Image Grading Logic & Parameters

This document explains how the
sort_images.exe tool decides whether an image is "Good" or "Bad".

The "Veto" System (Hard Filtering)

The classification uses a **strict veto system**. This means an image starts with a "Perfect" grade, and any single flaw causes it to fail immediately. There is no weighted average (e.g., a very sharp image is still rejected if it has digital zoom).

Rule: If **ANY** parameter fails its threshold, the image is **BAD**. **Rule**: The image must pass **ALL** checks to be **GOOD**.

Parameters & Thresholds

Here is the breakdown of each parameter, its default weight/threshold, and the reasoning.

1. Resolution (Metadata)

- **What it is**: The pixel dimensions of the image (Width x Height).
- **Threshold**: Must be at least **3000 x 2000** pixels.
- **Reasoning**: Images below this size lack the detail required for high-quality inspection or mapping. They are often accidental low-res snapshots or thumbnails.
- **Adjustment**: Modify MIN_WIDTH and MIN_HEIGHT in the script.

2. Digital Zoom (Metadata)

- **What it is**: The ratio of digital magnification applied by the camera.
- **Threshold**: Must be **<= 1.0** (No digital zoom).
- **Reasoning**: Digital zoom is just "cropping and stretching." It destroys pixel data and resolution integrity. We only want optical zoom or no zoom.
- **Adjustment**: Modify MAX_DIGITAL_ZOOM in the script.

3. ISO Sensitivity (Metadata)

- **What it is**: The sensor's sensitivity to light.
- **Threshold**: Must be **<= 1600**.
- **Reasoning**: High ISO (e.g., 3200, 6400) introduces significant "noise" or grain, making the image look speckled and reducing clarity.
- **Adjustment**: Modify MAX_ISO in the script.

4. Blur Score (Visual Analysis)

- **What it is**: A calculation of the "Laplacian Variance".
    - High Variance = Many sharp edges = Sharp Image.
    - Low Variance = Few sharp edges = Blurry/Flat Image.
- **Threshold**: Must be **>= 100.0**.
- **Reasoning**: This detects motion blur (drone moving too fast) or focus issues.
- **Adjustment**: Modify MIN_BLUR_SCORE in the script.
    - If **Good** images are being rejected: **Lower** this number (e.g., to 50.0).
    - If **Bad/Blurry** images are being accepted: **Raise** this number (e.g., to 200.0).

Example Grading Scenarios

Image	Resolution	Zoom	ISO	Blur Score	decision	Reason
Img_A	4000x3000 (Pass)	1.0 (Pass)	100 (Pass)	500.0 (Pass)	**GOOD**	All Pass
Img_B	**1920x1080 (Fail)**	1.0 (Pass)	100 (Pass)	600.0 (Pass)	**BAD**	Low Resolution
Img_C	4000x3000 (Pass)	**2.0 (Fail)**	100 (Pass)	300.0 (Pass)	**BAD**	Digial Zoom
Img_D	4000x3000 (Pass)	1.0 (Pass)	800 (Pass)	**40.0 (Fail)**	**BAD**	Blurry