Objectives

1. Complete the transformation of remaining functions into the double 2D pointer method.
2. Debug and test all updated functions for stability and performance.
3. Address crashes and errors in the line detection, line removal, and revert functions.
4. Replace the revert function with a more efficient undo functionality.
5. Refine the UI for Advanced Operations and Zoom features to enhance usability and functionality.

Activities

1. **Function Transformations and Debugging:**
    - Finalised the transformation of remaining functions to use the double 2D pointer method.
    - Conducted comprehensive debugging and testing of all transformed functions.
    - **Line Detection Function:**
        - Identified crashes caused by insufficient memory allocation.
        - Updated the code to allocate and clear memory more efficiently.
    - **Line Removal Function:**
        - Resolved crashes during direct stitch processing.
        - Added auto-skip functionality for error messages while ensuring line removal is completed.
2. **Revert Function Replacement:**
    - Investigated revert function crashes:
        - Verified `saveCurrentState()` was functioning correctly.
        - Integrated the function into all control panels and operations to ensure state saving.
        - Enhanced debugging info but determined revert function instability required its removal.
    - **Implemented Undo Functionality:**
        - Designed the undo function to replace the revert function.
        - Improved memory management by freeing the current image during undo operations.

        - Enhanced handling of dark line-related states and provided clearer debug messages.
        - Saved state and parameters for easier undo process updates.
3. **UI Enhancements:**
    - Refined the **Advanced Operations Group**:
        - Enabled input fields only after the associated button is clicked.
        - Consolidated button groups into a single layout within the Advanced Operations group.
        - Blocked Advanced Operations buttons when no file is loaded.
    - Updated **Zoom Functionality**:
        - Added a warning message to notify users about zoom level adjustments when deactivating Zoom.
        - Relocated the zoom function box to appear below the Zoom button for improved UI consistency.

Achievements

1. Successfully transformed all functions to the double 2D pointer method, completing the transition.
2. Resolved major crashes in line detection and line removal functions, ensuring smoother operation.
3. Implemented a more robust and user-friendly undo function, replacing the unstable revert function.
4. Enhanced the UI with improvements to the Advanced Operations group and Zoom functionality for better user experience.
5. Debugged and tested key functions to ensure compatibility and stability across modules.

Problems & Solutions

1. **Line Detection Function Crashes:**
    - **Problem:** Crashes due to insufficient memory allocation.

- **Solution:** Updated memory handling for better allocation and cleanup.

2. **Line Removal Function Errors:**
    - **Problem:** Crashed during direct stitch processing, but lines were still removed.
    - **Solution:** Added auto-skip functionality for errors while retaining line removal.
3. **Revert Function Crashes:**
    - **Problem:** Unable to revert states reliably.
    - **Solution:** Removed revert function and replaced it with a more efficient undo function.
4. **Zoom Function Confusion:**
    - **Problem:** Users were unaware of the impact of zoom deactivation on zoom levels.
    - **Solution:** Added a warning message and updated the UI layout for clarity.