# L12\_Sulayman Adewale\_ITAI\_2376 Spring 2024

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# Academic Reflective Journal : LAB 12

1. **Introduction:**
   * **Brief Overview:** This lab focuses on how to train a convolutional neural network (CNN) for basic image operation. This is a Computer Vision project using PyTorch.
   * **Purpose:** I hope to reflect on what I learn from this lab in terms of how to create a CNN, add layers to it, and evaluate the performance of the neural network.
2. **Description of Experience or Topic:**
   * **Background Information:** The CIFAR-10 dataset was used to train and validate the image classification. It has images from different classes like airplane, truck, ship and animals like: deer, horse, cat, dog etc. There are 3-channel color images with 32x32 pixels.
   * **Specific Details:** The dataset was loaded with DataLoader , and was split into a training and validation datasets. Sequential in PyTorch was used to chain together the various layers. A 2D convolutional was built with in\_channel value of 3, out\_channel value of 16, and kernel size of 5. Max-pooling was then done with kernel size and stride of value 2 each. The dense layer value was 10 as the dataset has 10 classes. ReLU was used as the activation function. The dataset was trained with 25 epochs and learning rate of 0.01. An Optimizer was used to optimize the weights of the neural network. The dataset was trained and evaluated.
3. **Personal Reflection:**
   * **Thoughts and Feelings:** I think I learnt a few things from this lab work. I learnt that there is a need to load the dataset with a DataLoader, use Sequential to chain the various layers together, and use Max-pooling for the dataset. There was also the need to optimize the weight of the neural network, and use ReLU as the activation function.

I will really like to learn more how I can practice with more datasets to perfect my understanding of this image classification project. For example, the Python codes used, I am not that familiar with them. I will also appreciate if our professor can take time out to explain the labs to us step-by-step so that we can learn more. It is good for us to understand all that we are doing in the labs. This will really help me to learn more and be sure I really understand the concepts and be able to apply them in real-life scenarios.

* + **Analysis and Interpretation:** I think I can connect part of what I learnt about CNN earlier in our group work on CNN with this lab. The need for Max-pooling in the dense layer to help with the final output of the project. It could also be seen that CNN is not the best method for this project as there was not much of a difference even when more layers are added to the network. Other types of neural network will perform better than CNN in this project.
  + **Connections to Theoretical Knowledge:** CNN is not the best method for this classification project due to its limitations. For example, the accuracy of this CNN classification is just 60%. Feature extraction through CNN is difficult, and the long time of detection does not make it the best method for image classification like this.
  + **Critical Thinking:** I think Recurrent Neural Network (RNN) or better still Generative Adversarial Network (GAN) will give a more realistic result in this project.

1. **Discussion of Improvements and Learning:**
   * **Personal Growth:** The project clearly shows the limitations of CNN for image classification. I will prefer RNN or GAN be used for this project. They will give a more realistic result for this project.
   * **Skills Developed:** I have learned how to create a CNN for image classification. I have also seen that CNN may not be the best method for image classification due to its limitations.
   * **Future Application:** I will rather use other neural networks for image classification than to use CNN.
2. **Conclusion:**
   * **Summary:** This lab experience has shown me how CNN can be used for image classification. It has also shown the limitations of CNN for image classification due its low accuracy, difficult feature extraction and lengthy time for image detection.
   * **Final Thoughts:** I think when we talk of image classification, it is better to use another neural network other than CNN. RNN and GAN will give more realistic results for image classification and detection.
3. **References**

<https://learnernotebook-003181-021f3a34f10f-gwxw.notebook.us-east-2.sagemaker.aws/notebooks/MLUDTI-EN-M3-Lab2.ipynb#Toy-example>

[**https://www.linkedin.com/advice/0/what-advantages-disadvantages-using-convolutional**](https://www.linkedin.com/advice/0/what-advantages-disadvantages-using-convolutional)

[**https://goodboychan.github.io/python/datacamp/pytorch/deep\_learning/2020/07/29/01-Convolutional-Neural-Networks-in-PyTorch.html**](https://goodboychan.github.io/python/datacamp/pytorch/deep_learning/2020/07/29/01-Convolutional-Neural-Networks-in-PyTorch.html)