**Generation of distorted SCIs in the SCID**

**The distorted SCIs are generated by applying various image operations to each reference SCI, individually. Image operations to generate 9 distortion types with 5 degradation levels (ranging from imperceptible level to highly-annoying one) are introduced as below:**

1. **Gaussian Noise (GN): the corresponding distorted SCIs with GN are obtained by performing MATLAB function “*imnoise*”. The mean is zero, and the standard deviation is set as 0.001, 0.005, 0.01, 0.05 and 0.1, respectively.**
2. **Gaussian Blur (GB): the corresponding distorted SCIs with GB are obtained by performing MATLAB function “*imfilter*” with Gaussian kernel. The size of the Gaussian kernel is 5×5, and the standard deviation is set to 0.58, 0.76, 0.96, 1.2 and 2.1, respectively.**
3. **Motion Blur (MB): the corresponding distorted SCIs with MB are obtained by performing MATLAB function “*imfilter*” with motion kernel, which stimulates the linear motion of a camera. The blurring level is controlled by the following two parameters “len” and “theta”. The former one controls the linear motion of a camera by ‘len’ pixels, while the latter one controls the degree of angle in a counterclockwise direction. In our experiments, ‘theta’ is zero and ‘len’ is set as 2, 3.4, 4, 5.5, and 6.4, respectively.**
4. **Contrast Change (CC): the corresponding distorted SCIs with CC are obtained by performing MATLAB function “*imadjust*”. The contrast change level is controlled by the parameter “[low\_in; high\_in]” and “[low\_out; high\_out]”, which individually means the scale of the reference SCI and contrasted changed SCI. In our experiments, ([low\_in; high\_in], [low\_out; high\_out]) is set as: ([ ; ], [0.3; 0.5]), ([ ; ], [0.1;0.7]), ([0.1;0.8],[0.1; 0.9]), ([0.2; 0.8],[0.1; 0.8]), and ([0.2; 0.7],[ ; ]), respectively.**
5. **JPEG compression: the corresponding distorted SCIs with JPEG compression are obtained by performing MATLAB function “*imwrite*”. The quality factor is set as 75, 35, 18, 8, and 5, respectively.**
6. **JPEG2000 compression: the corresponding distorted SCIs with JPEG2000 compression are obtained by performing JasPer software [a], [b] (in this response letter). The compression ratio is set as 0.08, 0.045, 0.02, 0.015, and 0.01.**
7. **JPEG 2000. [Online]. Available:** [**https://jpeg.org/jpeg2000/software.html**](https://jpeg.org/jpeg2000/software.html)
8. **JasPer Software. [Online]. Available:** [**http://www.ece.uvic.ca/~frodo/jasper/**](http://www.ece.uvic.ca/~frodo/jasper/)
9. **Color Saturation Change (CSC): the corresponding distorted SCIs with CSC are obtained by keeping the luminance component unchanged while changing the chrominance components. Firstly, MATLAB function ‘rgb2ycbcr’ is used to transform SCI from RGB to YCbCr. Then, the chrominance component is adjusted according to the following equation：**

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**where** **,** **,** **,** **,** **, and**  **means the Y, Cb, Cr components of reference SCI**  **and distorted SCI** **, respectively.** **is the parameter to control the level of color saturation change and is set as 0.96, 0.72, 0.58, 0.42, 0.1, respectively.**

1. **HEVC Screen Content Compression (HEVC-SCC): the corresponding distorted SCIs with HEVC-SCC compression are obtained by performing HEVC-SCC encoder with standard configuration—“All Intra Main setting”. The quantization parameters are set as 16, 36, 40, 42, and 48, respectively.**
2. **Color quantization with dithering (CQD): the corresponding distorted SCIs with CQD are obtained by performing MATLAB function “*rgb2ind*”. This function is used to convert RGB image to indexed image using dithering minimum variance quantization, where the parameter “N” is to control the number of color and is set as 30, 28, 25, 10, and 5, respectively.**