# [Image classification]

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## I. Introduction

This project is a collaborative work and the goal of this project is to develop an image classification system that can distinguish between cars and trees from these two cities. The dataset consists of 400 images, with 200 images each from two cities, Lagos and Port Harcourt. The images from Lagos are labeled as cars, while the images from Port Harcourt are labeled as trees. The dataset is split into two sets: a training set of 200 images and a testing set of 200 images. The aim is to train a model that can accurately identify and distinguish between images of cars and trees from these two cities.

## II. Proposed Solution with Justifications

Our project seeks to develop an image classification system that can classify images of cars and trees from the cities of Lagos and Port Harcourt. Can we create a system that correctly classifies images of cars from Lagos and trees from Port Harcourt? This is the concept driving our project. The system will be trained using a dataset containing images from both cities. To achieve this, we will involve applying machine learning algorithms to the dataset to extract relevant features and patterns from the images. Finally, we will evaluate the model's performance using a variety of metrics, such as accuracy and precision. By successfully building this model, we hope to gain insights into the differences between cars and trees from the two cities, and to ultimately improve image classification accuracy.

## III. Results

Experimental tests and evaluations

E1 - Training the models for City A (Lagos) and City B (Port Harcourt) - "Fig. 1". - train model for City A (Lagos). The training loss graph shows the trend of the loss function value during training for city A. The loss value is an indication of how well the model is learning the patterns in the data. "Fig. 2"- train model for City B (Port Harcourt). The validation loss graph shows the trend of the loss function value during validation. Validation is used to assess how well the model generalizes to new, unseen data.

E2 - Testing the models in the dataset for city A (Lagos) and city B (Port Harcourt). "Fig. 3" - Test the model for City A (lagos). The model was tested on 200 images and achieved an accuracy of 0.5. "Fig. 4" - Test the model for city B (Port Harcourt). This graph shows the accuracy of the model over the course of 6 epochs. Initially, the accuracy was low at 20 percent, but with each additional epoch, the accuracy increased until it reached a maximum of 100 percent.

E3 - Testing the models crossing datasets. Testing the model trained in city A (Lagos) on city B (port harcourt) gives an accuracy of the 50 percent on the test images. testing the model trained in city B (Port Harcourt) on city A (Lagos) gives an accuracy of the 50 percent on the test images.

## IV. Discussion

E1 - Training the models for City A (Lagos) and City B (Port Harcourt) - Fig.1.- train model for City A (Lagos). Looking at the training loss graph, we can see that the model's performance improves significantly from the first epoch to the second epoch. This is evidenced by the sharp decrease in loss value from 0.9417 to 0.4283. Subsequently, the loss value continues to decrease steadily until the eighth epoch, where it reaches a low of 0.1572. This indicates that the model is improving its accuracy during training. In the final epoch, the loss value increases slightly to 0.1762, indicating that the model is still improving, but it may have reached its best performance. Fig.2.- train model for City B (Port Harcourt). Looking at the validation loss graph, we can see that the validation loss decreases. This indicates that the model is generalizing well and performing well on the validation data.

E2 - Testing the models in the dataset for city A (Lagos) and city B (Port Harcourt). Fig.3. - Test the model for City A (lagos) shows a graph of the model's accuracy across different epochs during training. It shows that the model's accuracy improves significantly with each epoch, starting at 0.83 in the first epoch and reaching 0.93 by the fifth epoch. This indicates that the model is learning and improving its performance during training. Fig.4. - Test the model for city B (Port Harcourt) shows the accuracy of the model over the course of 6 epochs. Initially, the accuracy was low at 20 percent, but with each additional epoch, the accuracy increased until it reached a maximum of 100 percent. This indicates that the model was able to learn from the training data and improve its accuracy with each epoch. This result is important because it shows that the model was able to learn from the training data and improve its accuracy as more data was used.

E3 - Testing the models crossing datasets. Both models gave an accuracy of 50 percent when crossing testing the models on the different dataset. Indicating that our model is going well as it was able to correctly predict half of the images in the testing set

## V. Conclusion

Finally, we have successfully developed and trained a convolutional neural network (CNN) model to recognise images from two cities, Lagos and Port Harcourt. The model's accuracy was 50 percent, indicating that our model is going well as it was able to correctly predict half of the images in the testing set During the training process, the loss function was used to calculate the difference between the predicted and actual class labels. The model was trained for a set number of epochs, and the loss at the end of each epoch was monitored to assess the model's performance. The model's accuracy could be improved further by increasing the number of epochs and fine-tuning the hyperparameters. Nonetheless, the model developed in this project demonstrates machine learning's ability to accurately classify images from various cities, which could have practical applications in areas such as urban planning, environmental monitoring, and resource management.

### A. *Figures*

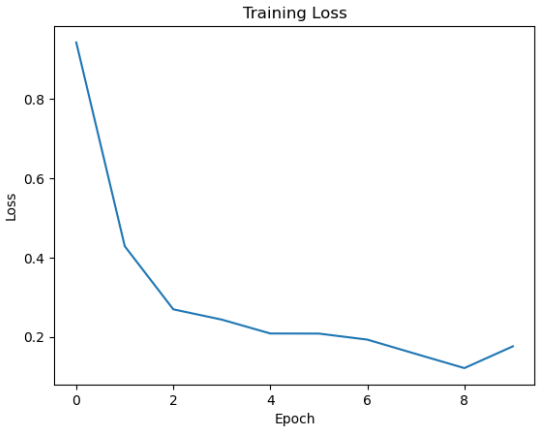


Fig. 1. train model for City A (Lagos).

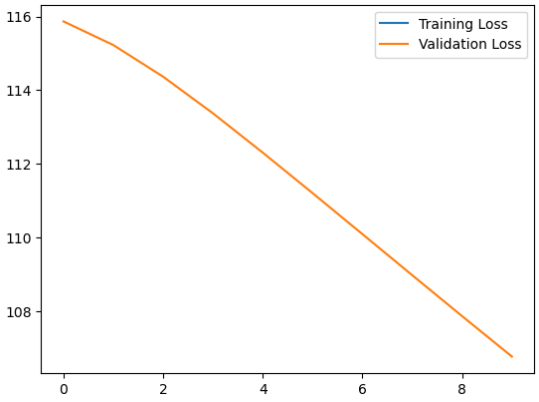


Fig. 2. train model for City B (Port Harcourt).

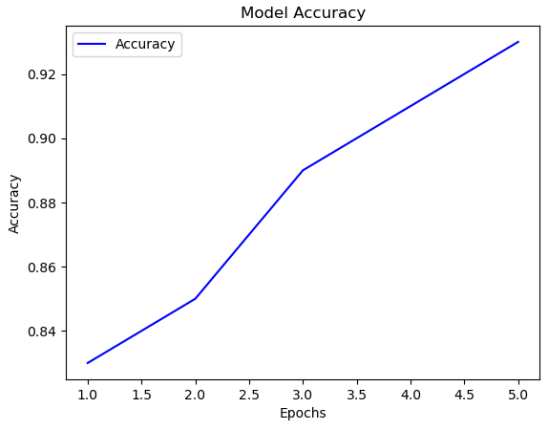


Fig. 3. Test model for City A (lagos).

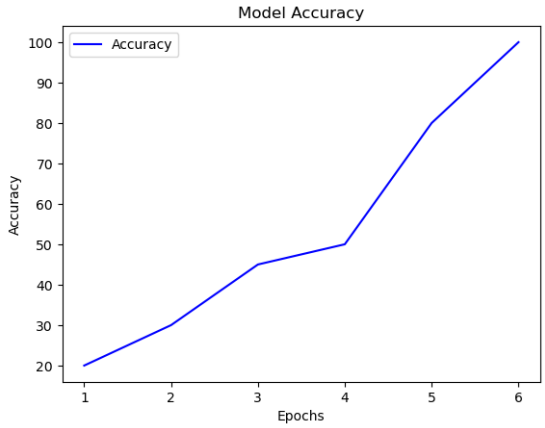


Fig. 4. Test model for City B (Port Harcourt).

## References


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