

Image denoising with multi-layer perceptrons

HAX907X - Apprentissage statistique

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1 Introduction

This article **TODO** aims to learn the mapping from a noisy image to a noise-free image directly with plain multi-layer perceptrons (MLP), applied to smaller areas, called patches. The denoised image patches are then combined into a denoised image.

Images are invariably corrupted by some degree of noise, which strength and type depends on the imaging process. Image denoising seeks to find a clean image given only its noisy version.

Its complexity requires to split the image into possibly overlapping patches, denoised separately.

However, the size of the patches affect the modelling of the denoising function and the denoising results.

Among the numerous existing types of noise, we will mainly focus on additive white and Gaussian-distributed noise with known variance (AWG noise), but the method can also adapted to mixed Poisson-Gaussian noise, JPEG artifacts, salt and pepper noise and noise that resembles stripes.

2 Multi-layer perceptron

In a perceptron, each neuron of a hidden layer is connected to every neuron of the previous and next layers.

Expliquer les MLP et ajouter une phrase qui dit que dans la mesure où ce sont des matrix-vector product c'est parallélisable et GPU...

References

- [1] Christopher HAROLD, Christian J. SCHULER, Stefan HARMELING. *Image denoising with multi-layer perceptrons, part 1: comparison with existing algorithms and with bounds*, Journal of Machine Learning Research (2012)