

Quick MTF GUI

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Introduction

Welcome to the quickmtf Application! This application allows you to open images, draw rectangles on them, calculate the Modulation Transfer Function (MTF), and perform various image processing tasks. This instruction manual will guide you through the features and functionalities of the application.

Source code and link

[PyPI Package Page](<https://pypi.org/project/quickMTF/>)

[Source Code](<https://github.com/Lorrytoolcenter/quickMTF>)

Installation and Requirements

Before using the Image Processing Application, ensure you have the following requirements:

Python 3.x or higher installed on your system.
PyQt5 and matplotlib libraries.

To install the required libraries, open a terminal or command prompt and run the following command:

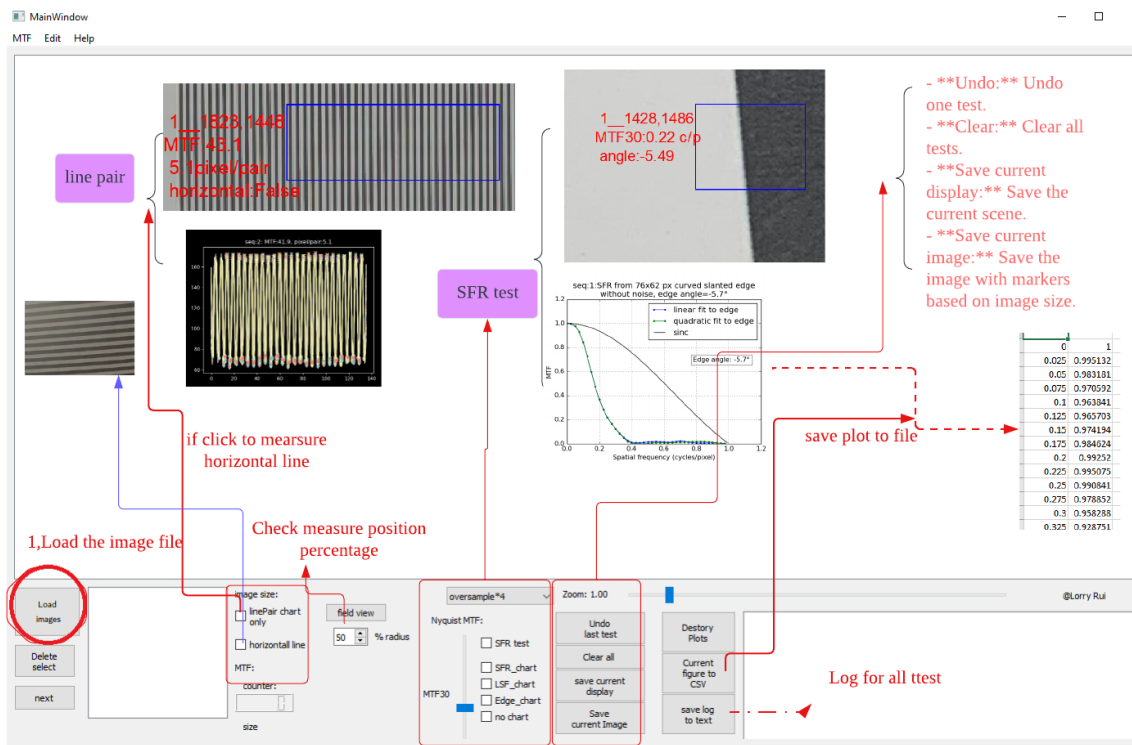
```
pip install PyQt5 matplotlib
```

```
pip install quickMTF
```

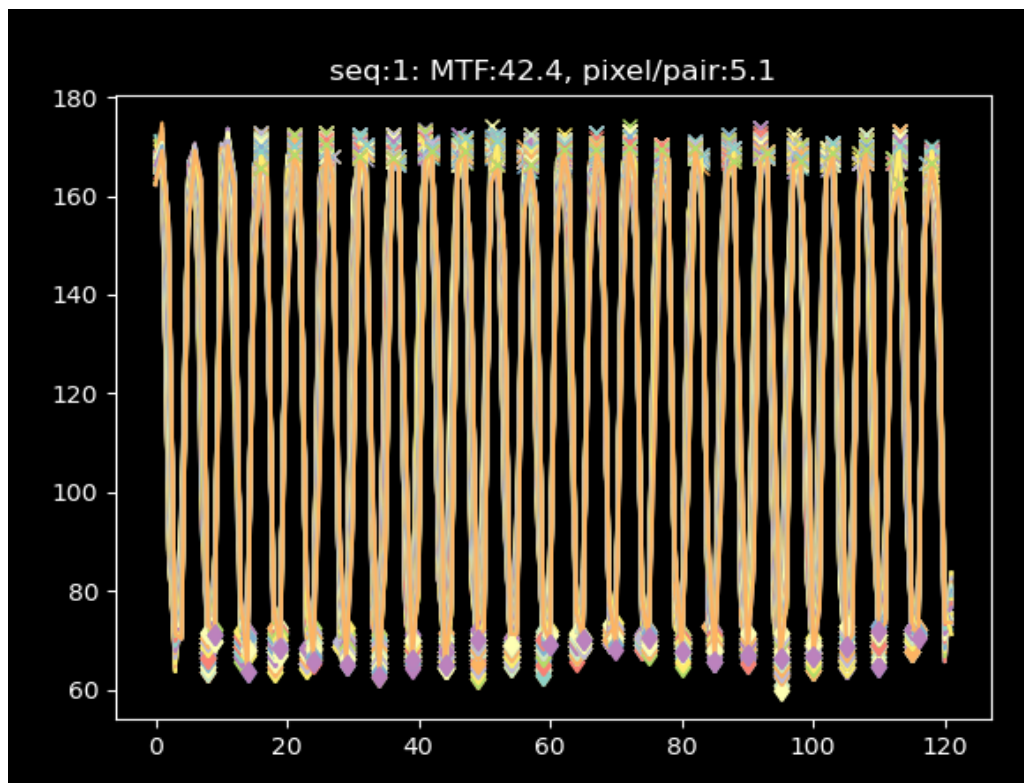
How to Use the Application

1. Launching the Application
 - a. Run the script to launch the application.
2. Opening an Image
 - a. Click the "Open Image" button to browse and select an image file (PNG, JPG, BMP, or GIF).
 - b. The selected image will be displayed in the main window.
3. Drawing Rectangles
 - a. To draw a rectangle on the image, click and hold the left mouse button, then drag the cursor to define the rectangle's area.
 - b. Release the mouse button to complete the rectangle.
4. Result Options
 - a. After drawing a rectangle, you have two options:
 - i. Keep the result directly without any further action.
 - ii. Click the selection to display its plot chart for visual analysis.
5. Plot Chart Actions
 - a. If you choose to see the plot chart:
 - i. You can destroy the plot when you are done analyzing it.
 - ii. Or, you can save the current plot into a CSV file for further use.
6. Clearing Rectangles
 - a. To remove all drawn rectangles from the image, click the "Clear Rectangles" button.
7. Undoing Rectangles
 - a. To undo the last drawn rectangle, click the "Undo Rectangles" button.
8. Saving the Image with Annotations
 - a. To save the image along with the drawn rectangles and any text annotations, click the "Save Image" button.
 - b. Choose a file location to save the modified image.
- 9.

Processing manual



Plot example



Modulation Transfer Function (MTF) Calculation

To calculate the MTF, use the sliders and checkboxes:

- Use the "Vertical Slider" to adjust the MTF calculation index.
- Use the "Horizontal Slider" to adjust the zoom level of the image.
- Check the "MTF Plot" checkbox to display the MTF plot.
- Check the "LSF Plot" checkbox to display the Line Spread Function (LSF) plot.
- Check the "Edge Detection" checkbox to perform edge detection on the image.

The MTF value will be displayed in the "MTF" label below the image.

Circle Visualization

Click the "Show Circle" button to toggle the visibility of a circle on the image.

Use the "SpinBox" to adjust the circle radius percentage.

The circle will appear centered on the image, and the radius can be adjusted using the "SpinBox".

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Troubleshooting and Technical Support

If you encounter any technical issues or need assistance with using the application, please refer to the following resources:

Refer to the "Troubleshooting" section in this instruction manual for common issues and solutions.

For additional support or to report a bug, contact our technical support team at support@example.com.

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Additional Notes

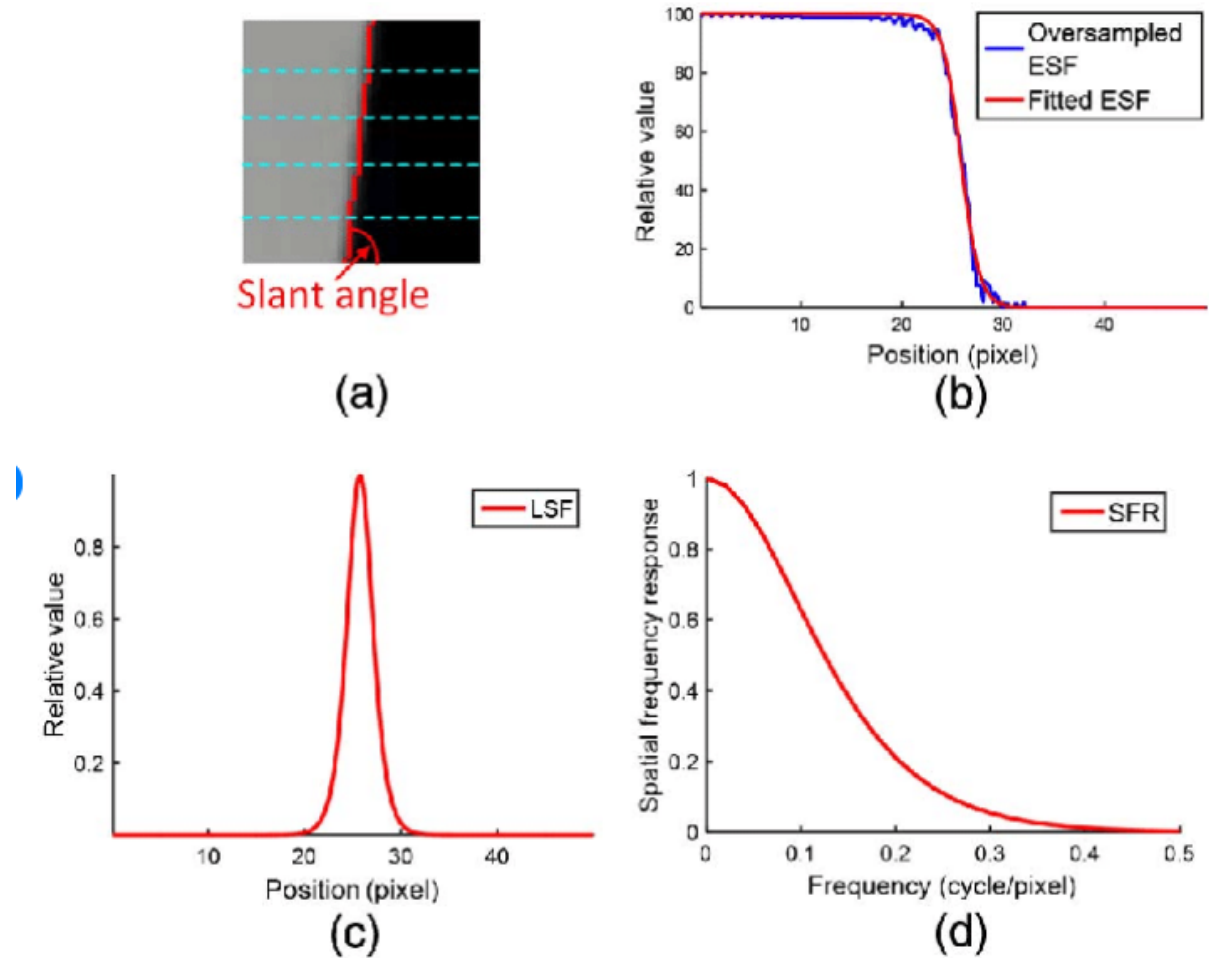
- The "Save All Logs to File" button allows you to save the log messages displayed in the application.
- The "Save to CSV" button saves data from multiple charts (subplots) in the matplotlib figure to a CSV file.

Conclusion

Congratulations! You are now familiar with the Image Processing Application and its various functionalities. Have fun exploring the capabilities of the application and feel free to provide feedback or suggestions for improvements.

Thank you for using the Image Processing Application!

Reference



Example of SFR calculation. (a) ROI with detected edge marked with a red line and four raw ESFs for interpolation marked with cyan lines. (b) Four times oversampled and fitted ESF. (c) LSF with window function applied. (d) Outputted SFR within Nyquist frequency.

Slanted-Edge Algorithm

Quick overview of slanted-edge algorithm:

- Acquire image, linearize data
- Take derivative of each row/column and apply Hamming filter
- Estimate edge angle and position using 1st order fit
- Bin each row/column based on actual edge center distance from estimated line
- Create super-sampled edge-spread function
- Take derivative of super-sampled edge to get line-spread function (LSF)
- Take discrete Fourier transform of LSF and normalize to 0 frequency to get MTF

Introduction

Digital MTF/SFR can be measured and evaluated using a variety of patterns and algorithms. For example:

- Slanted-edge
- Siemens star
- Linear sinusoidal patterns
- Hyperbolic wedge
- Dead leaves/scale invariant random patterns
- Others

