Objectives

1. Resolve issues with dark pixel distribution and blending in the threshold CLAHE function.
2. Refine the threshold mask and distribution logic for improved accuracy and performance.
3. Explore the application of combined CLAHE and thresholdCLAHE effects for enhanced visual detail.
4. Present findings and concepts to the team lead through a PowerPoint slide with comparisons and a flowchart.

Activities

1. **Threshold CLAHE Debugging and Refinements:**
    - **Issues Identified:**
        - Dark pixels in the threshold region were not distributed across the whole image.
        - Threshold CLAHE function incorrectly applied smooth blending and other filters.
    - **Solutions Implemented:**
        - Updated threshold mask logic to select areas greater than the threshold instead of reverse selection.
        - Removed smooth blending from the process.
        - Adjusted mapping range:
            - Minimum value derived from the original image's minimum value.
            - Maximum value extended to 1.5x the original maximum value for enhanced effects.
        - Replaced corresponding pixels in the original image directly with processed threshold areas, eliminating weighted blending.
2. **Data Type and Region Highlighting:**
    - Ensured `thresholdMask` data type is set to `CV_8U` for compatibility.
    - Attempted to highlight the threshold region in red:

        - Output window incorrectly highlighted the entire image.
        - Removed the highlighting function temporarily for further debugging.
3. **Dark Pixel Distribution Adjustments:**
    - Restricted dark pixel distribution to non-white regions:
        - Defined `whiteThreshold` to determine white regions.
        - Defined `blackThreshold` to determine dark regions.
4. **Combining CLAHE and ThresholdCLAHE Effects:**
    - Applied the CLAHE effect first, followed by thresholdCLAHE on the output.
    - Observed enhanced detail, particularly in cargo images, making the results visually clearer.
5. **Team Meeting and Presentation:**
    - Conducted a short meeting with the team lead to demonstrate the combined effects.
    - Created a PowerPoint slide comparing the original, CLAHE, and thresholdCLAHE effects.
    - Included a flowchart to explain the updated concept and process.
    - Submitted the presentation to the team lead before the end of the working day.

Achievements

1. Resolved key issues in the threshold CLAHE function:
    - Corrected dark pixel distribution.
    - Improved logic for threshold mask application.
    - Enhanced mapping range for better visual effects.
2. Successfully applied and demonstrated combined CLAHE and thresholdCLAHE effects, highlighting improved image detail.
3. Delivered a well-documented PowerPoint presentation with comparisons and a flowchart to the team lead.

Problems & Solutions

1. **Incorrect Dark Pixel Distribution:**
    - **Problem:** Dark pixels were restricted to the threshold region.
    - **Solution:** Updated the logic to ensure proper distribution across non-white regions.
2. **Smooth Blending in Threshold CLAHE:**
    - **Problem:** Blending steps reduced the effectiveness of the enhancement.
    - **Solution:** Removed smooth blending and used direct pixel replacement.
3. **Region Highlighting in Red:**
    - **Problem:** Output window highlighted the entire image as the threshold region.
    - **Solution:** Temporarily removed the function for further debugging.
4. **Data Type Mismatch in Threshold Mask:**
    - **Problem:** Threshold mask data type did not match required specifications.
    - **Solution:** Ensured `thresholdMask` uses `CV_8U`.