooling with a 3×3 filter and stride of 2.
Args: inputs = conv_2, pool_size = [2,2], strides = 2
Output: pool_2

pool_2 is flattened using reshape and reshape size = $7 \times 7 \times 256$.

Dense Layer: dense layer to resize to 1024 and with a regularization method (drop out)

Logits: takes 1024 and returns the probability values for each class.

3. IMPLEMENTATION:

Let the training folder has all the images.

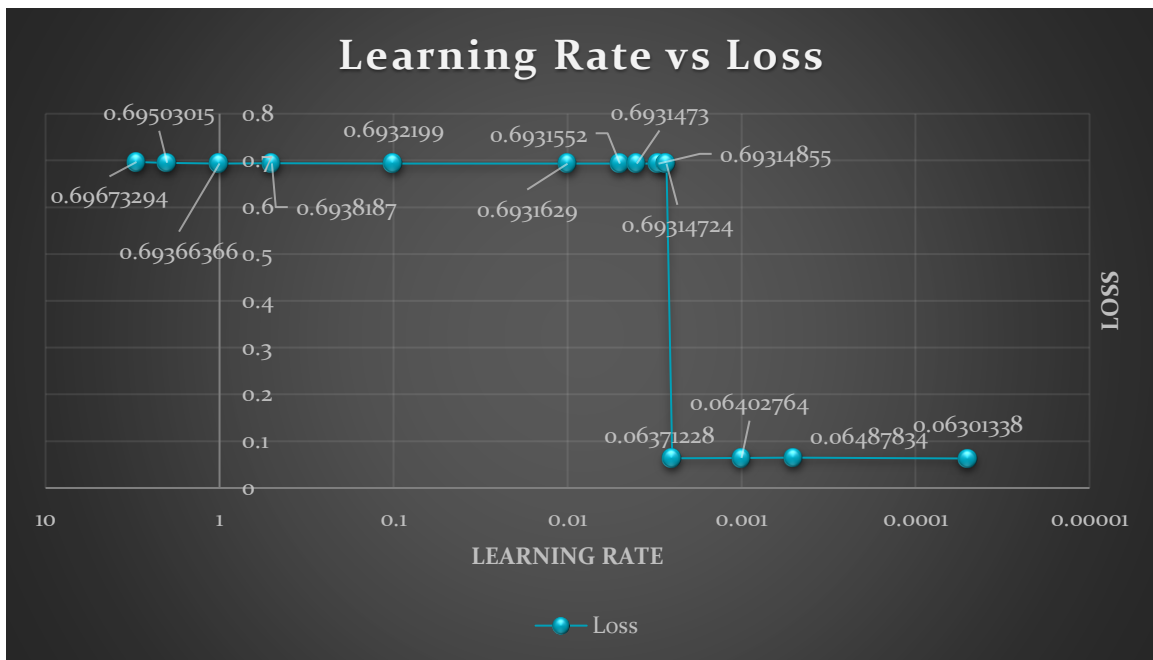
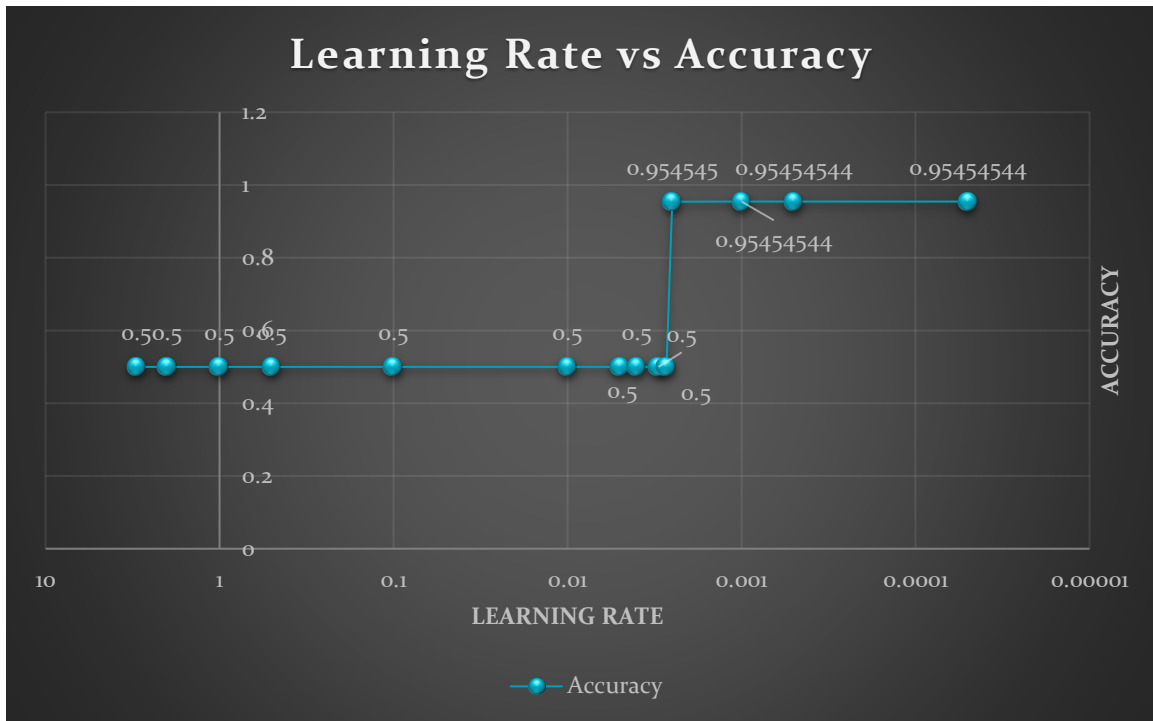
To make a test set, a random number is automatically selected from 10 to 20, and those many number of images is selected randomly from the training dataset and they are moved to testing data set.

The algorithm is then executed, and the accuracy is then averaged to a particular value.

The entire code is available here: <https://github.com/aravind3134/Github>

4. TESTING AND RESULTS:

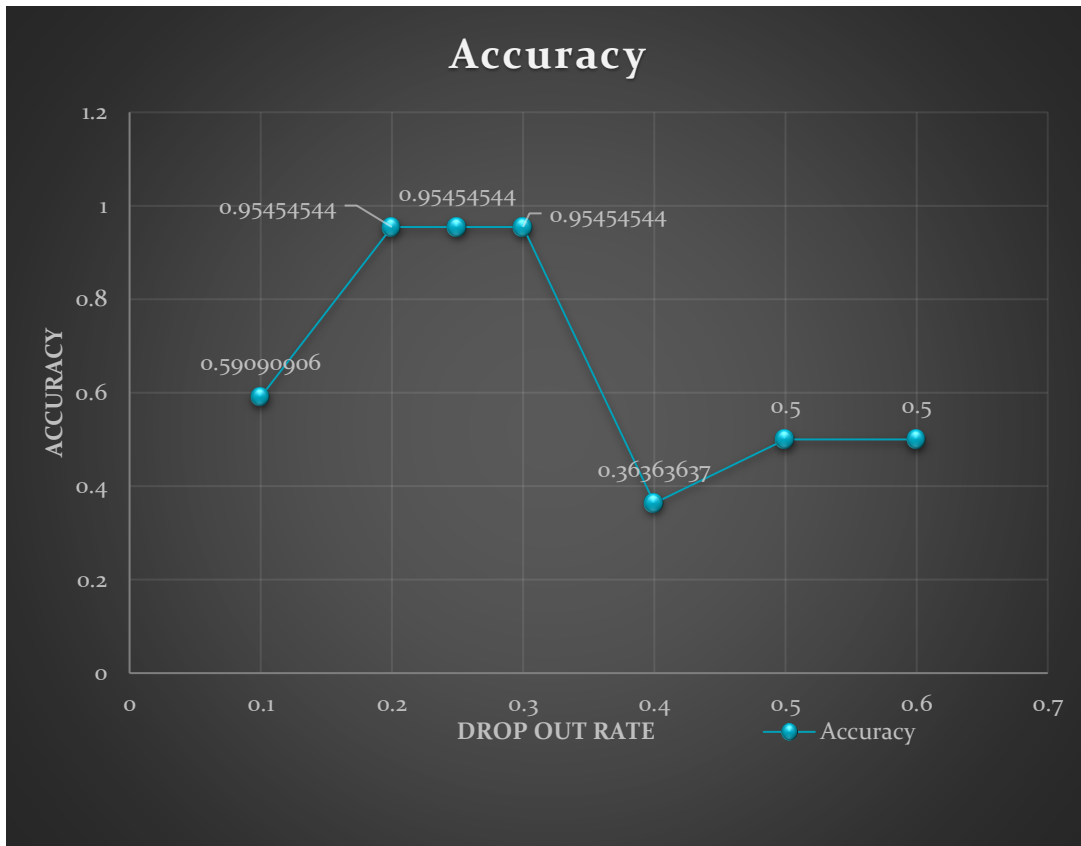
Initially drop rate of 0.3 is taken, which means that 30% of the inputs from the dense layer are not connected to the next layer.



By inferring the above two curves, learning rate of 0.0005 is a best fit for the data given.

Nascent Question 2: Building CNN from scratch

Let us vary the drop out now by setting the learning rate of 0.0005.



After finalizing the parameters, the following results were obtained by the execution of code as shown in the table.

| | | |
|---------------|--------|-------------|
| 5-fold | | |
| Random | 0.0005 | 0.909529912 |
| Random | 0.0005 | 0.967387044 |
| Random | 0.0005 | 0.875944567 |
| 3-fold | | |
| Random | 0.0005 | 0.820512811 |
| Random | 0.0005 | 0.964478095 |
| Random | 0.0005 | 0.964957237 |

5. CONCLUSION:

The algorithm performs better on the dataset that is assigned using CNN.