DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

BANGLADESH ARMY UNIVERSITY OF SCIENCE & TECHNOLOGY (BAUST)

SAIDPUR CANTONMENT, NILPHAMARI

(Project Proposal)

Course Code: CSE 4132 **Course Title:** Artificial Neural Networks and Fuzzy Systems Sessional

Date: March 4, 2023

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3. **Name of the Department :** Computer Science & Engineering

   Program **:** Bachelor of Science in Computer Science and Engineering

4. **Tentative Title** **:** Image Classification Detection Using CNN

5. **Introduction**

   Vehicle detection is an important task in computer vision with various practical applications such as traffic monitoring, autonomous driving, and security systems. In recent years, deep learning techniques have achieved improved performance in vehicle detection tasks. Convolutional Neural Networks (CNNs) are particularly effective at learning features from images and making predictions based on those features.

   In this report, we present our work on vehicle detection using CNN models. Our goal is to create a model that can accurately classify an image as a vehicle or not. To achieve this goal, we first collected a dataset of non-vehicular images and vehicular images. We then trained and evaluated several CNN models on this dataset to determine the most efficient architecture for our task.

6. **Background and Present State of the Problem**

   Vehicle detection is a crucial task in the field of computer vision with numerous applications such as surveillance, autonomous driving, and traffic control. In recent years, Convolutional Neural

Networks (CNNs) have shown remarkable success in object detection tasks, including vehicle detection.

One of the early works in vehicle detection using CNNs is the paper by Wang et al. (2016) [1], where a deep CNN model was trained to detect vehicles in aerial images. The authors achieved a high accuracy of 97.29% using their proposed model. Another study by Karimian et al. (2018) [2] proposed a vehicle detection system that combines a deep CNN model with a clustering algorithm. The authors showed that their proposed method outperforms traditional vehicle detection methods. Recently, transfer learning, which involves using pre-trained CNN models for vehicle detection, has become a popular approach. In a study by Kim et al. (2018) [3], the authors used a pre-trained VGG16 model for vehicle detection in traffic camera images. The authors fine-tuned the last few layers of the VGG16 model and achieved a high accuracy of 97.6%. A similar approach was used by Chen et al. (2020) [4], where a pre-trained ResNet50 model was fine-tuned for vehicle detection in surveillance videos.

In summary, CNN-based models have shown great potential for vehicle detection, and transfer learning has emerged as a popular approach for this task. However, there is still room for improvement in terms of accuracy and speed, and future research could focus on developing more efficient CNN architectures and incorporating advanced techniques such as attention mechanisms and reinforcement learning.

7. Objective with Specific Aims and Possible Outcome

1) The main objective of this project is to learn how CNN can be used for vehicle detection.
2) By doing vehicle detection, it can help traffic department to solve traffic issue.
3) It can be helpful for autonomous vehicles.

8. Outline of Methodology Design

We will use DenseNet121, ResNet50, VGG16 and MobileNet CNN models in the project with Baseline, Transfer Learning, Fine Tuning Techniques.

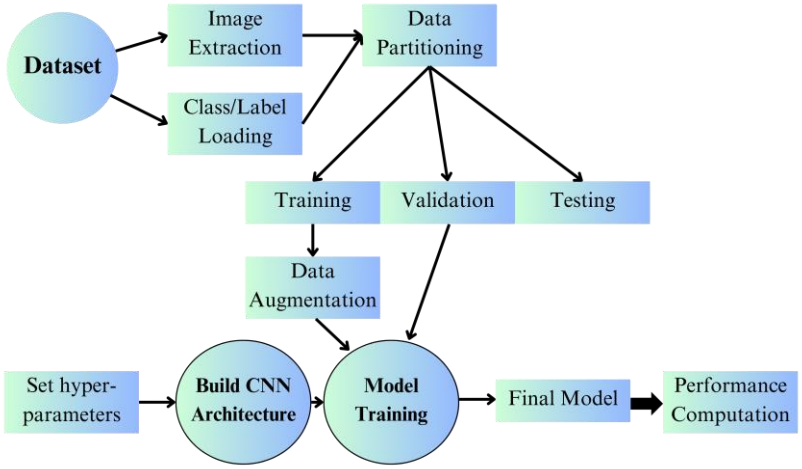

Figure 8.1: Methodology

9. Resources Required to Accomplish the Task

- Python
- TensorFLow
- Keras
- Matplotlib
- Pandas
- Seaborn
- Colab Notebooks

10. References

[1] Wang, Y., Huang, J., Yuan, Z., & Ding, X. (2016). Aerial vehicle detection from UAV imagery using deep convolutional neural networks. Remote Sensing, 8(4), 342.

[2] Karimian, N., Karimian, A., Sattarivand, M., & Rahimi, M. (2018). A clustering-based approach for vehicle detection in aerial images using convolutional neural network. In 2018 5th International Conference on Control, Decision and Information Technologies (CoDIT) (pp. 583-588). IEEE.

[3] Kim, M., Kim, Y., & Kim, M. (2018). Vehicle detection in traffic camera images using a pre-trained deep neural network. Sensors, 18(4), 1234.

[4] Chen, Y., Li, K., Peng, Q., & Yang, J. (2020). Real-time vehicle detection using deep learning with GPU acceleration for traffic surveillance systems. Sensors, 20(7), 2011.

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