

Paper → Image restoration is a positive-sensitive procedure. needs pixel to pixel correspondence. from input image to output image. This is done using CNNs.

- Developed a multiscale approach that maintains the original high resolution features along the network hierarchy, thus minimizing the loss of spatial details.
- It also encodes multiscale context by using parallel convolutional streams that process features at lower spatial resolutions.

Existing methods and paper method:-

- The existing methods process each scale in ~~isolation~~ isolation.
- Here they progressively exchange and fuse information from coarse-to-fine resolution levels.
- Furthermore, they employ a simple concatenation or averaging of features coming from multiresolution branches, we introduce a new selective kernel approach that dynamically selects useful set of ~~kernels~~ kernels from each branch using a self attention ~~rec~~ mechanism.

Main Contributions:-

- A novel feature extraction model that obtains a complementary set of features across multiple spatial scales, while maintaining the original high resolution features to preserve precise spatial details.
- A regularly repeated mechanism for information exchange where the features from coarse-to-fine resolution branches are progressively fused together for improved representation learning.
- A new approach to fuse multiscale features using a selective kernel network that dynamically combines variable receptive fields and faithfully preserves the original feature information at each spatial ~~ref~~ resolution.

Made significant modifications to MDRN Model that allows to significantly reduce the computational cost while enhancing model performance.

- (a) Demonstrate ~~of~~ feature fusion only in the direction from low to high resolution streams performs ~~best~~ best, and the information flow from high to low resolution branches can be removed to improve efficiency.
- (b) replaced dual attention unit with a residual contextual block (RCB).

Propose a new method of capable of performing dual-pixel defocus deblurring, image denoising, super resolution, and image enhancement.

#### Image super resolutions:-

Early methods take low resolution input, learn directly to generate HR image. In contrast to directly producing a latent HR image, recent SR networks employ the residual learning framework to learn the high frequency image detail, which is later added to the input LR image to produce the final result.

#### Image Enhancement:

Histogram equalization is most commonly used ~~appro~~ approach for image enhancement.

## Paper-2 :-

Divided into 2 stages.

- ① To estimate the degradation from real data and generate realistic LR images.
- ② To train SR model based on the constructed data.

In their method:-  
In order to estimate ~~In estimating~~ the degradation method more accurately, they explicitly estimate the kernel and noise patch, we build a degradation pool, which is used to degrade clean HR images into blurry and noisy images, thereby generating image pairs for training SR models. To describe their method consisely, we formalize this data-constructing pipeline as an algorithm.

### Kernel estimation & DownSampling:-

- ① Use a kernel estimation algorithm to explicitly estimate kernels from real images. They adopted a similar kernel estimation method and set appropriate parameters based on real images. The generator of KernelGAN is a linear model without any activation layers, therefore the parameters of all layers can be combined into a fixed kernel.



Paper-4:-

Method:-

- ① A New framework named Video Restoration Transformer VRT. that is characterized by parallel computation and long range dependency modelling. It jointly extracts, aligns, and fuses frame features at multiple scales.
- ② The mutual attention for mutual alignment between frames. It is a generalized soft version of image warping after implicit motion estimation.
- ③ VRT achieves state of the art performance on video restoration, including video super resolution, deblurring and denoising. It outperforms state of the art methods by up to ~~2.16~~ 2.16 dB on benchmark datasets.