FSRCNN model documentation

README

Objective: To implement the FSRCNN model for image super resolution as provided in the paper Dong et al. “Accelerating the Super-Resolution Convolutional Neural Network”, 2016

Approach:

1. The project necessitated some prerequisite knowledge of Artificial Neural Networks. We started with the fundamentals of ANNs – the core concept, intuition, single perceptron model, mathematical expressions involved in backpropagation, loss function followed by multilayered perceptron model.
2. We then moved on to the next set of comparatively advanced concepts regarding improving deep neural networks like optimization algorithms, hyperparameter tuning on various scales, batch normalisation, random initialisation techniques, etc.
3. We later applied these concepts by implementing an ANN model to run image classification over the MNIST dataset **form scratch** – using just NumPy for matrix representations and Matplotlib for visualisation. This was done to consolidate the fundamental understanding of the working of ANNs.
4. We then implemented the same using Pytorch library to get on terms with the workings of its modules and functions.
5. We then studied the concept of Convolutional Neural Networks (CNNs) to capture the spatial dependencies within the data. We studied different prevalent architectures that were relevant from a historical and contemporary point of view. This included the LeNet architecture, VGG, AlexNet, Inception, Resnets, U-net architecture, etc. We then implemented CNN based model to classify images in the MNIST dataset.
6. We then proceeded to implement CNN based model for image classification over the more complex CIFAR10 dataset.
7. We then implemented SRCNN model from the paper: Dong et al. “Image Super-Resolution Using Deep Convolutional Networks”, 2015
8. We then finally implemented the FSRCNN model. The faster and more accurate variant of the SRCNN architecture.