Task Progress Update Report

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1. Overview of Assigned Tasks

Task 1: Display Window for Interlace Result

Objective: Enable users to tick a UI box to display interlace results.

Current Status: Completed

Details:

- Implemented a display window for interlace results.
- Added a tick box in the UI, allowing users to toggle the display window.

Task 2: DarkLine Conversion to Double 2D Pointer Method

Objective: Convert the DarkLine implementation from `std::vector` to a double 2D pointer method for better performance.

Current Status: Completed

Details:

- Converted DarkLine storage to a double 2D pointer (`DarkLine**`).
- Implemented custom memory management using RAII principles.
- Enhanced data access with row-wise and column-wise optimizations.
- Updated related functions, such as `removeDarkLinesSequential`, `detectLines`, and helper methods (`drawLineLabelWithCount`).
- Integrated a new structure `DarkLineArray` to manage pointer-based lines.

Task 3: Line Removal Methods and Updates

Objective: Enable selective and sequential removal of detected lines using neighbour values or direct stitch methods.

Current Status: Completed

Details:

- Introduced a `SelectedLines` struct for pointer-based line handling.
- Updated `removeDarkLinesSequential` to process user-selected lines.
- Enhanced error handling and state preservation for `Direct Stitch` operations.

- Fixed issues in `removeDarkLinesSequential` and added workflows for neighbour-based and isolated line removals.

Task 4: UI Enhancements for Line Detection and Removal

Objective: Update the UI to better integrate pointer-based line detection and removal methods.

Current Status: Completed

Details:

- Combined detection, removal, and reset functionalities into a unified control panel.
- Added buttons for resetting detected lines per method.
- Enhanced the line information box to display dynamic updates on detected and removed lines.
- Improved parameter bar responsiveness with dynamic size adjustments.

Task 5: Edge Enhancement Functionality

Objective: Provide users with adjustable edge enhancement tools using the Sobel operator.

Current Status: Completed

Details:

- Added controls to adjust gamma, sharpness, and contrast in a single button.
- Implemented regional adjustment options requiring pre-selection of the region.

Task 6: Weighted Average for Merging Methods

Objective: Dynamically adjust weights for merging methods.

Current Status: Completed

Details:

- Added dynamic weight calculation options: `STATIC`, `INTENSITY_BASED`, `GRADIENT_BASED`, and `VARIANCE_BASED`.
- Updated UI to reflect selected methods and parameters.

Task 7: Debugging and Testing

Objective: Identify and fix bugs in calibration, interlacing, and merging processes.

Current Status: In Progress

Details:

- Debugged `processYXaxis` function but retained the original implementation due to minimal improvements.
- Investigated merging issues but found no effective solutions.
- Restructured and cleaned code for better readability and functionality.

2. Roadblocks/Challenges

- **Direct Stitch Issues:** Memory management inconsistencies were resolved by restructuring workflows and implementing robust error handling.
- **Y-Axis Calibration:** Detected issues with missing lines during Y-axis calibration; still under investigation.
- **Merging Process:** Loss of key details post-calibration and merging remains unresolved.
- **Pointer-Based Line Detection:** Frequent crashes due to pointer linkage; resolved with improved memory safety mechanisms.

3. Conclusion

- Successfully transitioned DarkLine methods to double 2D pointers for improved performance.
- Implemented UI enhancements for better user interaction and feedback.
- Enhanced line detection and removal methods for versatility and accuracy.
- Debugged and tested various functionalities, including edge enhancement and dynamic weighted merging.
- Remaining tasks focus on resolving calibration and merging issues while ensuring robustness and performance in the final implementation.