

# Manarat International University

Department of Computer Science and Engineering  
Neural Networks and Fuzzy Systems (CSE-433) &  
Computer Vision & Robotics (CSE-437)

## Assignment Milestone report

**Problem Title:** [CIFAR-10 - Object Recognition in Images](#)  
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**Kaggle Account:** <https://www.kaggle.com/rdnasim/>  
**Git Repository link:** <https://github.com/rdnasim/CIFAR-10-Object-Recognition-in-Images>

### **Problem statement:**

The CIFAR-10 dataset is a collection of images that are commonly used to train computer vision algorithms. It is one of the most widely used datasets for deep learning research. The CIFAR-10 dataset contains 60,000 32x32 color images in 10 different classes which are airplanes, cars, birds, cats, deer, dogs, frogs, horses, ships, and trucks. There are 6,000 images of each class.

### **Technical Approach:**

#### Preprocessing techniques

- Read image
- Resize image
- Remove noise(Denoise)
- Segmentation
- Data augmentation
- Morphology(smoothing edges)
- Mean subtraction
- Normalization
- Dimensionality reduction : PCA

#### Learning Techniques

- Convolutional Neural Networks
- Max-Pooling

#### Coding Language

- Python

#### Libraries

- Open CV
- Keras

## Create the Model

The entire model consists of 14 layers in total. In addition to layers below lists what techniques are applied to build the model.

1. Convolution with 64 different filters in size of (3x3)
2. Max Pooling by 2
  - ReLU activation function
  - Batch Normalization
3. Convolution with 128 different filters in size of (3x3)
4. Max Pooling by 2
  - ReLU activation function
  - Batch Normalization
5. Convolution with 256 different filters in size of (3x3)
6. Max Pooling by 2
  - ReLU activation function
  - Batch Normalization
7. Convolution with 512 different filters in size of (3x3)
8. Max Pooling by 2
  - ReLU activation function
  - Batch Normalization
9. Flattening the 3-D output of the last convolving operations.
10. Fully Connected Layer with 128 units
  - Dropout
  - Batch Normalization
11. Fully Connected Layer with 256 units
  - Dropout
  - Batch Normalization
12. Fully Connected Layer with 512 units
  - Dropout
  - Batch Normalization
13. Fully Connected Layer with 1024 units
  - Dropout
  - Batch Normalization
14. Fully Connected Layer with 10 units (number of image classes)

## Expected Submission:

- Times : I will submit 5 **times**.
- **99%** Accuracy
- Position : **50 – 100**