Boosting High-level Vision With Joint Compression Artifacts Reduction And Super-resolution

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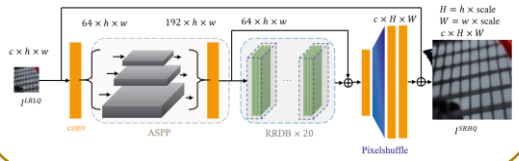
Motivation

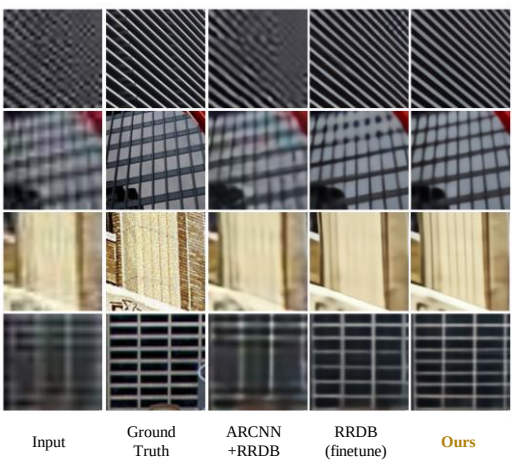
In this paper, we aim to generate an artifact-free high-resolution image from a low-resolution one compressed with an arbitrary quality factor. Previous methods solve this problem with two stages, which is expensive in computation, and fails to make full use of the locally related features between CAR and SR tasks, leading to over-smooth or amplifying the artifacts in the output. To overcome these issues, we propose a context-aware framework that jointly solves the CAR and SR problems.

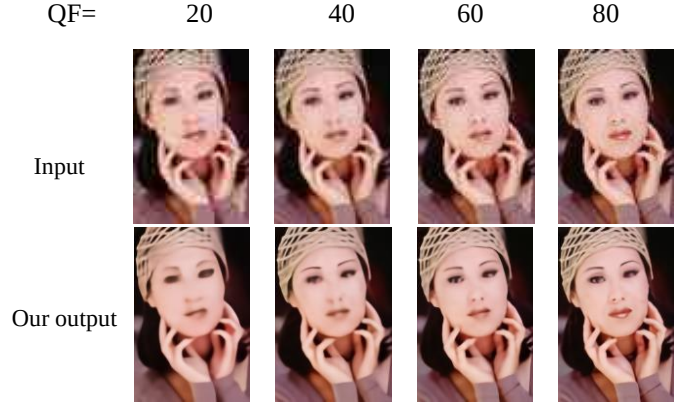
Architecture

Our proposed network, CAJNN directly reconstructs artifact-free HR images from the low resolution, low-quality images. We adopt Atrous Spatial Pyramid Pooling to utilize the inter-block features and intra-block contexts. Then, the reconstruction module turns the features into a deep feature map, which is converted to a high-quality, high resolution output by the upsampling and enhancement module.



Results





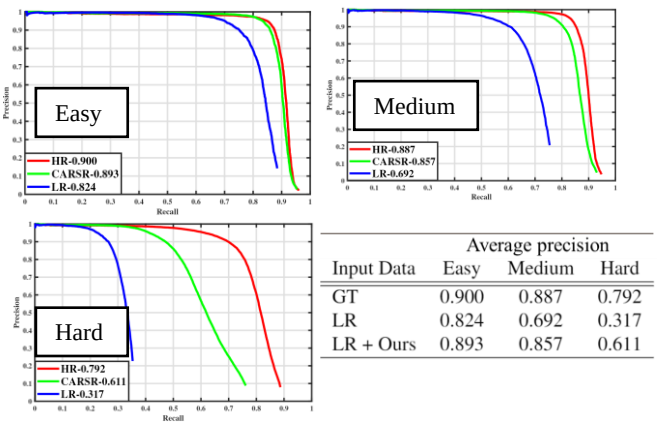
Our model can reconstruct artifact-free high-resolution results with sharper edges and more accurate patterns compared with other methods. For images compressed with different quality factors, our method is able to reconstruct reasonable SR images with one model and one weights, even at extremely low quality factors.

Improve Tiny Text Recognition

Method	Accuracy	Runtime (s)
Baseline [4]	85.30 %	31.22
Ours + Baseline [4]	**85.75**%	41.56
Ours + Downsample + Baseline [47]	85.57%	31.22

Text recognition accuracy results on the ICDAR 2013 Focused Scene Text dataset. Compared with the baseline method, the introduction of our CARSR method improves the detection performance by 0.45 %. The third row improves 0.27% compared to the baseline due to the reduction of compression artifacts, which indicates that our model is capable of extracting and maintaining critical features of input images.

Improve Tiny Face Detection



Input Data	Average precision Easy	Medium	Hard
GT	0.900	0.887	0.792
LR	0.824	0.692	0.317
LR + Ours	0.893	0.857	0.611

We compare the average precision and precision-recall curve of face detection on WIDER FACE dataset with a baseline detector. The application of our CARSR method greatly improves the detection performance with LR images on all three subsets.