Mini Project 2: Machine Learning Topic

Case Study: SRCNN – When Image Processing Meets Unsupervised Learning

SRCNN stands for Super Resolution Convolutional Neural Network and is a common solution for SR image processing. SR focus in deblurring/noise reduction in image processing. A rather obvious and common application is upscaling of small images.

SRCNN usually works in three steps:[[1]](#footnote-1)

Patch Extraction and Representation CNN – Non-Linear Mapping CNN – Reconstruction Convolution Layer.

This algorithm is trained by a loss function defined as mean square error of the differences of every pixel between the real and reconstructed image.

There are multiple working application instances of SRCNN, both open-source and commercial, and adapting different image styles:

Let’s Enhance[[2]](#footnote-2) and Reshade[[3]](#footnote-3) focus on photos and provide some filter and tone/color adjustments;

waifu2x[[4]](#footnote-4) and its derivatives[[5]](#footnote-5)[[6]](#footnote-6)[[7]](#footnote-7) focus on anime/comic-style drawings though also offer options for photos. They are also open-source. However many of them either exclusively uses nVIDIA CUDA or has better performance using CUDA, requiring supporting hardware. They also lack the aftereffect options.

1. https://arxiv.org/abs/1501.00092 [↑](#footnote-ref-1)
2. https://letsenhance.io/ [↑](#footnote-ref-2)
3. http://www.reshade.com/ [↑](#footnote-ref-3)
4. https://github.com/nagadomi/waifu2x [↑](#footnote-ref-4)
5. https://github.com/navjack/waifu2x-caffe [↑](#footnote-ref-5)
6. https://github.com/nihui/waifu2x-ncnn-vulkan [↑](#footnote-ref-6)
7. http://kourindrug.sakura.ne.jp/waifu2x.html [↑](#footnote-ref-7)