Compression Ratio

CR = (size of original image)/ (size of assessed image)

This function compares the sizes of images to understand if the assessed image is compressed well.

If the images are same output should be 1. The bigger the value is, the image is compressed more.

Relative Data Redundancy

RD= 1-1/CR

This function is related to compression ratio. It is another assessment method. Tells us data redundancy.

If the images are same output should be 0. RD is between 0 and 1. The bigger the value is, there is more data redundancy. Redundancy means useless information.

If the assessed image is bigger RD can be minus and not between 0-1

Mean Square Error

MSE = sum(sum(error\*error)) / (size of image)

Take the error, square it, take the mean. The larger the value is the more difference the images are.

Root Mean Square Error

RMSE = sqrt(MSE)

Same with MSE. Value is smaller because we are taking root.

Signal to Noise Ratio

SNR = 10\*log10((Power of signal)/ (Power of noise))

It is power of signal divided by power of noise. So it compares desired value to noised value. That means if SNR is higher, there are less noise, quality of image better.

Peak Signal to Noise Ratio

In the calculation square of max value of a pixel divided by MSE is examined.

PSNR value can be used directly to compare human perception of quality.

<25 bad quality; 25-35 can see differences; >37 differences can hardly distinguish.

Bigger the value is quality is higher.

Mean Square SNR

It has a different calculation but trend is similar to SNR. The higher is the better.

Entropy

It shows the information for each pixel.

Normalized Cross-Correlation

It shows the similarity between two images. It is not direct subtraction. But still it is not that a complex calculation. If the images are same, the value is 1. It differs from 1 more and more if the images become more different.

Average Difference

It is average of the total error. Closer to 0 means they are similar. Close to 0 is better quality for noisy images.

Structural Content

Calculates structural similarity with a different calculation. The larger the value means the image has poor quality. If they are same the value is 1.

Maximum Difference

It shows the max error. It compares all the pixels and picks the max error value. In some cases this information may be important but in some cases it may be less important. But generally, the higher is maximum difference, the quality is lower.

Normalized Absolute Error

It is like other error calculations but in this case we take the absolute value of the error. And divide it by sum of original image value. For quality, it means the higher this value, the quality is lower.

Laplacian Mean Square Error

This rather a complicated calculation. It is based on algebra and edges in the image. The larger value means the image quality is poor quality.

Structural Similarity Index

It shows the similarity between two images. Calculation is based on luminance, contrast and structure. If the images are same the value is 1.

Luminance

Mean value of the luminance of pixels.

The bigger value means the image is brighter.

Contrast

It is the difference between the values of pixels. If the contrast is higher, pixel values are distributed more uniformly.

Sharpness Index

If the image is sharper, you can see the colors separately better. So if the image is sharper, it means image is less blurry.

NIQE – Naturalness Image Quality Evaluator

This is a non-referenced quality factor. Compares the image to a model. This model is computed with images of natural scenes. Closer to 0 means better quality.

BRISQUE – Blind/Referenceless Image Spatial Quality Evaluator

This is a non-referenced quality factor. Compares the image to a model. This model is computed with images of natural scenes with similar distortions. Closer to 0 means better quality.

Defect -> niqe

Blur -> sharpness

Dark -> luminance

Differences -> psnr