



ARTWORK SUPER-RESOLUTION SCANNING APPLICATION

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PROJECT PLAN

Artwork Super-resolution Scanning Application



3 PROBLEM STATEMENT

Freelance artists with small budgets and limited income

No current cheap/easy solution to digitizing physical artwork

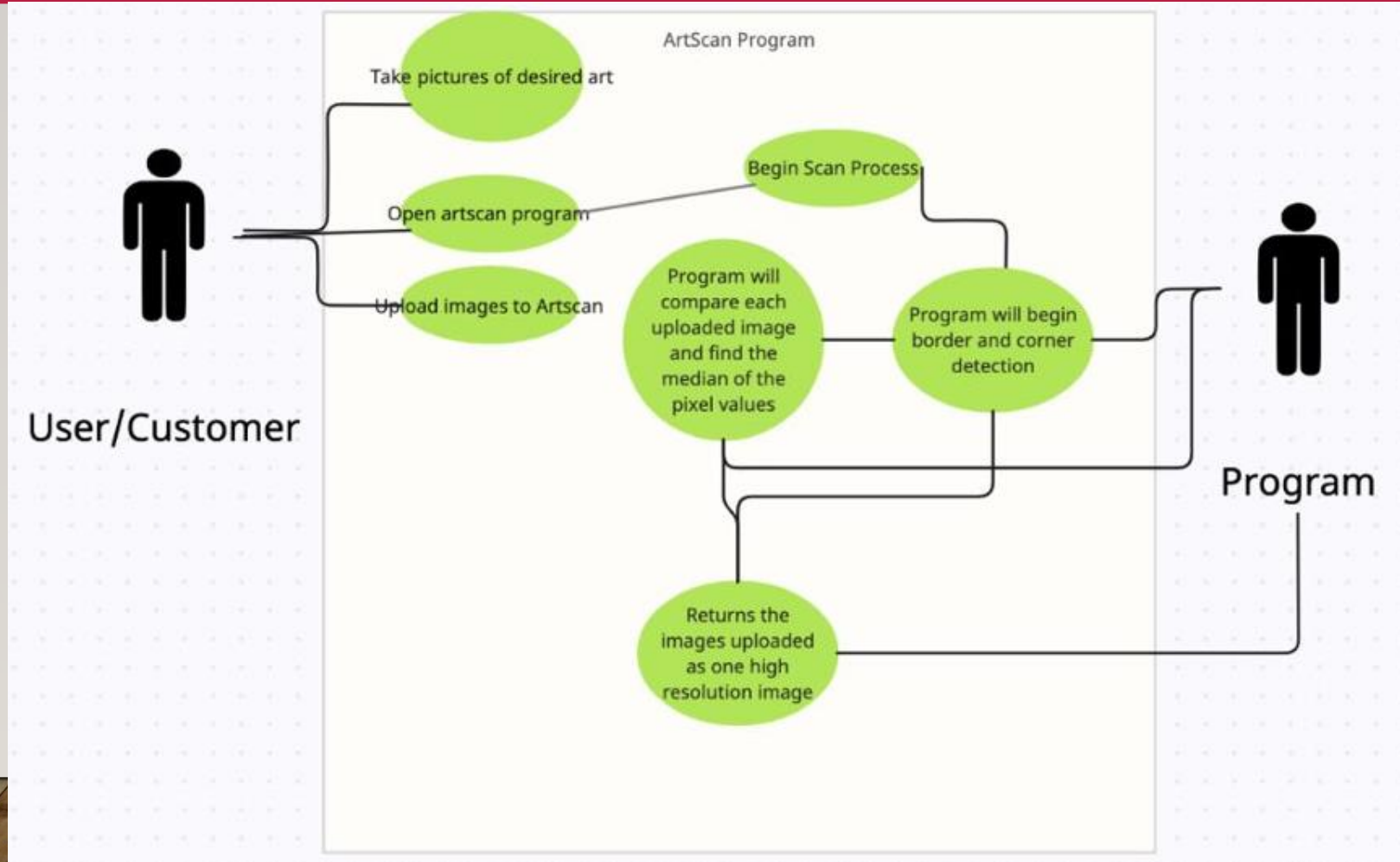
No way to monetize physical artwork (aside from sale)

Large-scale prints require high resolution images

Difficult to create a “backup” of a painting



4 PROJECT PLAN – CONCEPTUAL SKETCH



5 PROJECT PLAN – REQUIREMENTS

FUNCTIONAL

- Capability for the user to upload multiple images.
- Automatically perform image processing algorithms.
 - Corner/border detection.
 - Perspective correction.
 - Noise reduction.
 - Color correction.
- User confirmation.

NON-FUNCTIONAL

- Python/OpenCV.
- Easy to use UI to allow for efficient navigation.
- Simplified algorithms to reduce computation time.

6 PROJECT PLAN – TECHNICAL CONSTRAINTS

- Python/OpenCV.
- Accepts common image file formats (.png, .jpg).
- Cheap and accessible hardware.
 - Smart phone / Raspberry Pi camera.
 - Pantone color match cards.
- Limitations of hardware (camera).

7 PROJECT PLAN – MARKET SURVEY

- Our software will be able to autonomously process multiple images.
 - Increase resolution.
 - Higher quality results.
 - Minimal user interaction.
- Already achievable through applications such as Adobe Photoshop
 - Each step performed manually.
 - Requires powerful system to handle complex and unnecessary processing.
 - Tedious and time consuming.



8 PROJECT PLAN – RISKS AND MITIGATION

- Application Template/Upload Process
 - Problems with upload format and/or image display.
 - Estimate Risk Factor: 0.1
- Image Processing – User satisfaction
 - Border detection
 - Estimated Risk Factor: 0.4
 - Image alignment
 - Estimated Risk Factor: 0.2
 - Noise Correction
 - Estimated Risk Factor: 0.1

9 PROJECT PLAN – COST ESTIMATE

- Weekly commitment time and work from group
- 170+ hours worked on the project collectively
- Pantone cards (4) - \$60



10 PROJECT PLAN – MILESTONES & SCHEDULE



- Majority of time spent will be on image processing development.
- Current Milestones Reached:
 - Image Upload
 - Basic Border Detection
 - Image Cropping
 - Basic Perspective Correction



SYSTEM DESIGN

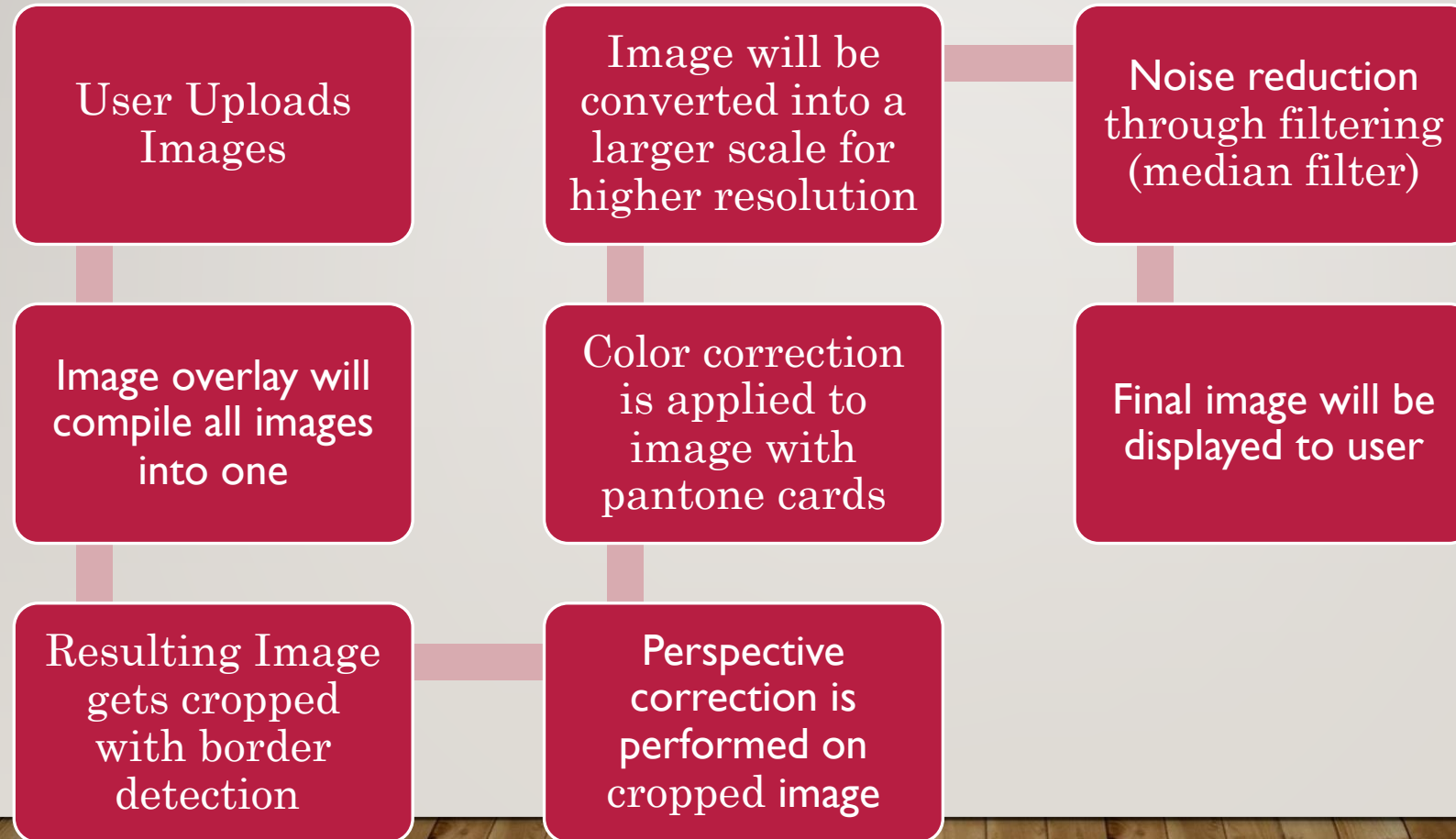
Artwork Super-resolution Scanning Application



12 SYSTEM DESIGN – FUNCTIONAL DECOMPOSITION

- Application template
- Multiple image upload
- Automatic image processing techniques
 - Corner/border detection
 - Image cropping
 - Perspective correction
 - Image alignment
 - Pixel mapping
 - Image noise reduction
 - Color correction
- Application finalizations/revisions

13 SYSTEM DESIGN – DETAILED DESIGN



14 SYSTEM DESIGN – TECHNOLOGY PLATFORMS

- Windows/Mac OS
- Python
- OpenCV
- Python image library
- Pantone color match cards

15 SYSTEM DESIGN – TEST PLAN

- Each image processing function will be tested individually.
- Completed functions will be combined and subsequently tested.
- Various images used for testing:
 - Images provided by Dr. Daniels.
 - Manually captured images containing Pantone cards.
 - Added noise and altered perspective.

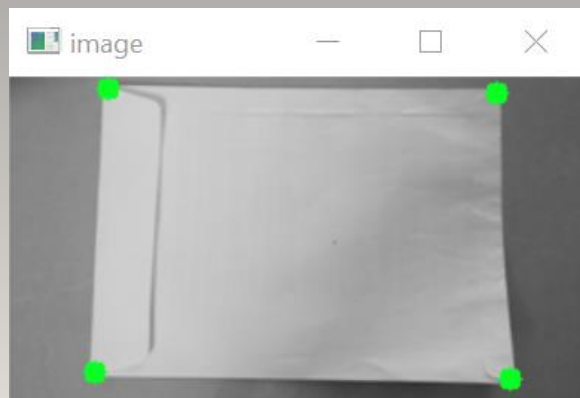
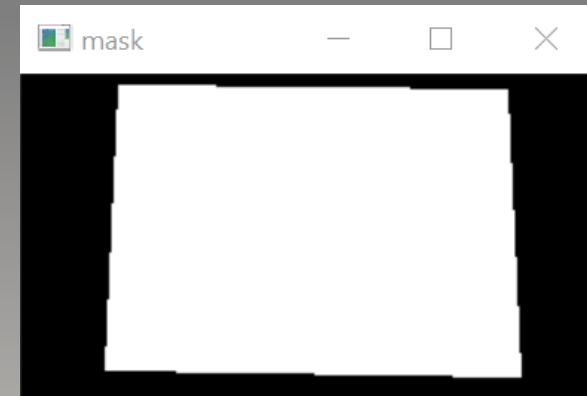
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SYSTEM DESIGN

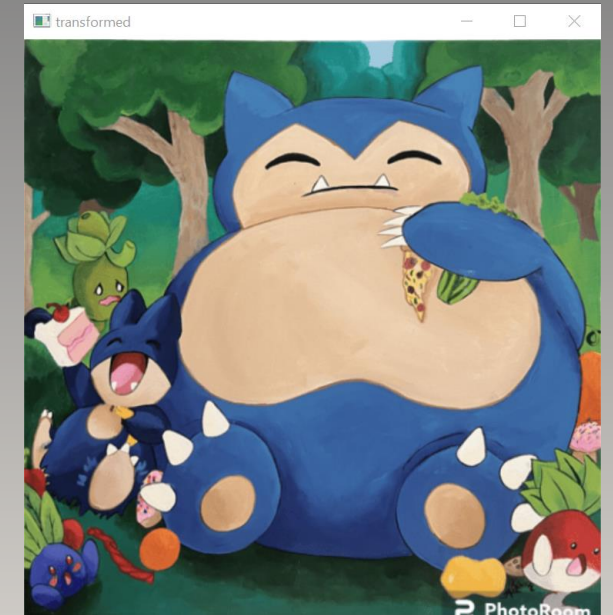
PROTOTYPE IMPLEMENTATIONS

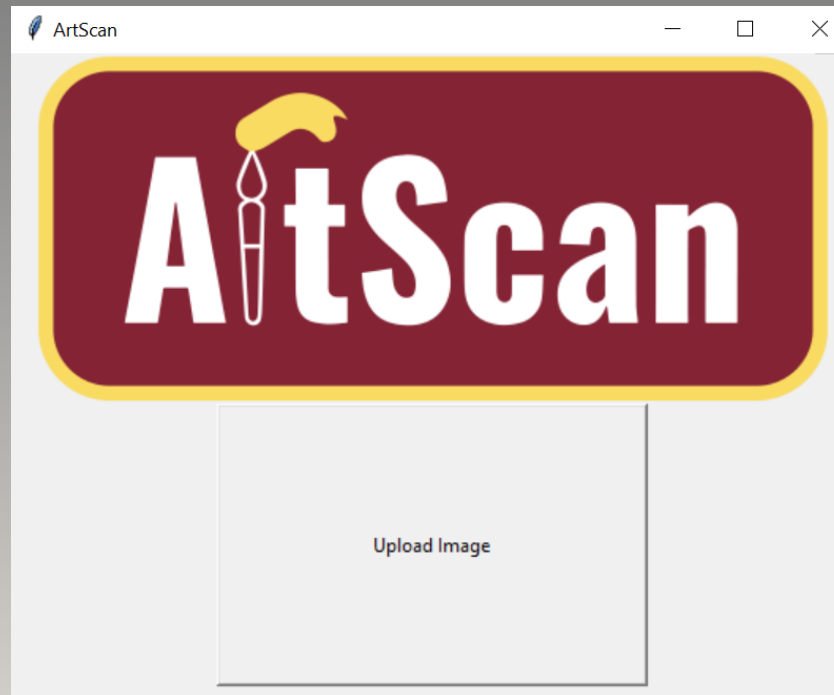


17 FINDING CORNERS (FIRST TEST ON AN ENVELOPE)



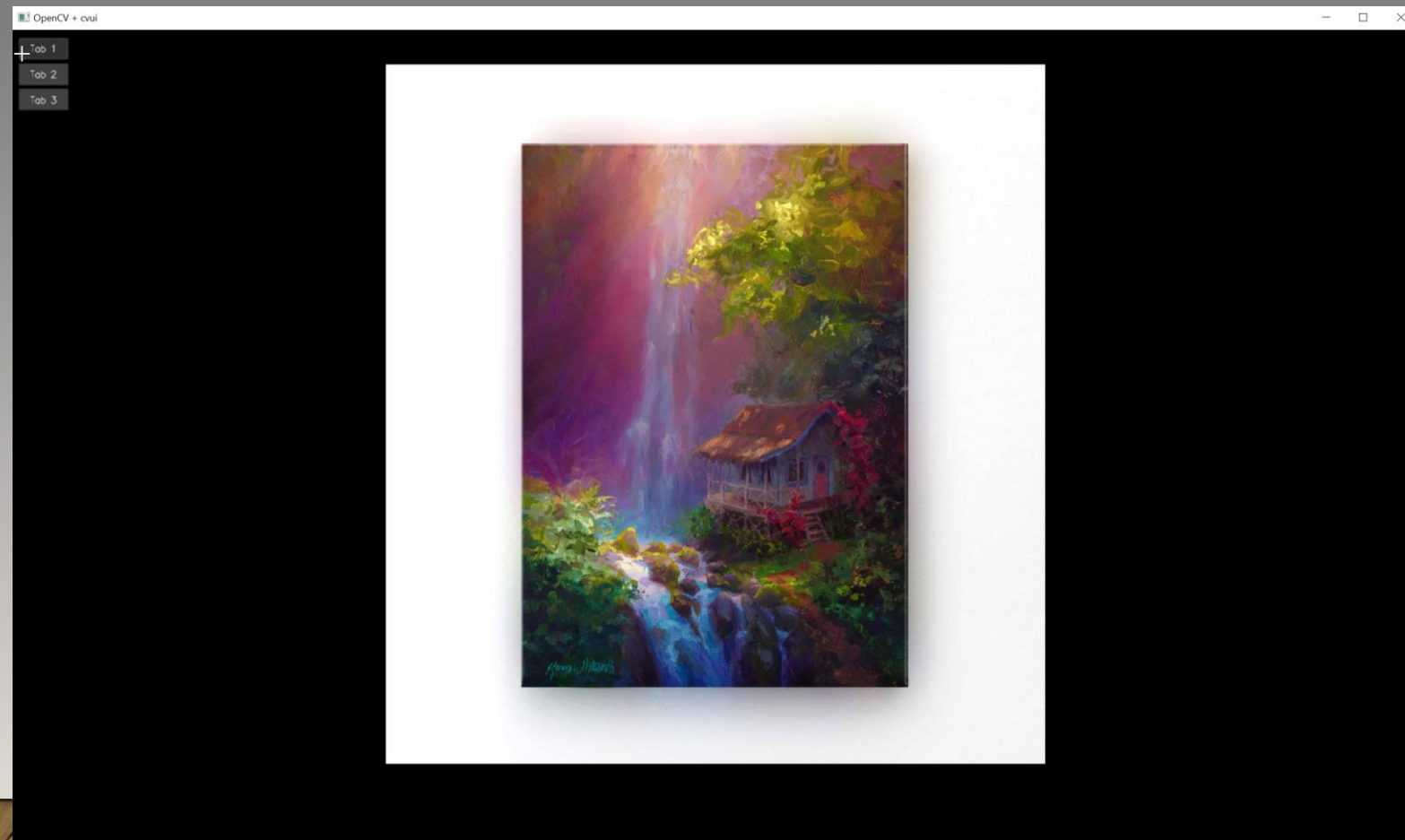
18 CROPPING ON A PAINTING (CURRENT ALGORITHM)





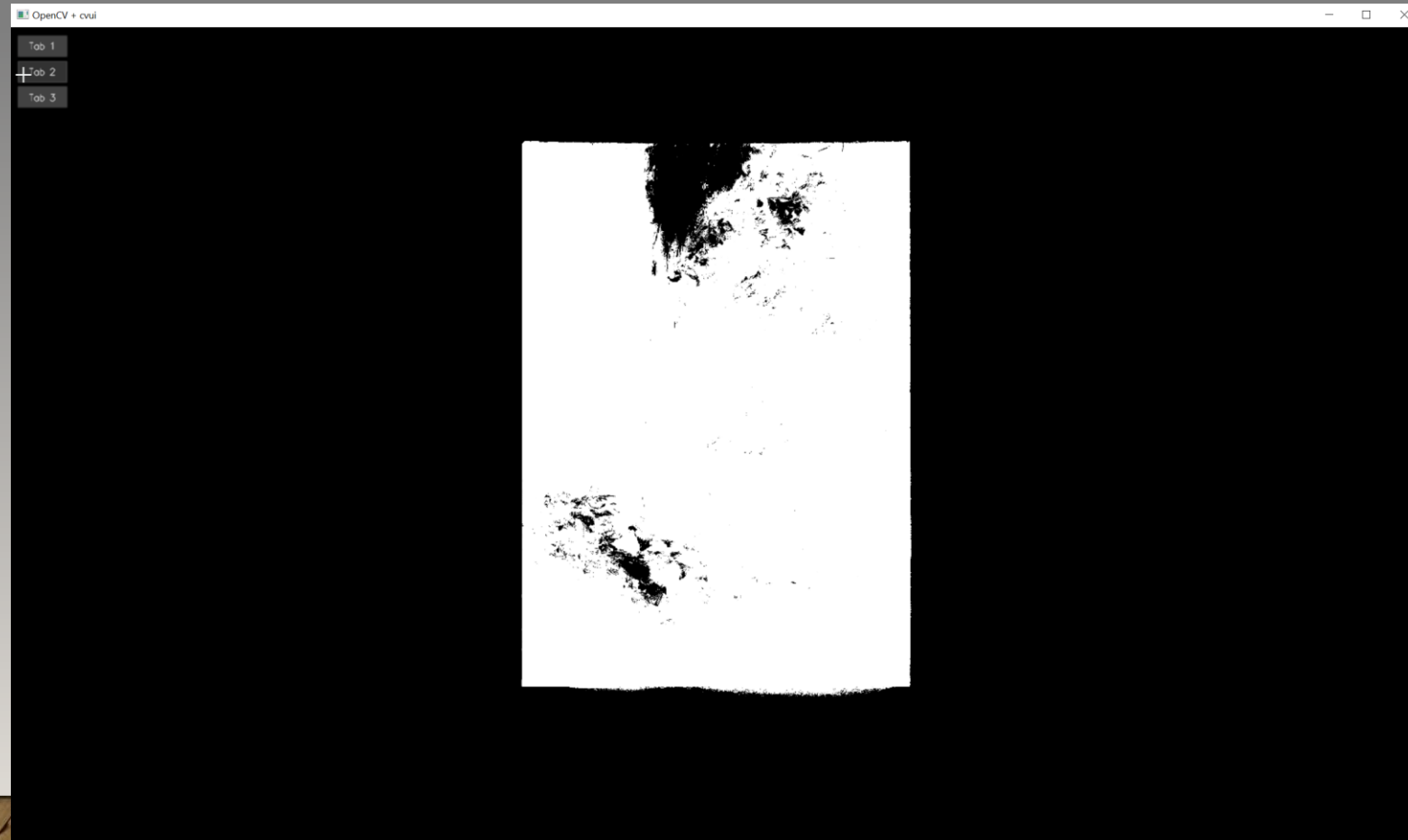
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APPLICATION PREVIEW



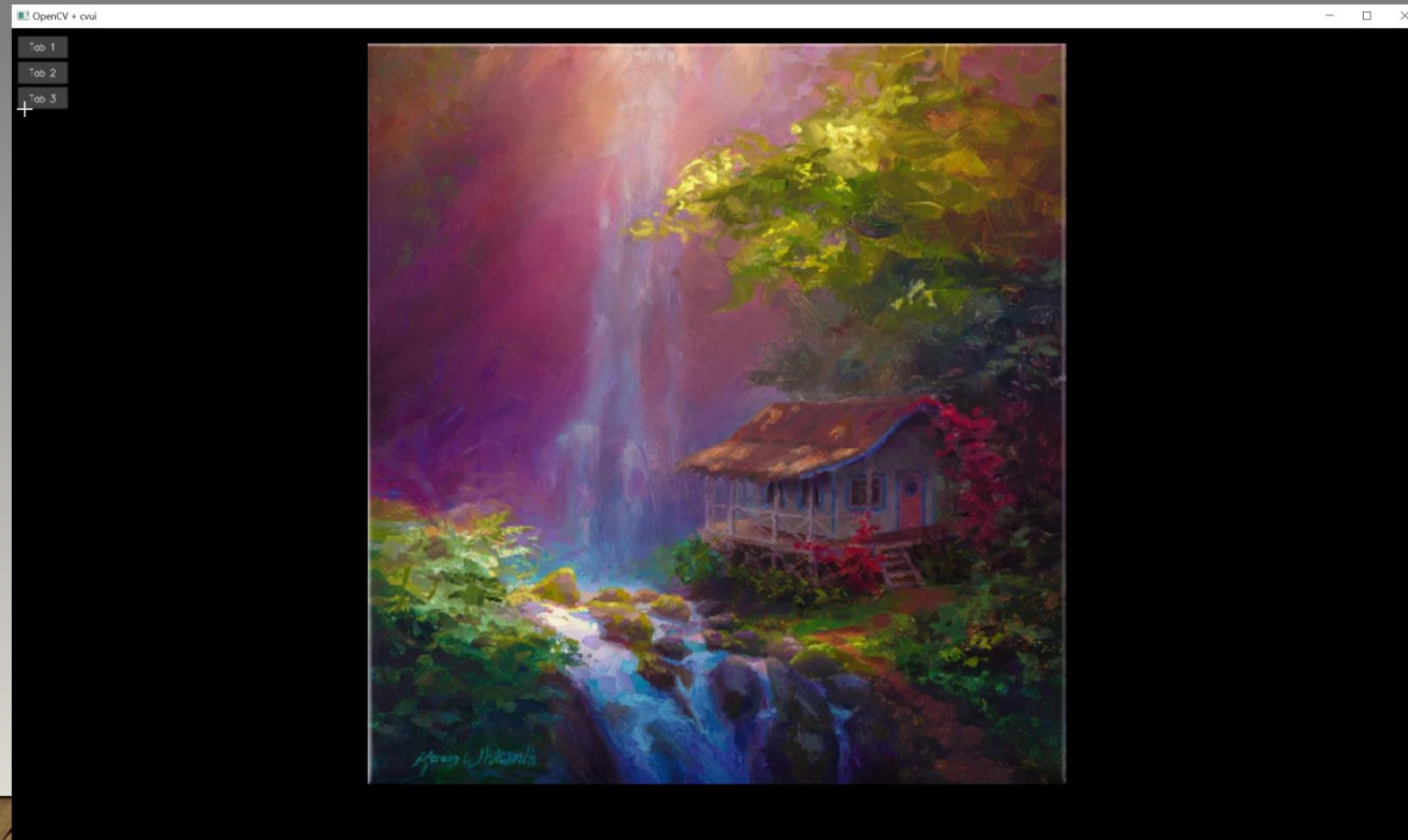
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APPLICATION PREVIEW



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APPLICATION PREVIEW



23 BORDER DETECTION USING HOUGH TRANSFORMS



CONCLUSION

Artwork Super-resolution Scanning Application



25 CONCLUSION – CURRENT PROJECT STATUS

- Current Milestones Reached:
 - Project Template
 - Image Upload
 - Basic Border Detection
 - Image Cropping
 - Basic Perspective Correction

26 CONCLUSION – TEAM MEMBER CONTRIBUTIONS

- Isaac Plambeck: Application development
- Reece Dodge: Project Organizer/Help with research and design plan
- Samuel Schaphorst: Border detection
- Garrett Powell: Research to build foundation for following semester / Python review

27 CONCLUSION – FALL 2023 PLANS

- Milestones to Complete:
 - Image Alignment
 - Pixel Mapping
 - Noise Reduction
 - Color Correction
- Combine all image processing functions.
- Testing, alterations, and finalizations.

QUESTIONS?
