World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:15, No:07, 2021

Efficient Video Compression Technique Using Convolutional Neural Networks and Generative Adversarial Network

Authors : P. Karthick, K. Mahesh

Abstract : Video has become an increasingly significant component of our digital everyday contact. With the advancement of greater contents and shows of the resolution, its significant volume poses serious obstacles to the objective of receiving, distributing, compressing, and revealing video content of high quality. In this paper, we propose the primary beginning to complete a deep video compression model that jointly upgrades all video compression components. The video compression method involves splitting the video into frames, comparing the images using convolutional neural networks (CNN) to remove duplicates, repeating the single image instead of the duplicate images by recognizing and detecting minute changes using generative adversarial network (GAN) and recorded with long short-term memory (LSTM). Instead of the complete image, the small changes generated using GAN are substituted, which helps in frame level compression. Pixel wise comparison is performed using K-nearest neighbours (KNN) over the frame, clustered with K-means, and singular value decomposition (SVD) is applied for each and every frame in the video for all three color channels [Red, Green, Blue] to decrease the dimension of the utility matrix [R, G, B] by extracting its latent factors. Video frames are packed with parameters with the aid of a codec and converted to video format, and the results are compared with the original video. Repeated experiments on several videos with different sizes, duration, frames per second (FPS), and quality results demonstrate a significant resampling rate. On average, the result produced had approximately a 10% deviation in quality and more than 50% in size when compared with the original video.

Keywords : video compression, K-means clustering, convolutional neural network, generative adversarial network, singular value decomposition, pixel visualization, stochastic gradient descent, frame per second extraction, RGB channel extraction, self-detection and deciding system
Conference Title : ICIP 2021 : International Conference on Image Processing
Conference Location : Stockholm, Sweden
Conference Dates : July 15-16, 2021