Image Processing – A1, part 1

# Part 1: Bad Photos

Six image quality issues will be covered. The six issue types that will be covered are:

1. Overexposure
2. Underexposure
3. Motion blur
4. Out of focus
5. Incorrect white balance
6. Noise

## Overexposure

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| [**Original Image:**](http://edmonkey.com/wp-content/uploads/2016/10/KEN_1946-over.jpg) | **Histogram for image:** |
|  | This image suffers from over contrast, and all the details appear to be somewhat faded. |
| **Enhanced image:** | **Histogram for new image:** |
|  | We can improve this image by lowering the brightness, while increasing the contrast. |

## Underexposure

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| --- | --- |
| [**Original Image:**](http://photography.bastardsbook.com/assets/content/images/large/parco-ninfeo-di-nerone-_-7374864048.jpg) | **Histogram for image:** |
|  | This image suffers from underexposure. The majority of details cannot be seen. |
| **Enhanced image:** | **Histogram for new image:** |
|  | With some contrast adjustment and some smoothing, we can make the details of this image much more visible. |

## Motion Blur

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| [**Original Image:**](https://chrismartinphotography.files.wordpress.com/2011/03/downtown-calgary-8750.jpg) | **Histogram for image:** |
|  | This image suffers from motion blur. |
| **Enhanced image:** | **Histogram for new image:** |
|  | This image can be improved by a tiny bit by removing outlier noise, and applying an un-sharp filter. I was largely unable to improve the original image unfortunately. |

## Out of Focus

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| [**Original Image:**](http://www.photographybb.com/versatile/wp-content/uploads/2013/01/assignment-2.jpg) | **Histogram for image:** |
|  | This image suffers from being out of focus, and a lot of the detail appears blurry. |
| **Enhanced image:** | **Histogram for new image:** |
|  | This image can have detail appear more in focus by applying an unsharp-mask, and then performing a soft de-speckle blur. |

## Incorrect White Balance

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| --- | --- |
| [**Original Image:**](http://8020.photos.jpgmag.com/2373245_239756_87ddbcb94c_p.jpg) | **Histogram for image:** |
|  | This image suffers from poor white balance, and has too much blue. This can be improved by reducing the steep amount of blue present, |
| **Enhanced image:** | **Histogram for new image:** |
| C:\Users\drew\AppData\Local\Microsoft\Windows\INetCacheContent.Word\white_balance_fixed_2.png | This image can be somewhat improved by reducing the blue channel of the image. |

## Noise

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| **Original image:** [Example\_lena\_denoise\_noisy](http://boofcv.org/images/1/18/Example_lena_denoise_noisy.jpg) | **Histogram for image:** |
| C:\Users\drew\AppData\Local\Microsoft\Windows\INetCacheContent.Word\noisy.jpg | The image suffers from noise, resulting in the image looking grainy. The graininess can be reduced by applying a smoothing algorithm. |
| **Enhanced image:** | **Histogram for new image:** |
|  | This image can have some speckles removed by applying a blur filter. However, which of the two images looks better seems subjective. |

Of the six cases covered: improvement was arguably seen in at least five of the images. I was not able to meaningfully improve the motion blur image. Of the five images that were improved, the noise image seems to be subjective on whether the improved image looks better than the original. Meaning that I think the four remaining images were objectively improved.

Objectively improved 4/6 = 66.67%

Subjectively improved 1/6 = 16.67%

Not improved = 1/6 = 16.67%

Not perfect, but not a waste of time either, and after experimenting, I did learn a little about how to approach improving images with certain issues.