

# ECS795P Deep Learning and Computer Vision, 2021

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## Course Work 1: Image Super-resolution Using Deep Learning

1. Suppose the settings of a SRCNN as:  $f_1=9$ ,  $f_2=3$ ,  $f_3=5$ , how many pixels of the low-resolution image are utilized to reconstruct a pixel of the high-resolution image with the SRCNN? (10% of CW1)

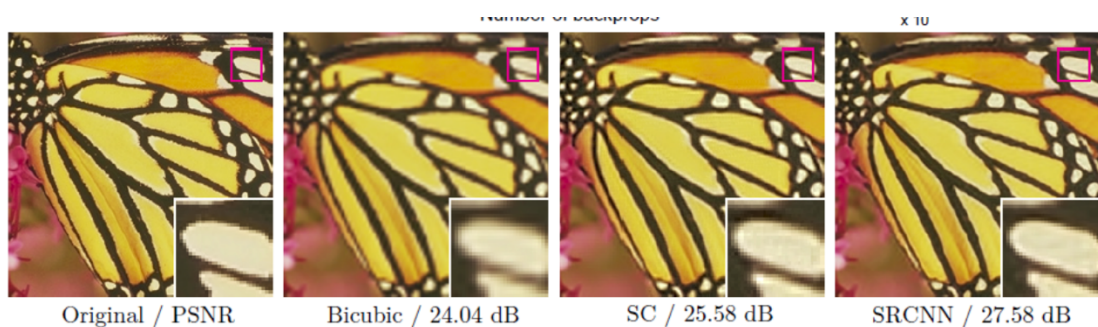
**ANSWER:** There would be 225 pixels as it is  $15 \times 15$

2. Why the deep convolutional model is superior to perform image super-resolution? Give one reason to explain it. (10% of CW1)

**ANSWER:** It is superior because it directly learns an end-to-end mapping between low/high resolution image. The three convolutional layers like path extraction, non-linear mapping and reconstruction are effects well on image reconstruction.

3. Please explain the physical meaning of **peak signal-to-noise ratio (PSNR)** in the context of image super-resolution. PS: place here the ground truth (GT) image, and the high-resolution images by SRCNN (HR-SRCNN) and bicubic interpolation (HR-BI) for reference. Also put the PSNR value below the high-resolution images. (10% of CW1)

**ANSWER:** The PSNR in Super Resolution is the ration of maximum pixel value in the image to maximum MSE. Larger PSNR value shows better image reconstruction.



GT
HR-BI (PSNR=24.04)
HR-SRCNN (PSNR=27.58)