Applied Machine Learning Final Project Proposal

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Image Denoising Autoencoders

Abstract

An autoencoder is an unsupervised machine learning algorithm that takes an image as input and tries to reconstruct it using fewer number of bits from the bottleneck also known as latent space. The image is majorly compressed at the bottleneck. The compression in autoencoders is achieved by training the network for a period of time and as it learns it tries to best represent the input image at the bottleneck. Sometimes, the input images for autoencoders can be noisy. In that case, the deep learning autoencoder has to denoise the input images, get the hidden code representation, and then reconstruct the original images. It is one of the useful applications of autoencoders in deep learning.

Project Goals

This project aimed at familiarizing the student with image processing basics and is going to help him to join the GNN research group in Shahid Beheshti University of Tehran.

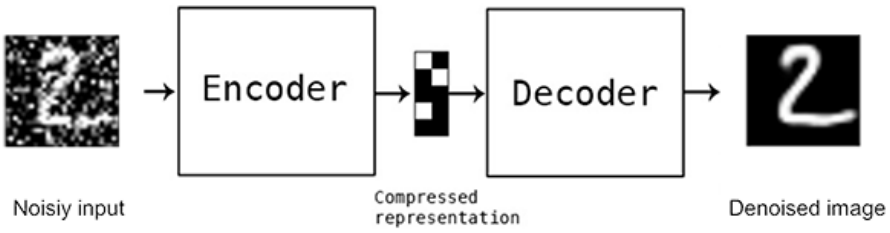

Figure 1: Image Denoising Autoencoders Concept

Project Path

In this project we are going to:

First train some models on a small data set such as MNIST and Fashion MNIST using only available networks.

We then apply denoising function to some noisy samples searching for the best architecture based on basic metrics.

Finally repeat the whole process for larger data sets such as CIFAR making minimal changes to improve the performance of the selected network.

As we are about to exploit the generative power of autoencoders will also try to generate some new samples on the fly.

Project tools

We try to use Tensorflow Keras api equipped with some of sickit learn's helper functions. We use python 3.6 on Google (or Kaggle) cloud servers.