

1. Objectives

- Resolve issues with cropping functionality for loaded images without processing.
 - Address incorrect image coordinate mapping and ensure the origin starts at the top-left corner.
 - Enhance the status bar layout to display process status, image dimensions, and coordinates clearly and effectively.
 - Incorporate hover-based coordinate tracking to improve user interaction feedback.
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2. Activities

- **Fixing Crop Functionality for Loaded Images:**
 - Identified an access violation when cropping was attempted immediately after loading an image (`m_processedData` was null).
 - Solutions implemented:
 - Added a null check for `m_processedData` in `cropToSelection()` to prevent accessing unallocated memory.
 - Ensured memory allocation succeeded after calling `malloc2D` before using the allocated space.
 - Updated `m_imgData` to maintain consistency before handling `m_processedData`.
 - Allowed cropping to function for the original image even if processed data handling failed.
 - **Outcome:**
 - Cropping now works as intended for loaded images without processing.
- **Coordinate Mapping Fix:**
 - Identified incorrect image coordinates where (0,0) did not start at the top-left corner.
 - Solutions implemented:

- Fixed viewport height calculation to account for UI elements such as the control panel.
- Introduced a projection matrix to accurately transform screen coordinates into image coordinates.
- Adjusted normalized device coordinates (NDC) calculations to ensure correct y-axis orientation.
- Clarified the mapping logic with detailed comments.
- **Outcome:**
 - Image coordinates now start at (0,0) from the top-left corner as expected.
- **Enhancements to the Status Bar:**
 - Redesigned the status bar layout for better clarity and usability:
 - Organized the status bar into two rows:
 - **First row:** Left-aligned buttons, right-aligned zoom level adjacent to the crop button.
 - **Second row:** Status text on the left, centered image dimensions with dividers, and coordinates on the right.
 - Added logic to display "No Image Loaded" when no image data is available.
 - Calculated offsets and dividers to center-align image dimensions.
 - **Outcome:**
 - Improved user experience with a clear and visually aligned status bar.
- **Mouse Hover Coordinate Tracking:**
 - Implemented functionality to display real-time coordinates in the status bar when hovering over the image.
 - Displayed whether the mouse is inside or outside the image boundaries.
 - Simultaneously showed coordinates for the image and the window.

- **Outcome:**
 - Enhanced user feedback with clear and dynamic coordinate tracking in the status bar.
 - **Team Lead Feedback and Discussion:**
 - Discussed crop functionality issues with the team lead:
 - Suggested checking if window and item corners both show (0,0) and using a transpose matrix if required.
 - Feedback integrated into the coordinate mapping solution.
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3. Achievements

- Resolved cropping issues for unprocessed loaded images with robust null checks and memory allocation validation.
 - Fixed coordinate mapping logic, ensuring the image origin aligns with the top-left corner as expected.
 - Redesigned the status bar for enhanced clarity and improved user interaction.
 - Added real-time hover-based coordinate tracking for better feedback and usability.
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4. Problems & Solutions

1. **Problem:** Access violation during cropping due to null `m_processedData`.
 - **Solution:** Added null checks and ensured consistent data updates before accessing `m_processedData`.
2. **Problem:** Incorrect coordinate mapping with the origin not starting at (0,0).
 - **Solution:** Fixed viewport height calculations, applied a projection matrix, and adjusted NDC calculations for consistent mapping.
3. **Problem:** Status bar lacked clarity and effective layout.

- **Solution:** Redesigned the status bar into two rows for organized display of status, dimensions, and coordinates.

4. **Problem:** Hover-based coordinate tracking was not available.

- **Solution:** Implemented dynamic coordinate tracking in the status bar, showing whether the mouse is inside or outside the image.