

ASSIGNMENT – 0

Q.1 Construct a Convolutional Neural Network for Image classification using the CIFAR-100 dataset (<https://www.cs.toronto.edu/~kriz/cifar.html>) with the following tasks :

- (i) Increase the no. of layers.
 - The network should be implemented at 4 different sizes, at least
 - Minimum size of the network is 3 layers
- (ii) Increase the dataset size
 - Minimum no. of images in each class should be 15 .
 - Increment the size of each class by 15
 - The experiment should be conducted at 5 different dataset sizes, at least.

Dataset:

- The CIFAR-100 dataset consists of 100 objects with 500 images in each class for training and 100 images for testing

Write a report on the **implementation details** of each experimental task. It should additionally contain the following :

- (a) Choice of parameters and justification (in your own words) for choosing them
- (b) Plot the following graphs
 - a. For the largest dataset-size
 - i. Error-metrics vs model size (no. of parameters in Millions)
 - ii. Time taken vs model size
 - b. For the largest network size
 - i. Error-metrics vs Dataset size
 - ii. Time taken vs dataset size
 - c. For the largest dataset size and network size
 - i. Error-metrics vs the no. of iterations
- (c) Insights gained from the experiment conducted such as the behavior of the aforementioned graphs
- (d) Implementation details:
 - a. Network description (layers, feature map dimensions etc.,)
 - b. Language and Framework used
 - c. Hardware details of the implementation

Error metrics:

- (i) Validation-loss
- (ii) Top-5 error

Hyperparameters

Submission:

- The submission should include the following items zipped in a .zip format:

- (i) A README file with instructions for setting up the environment and executing the source code
- (ii) Source code
- (iii) Report

Deadline: 30th January 2018

Evaluation Criteria:

The purpose of the assignment is to enable the students to gain a practical understanding of neural networks and for them to gain insights on their behavior. The assignment will be evaluated on the student's degree of understanding with respect to choice of network parameters and observations on the behavior of the neural network with respect to the size of the model and the dataset.

Bonus:

The following questions may be answered in the report to gain a thorough understanding of Deep Learning concepts,

Within the context of the above experiment, answer the following questions:

- (i) Why is dropout used for regularisation?
- (ii) Which is better MSE or cross-entropy ? why ?
- (iii) List the dimensions of the feature maps at each layer with and without zero-padding