
Malaria Infection Diagnosis using CNN

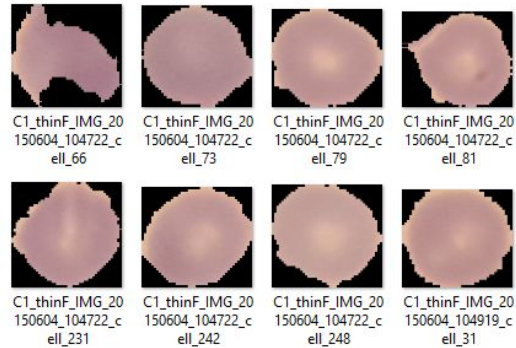
Phani Sai Kamal Lingam

Introduction

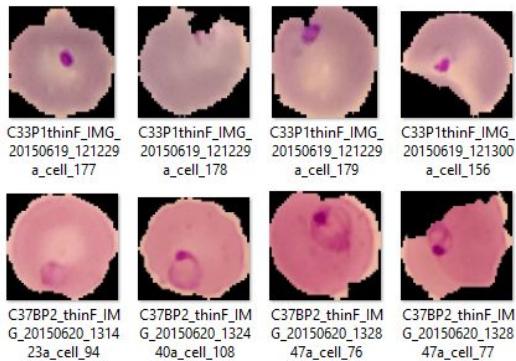
- Malaria is a widespread epidemic disease claiming thousands of lives globally every year.
 - Automate parasite infection diagnosis using cellular images.
 - Cost effective and less computational intensive CNN model for mobile applications.
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Approach

- The first convolutional layer is connected to the input layer taking the rescaled cellular images as input, consists of 16 filters of kernel size 3×3 to learn more generalized features which is then connected to a 2×2 max pooling layer after which 20% of the randomly selected neurons are dropped by the dropout layer.
- Similarly, the second and third convolutional blocks has same kernel size in both convolutional and map pooling layer with 20% dropout each but has 32 filters and 64 filters respectively.
- In all the convolutional layers we have used non-linear activation function called Rectified Linear Units (ReLU)

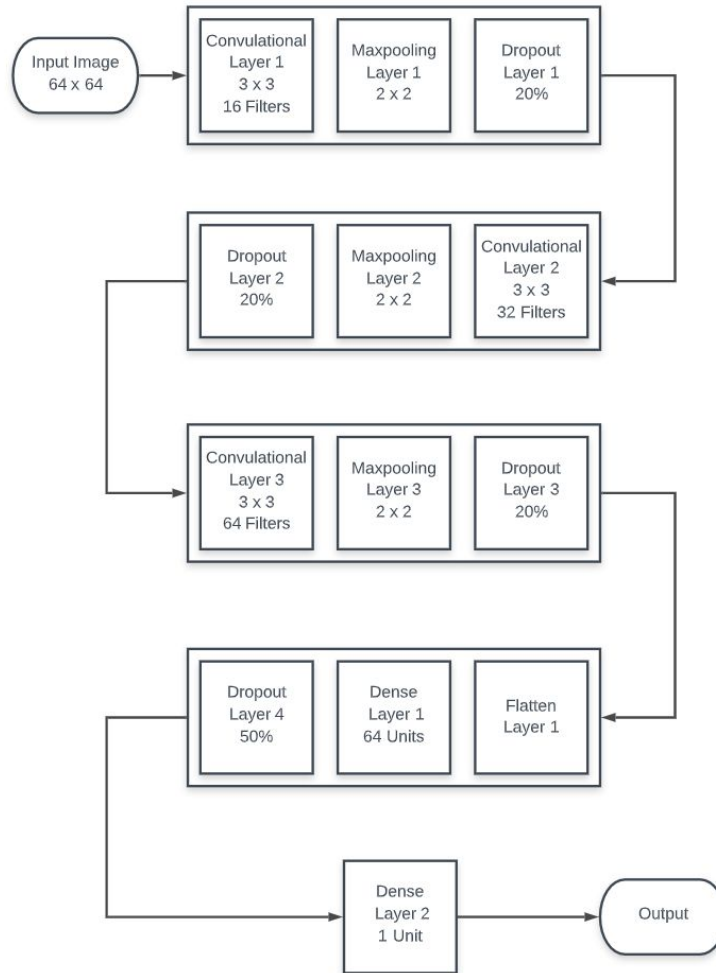


Approach

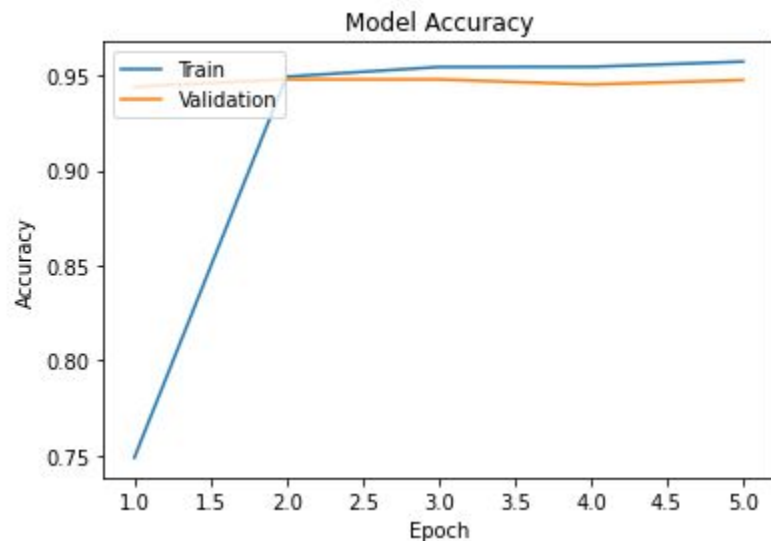


- The pooling layers reduces the size of feature maps by a factor of 2 and the dropout layers help us from overfitting the model. Following the three convolutional blocks the data is flattened and feed to the first dense layer of 64 units with ReLU activation.
 - Following this the first fully connected layer, we added a dropout layer to drop 50% of the neurons.
 - Then the final fully connected layer, consists of a dense layer of only 1 unit with Sigmoid activation function because the problem we are solving is a binary classification problem which gives us our output as 0 or 1 indicating whether the cell is infected or uninfected by malarial parasite.
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CNN Architecture



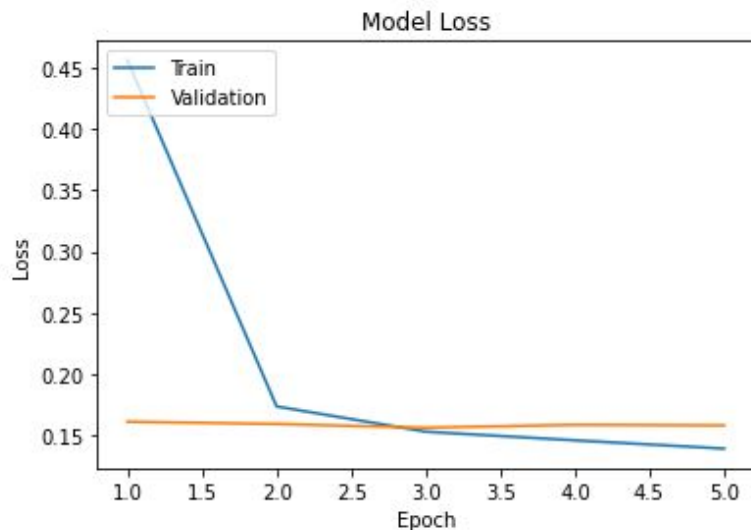
Results



Accuracy

- 95.75% training accuracy
 - 94.81% validation accuracy
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Results



Loss

- Training Loss reduced to 13.89%
 - Validation Loss to 15.60%.
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Conclusion

- Use various methods, such as Dropouts and Batch Normalization, helped to us to fine tune the model.
 - The proposed method works well because of the use of a large amount of thick blood fracturing data that is appropriate for a neural network-based method.
 - Using microscope data which are used by pathologists to manually diagnose malaria parasites and thus the effect may lead to a fatal situation due to human error in the study.
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Thank You
