**ESPCN**

* Then, they (Dong et al., 2016b) adopted a deconvolutional layer at the end of the network in FSRCNN, which can reduce computation cost. However, the deconvolution operation is easy to introduce checkerboard artifacts (Odena et al., 2016). Different from the first two methods, Shi et al. (2016) adopted a novel upsampling method, called pixel shuffle, which is designed specifically for SR problem without extra parameters.