DECONOLUTION LAYER

According to the above observations, we investigate a more concise and efﬁcient network structure for fast and accurate image SR. To solve the ﬁrst problem, we adopt a deconvolution layer to replace the bicubic interpolation. To further ease the computational burden, we place the deconvolution layer1 at the end of the network, then the computational complexity is only proportional to the spatial size of the original LR image. It is worth noting that the deconvolution layer is not equal to a simple substitute of the conventional interpolation kernel like in FCN [1], or ‘unpooling + convolution’ like [2]. Instead, it consists of diverse automatically learned upsampling kernels that work jointly to generate the ﬁnal HR output, and replacing these deconvolution ﬁlters with uniform interpolation kernels will result in a drastic PSNR drop.

Furthermore, all these networks [3-5] need to process the bicubic-upscaled LR images. The proposed FSRCNN does not only perform on the original LR image, but also contains a simpler but more efﬁcient mapping layer. Furthermore, the previous methods have to train a totally different network for a speciﬁc upscaling factor, while the FSRCNN only requires a different deconvolution layer. This also provides us a faster way to upscale an image to several different sizes.

