

2 Abstract

This project proposes a method to encode 4K UHD TV video streams over the existing HDTV standard augmented with internet-borne enhancement mechanism to provide backward compatibility with existing receivers by the implementation of Scalable Convolutional Neural Network for JPEG Compression Artifact Reduction (S-Net) and Fast and Accurate Image Super-Resolution by Deep CNN with Skip Connection and Network in Network (DCSCN) to perform compression artifact reduction and image super-resolution, respectively. At the encoder, where the HDTV broadcast is being encoded, some video frames are sampled. These sampled frames were then fed into the neural networks for training, so the neural networks know the way to reconstruct 4K UHD video from the encoded HDTV broadcast. These neural networks were sent via the internet to the receiver so that the receiver can accurately reconstruct the 4K UHD TV video from the HDTV broadcast. To evaluate the performance of our proposed method, we use our newly created custom dataset built from content from 4K UHD TV channels all around the world, called TV8, and then the results are evaluated and compared to conventional methods. The experimental results show that our approach significantly outperformed any conventional HDTV coding methods and achieves state-of-the-art accuracy in both PSNR and SSIM metrics.

