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CS 3150

Homework 5

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This homework took on a familiar outline to homework four with a few less quality assessing functions and noise creation functions. The biggest change to a function I’ve already been working with came to the gaussian noise creator (gaussian noise is what I choose to corrupt my images). I could have written three different functions, one to corrupt the entire image, one to corrupt areas of consequence and a final function to add noise only to back ground areas but instead I wrote one function that accepted a higher order function. This way, depending on how I called the function, it would add noise to the entire image, or just the parts of the image that corresponded to low or high values in the saliency map. Here is how they turned out:

Original

A close up of a screen

Description automatically generated

Saliency Map

A picture containing graphical user interface

Description automatically generated

Uniform Gaussian Noise. MSE: 101.1416

A picture containing ball, room, table

Description automatically generated

Consequential Gaussian Noise. MSE: 14.8222

A picture containing graphical user interface

Description automatically generated

Inconsequential Gaussian Noise. MSE: 84.2185

A close up of a screen

Description automatically generated

Unsurprisingly, when measured with a regular MSE quality function, all three altered images scored somewhat hi. However, the image that had a clear subject had a much higher (worse) quality score than the image that had a clear background and a grainy subject.

To fix this inconsistency I created a second MSE function to take into account the saliency map. The function basically used the saliency map as a threshold to determine which parts of the image where important to its quality and which were not. Here are the results (with out the original):

Uniform Gaussian Noise. Salience MSE: 16.6313

A picture containing ball, room, table

Description automatically generated

Consequential Gaussian Noise. Salience MSE: 14.8222

A picture containing graphical user interface

Description automatically generated

Inconsequential Gaussian Noise. Salience MSE: 1.3683

A close up of a screen

Description automatically generated

Now all three measures are much low since the saliency map has limited the number of pixels that the mean square error is measuring. More importantly though, the image with a noisy background and clear subject is now rated better than its counterpart. This suggests that the new function works and judges the important parts of the image rather than the unimportant parts.

If I were to do this exercise again, I would want to try and use the saliency map as a sliding weight on how the quality is determined instead of as a threshold. Similarly, I would like to see if I could add the Gaussian noise in a smoother fashion so as to hide the lines of where the noise has and has not been added.