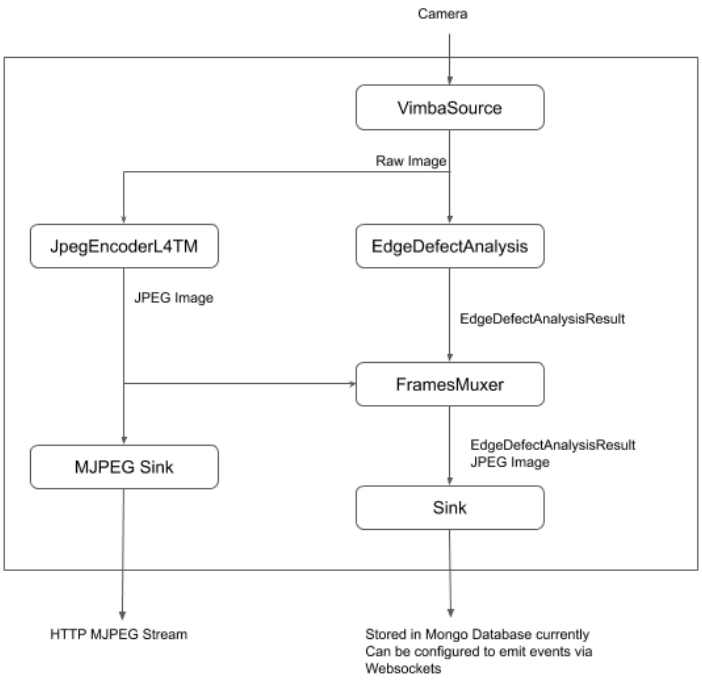
EdgeDefectAnalysis

Pipeline Overview



Installation

Jetson Setup

- Ubuntu Host PC is required. There are other ways but this is the easiest and complete.
- On Ubuntu Host PC Download Nvidia SDK Manager
- Install and run SDK Manager
- Now we are ready to flash Jetson. Connect Jetson with the host using micro usb cable provided with the developer kit.
- Make sure you connect jetson to keyboard, mouse and hdmi monitor
- Setup the Jetson board following the instructions
- After flashing OS, the SDK Manager waits for you to setup username, password for the Ubuntu OS on the board.
- Once Login setup is done, provide the username and password to the SDK Manager to complete the packages installation
- Overall it may take 1-2 hours
- Ubuntu OS Installation and packages installation should have finished

Install Application

- Go to the latest relese in drive folder
- Download the tar.xz and install.sh file
- sudo chmod +x install.sh
- ./install.sh
- system will restart

Configure Camera and Network

- change mtu to 8228 following the doc

Run Application

- cd ~/ecsip/v1
- ./run_server.sh

Stop Application

- cd ~/ecsip/v1
- ./stop_server.sh

Clear All Settings

- cd ~/ecsip/v1
- ./clearmongo.sh

Using the Client

- Now you can use the client on any PC from chrome browser.
- <ip>:5001 Example 10.102.10.146:5001
- username:ecs
- passowrd:ecs@i20

Configuration

Theory

- Canny Edge Detection theory

Edge Localization and Defect Detection properties

Edge Detection Properties - Opencv Reference1

Hough Line Transform - Opencv Reference2

- Min edge threshold - first threshold for the hysteresis procedure.
- Max edge threshold - second threshold for the hysteresis procedure.
- Min edge angle
- Max edge angle
- Min Line Length - Minimum line length. Line segments shorter than that are rejected.
- Max Gap – Maximum allowed gap between points on the same line to link them.
- Line Threshold - Accumulator threshold parameter. Only those lines are returned that get enough votes (>threshold).

Edge Angle - Good values for current dataset

- Edge Localization

    Min edge angle: 80

    Max edge angle 100

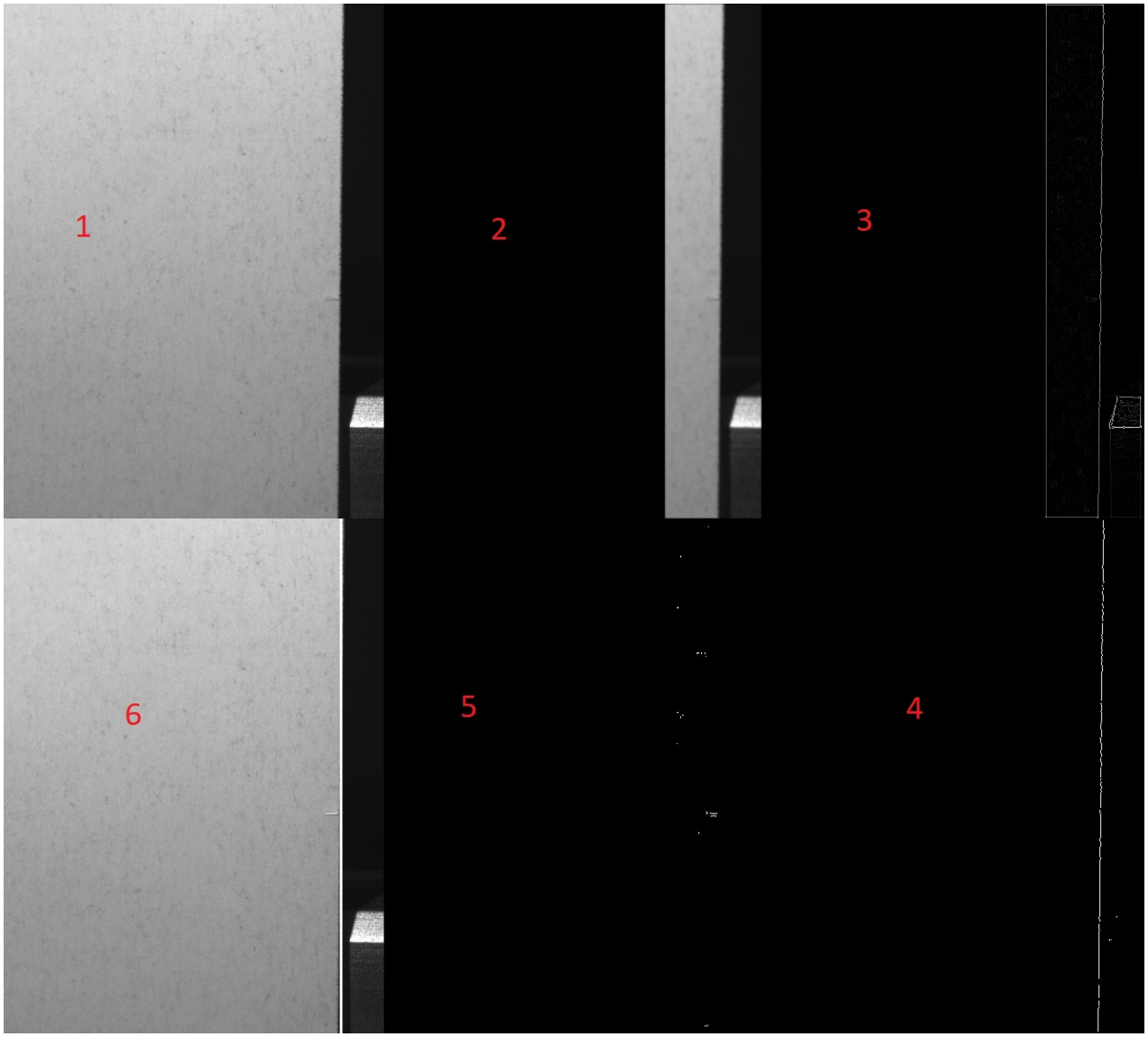
- Defect Detection

    Min edge angle: 0

    Max edge angle 45

Using Debug Mode

Note: The disk can get full very quickly if debug mode is enabled



- 1 - Source Image
- 2 - Image after applying Gaussian Blur

  Change Gaussian Kernel Size to control the smoothing and reduce noise
- 3 - Intermediate image in Canny Edge Detection - after Non-max Suppression

  This image is used for both edge localization and defect detection
- 4 - Image after hysteresis thresholding

  Change Min edge threshold and Max edge threshold and make sure the edge is clearly visible

  This image is used for for edge localization using Hough Line Transform

  For the edge defect detection the search happens from the edge and within the Edge defect search width
- 5 - Image after hysteresis thresholding

  Change Min edge threshold and Max edge threshold and make sure the defect is fairly visible

  This image is used for for defect detection using Hough Line Transform

- 6 - Output Image with line overlays

    Change Min Line Length, Max Gap and Line Threshold to control Hough Line Transform

Debug scale factor

If Debug is enabled, disk can get pretty full. Change to 0.5 to decrease debug image resolution.

- Debug scale factor = 1
    - width = src_width*3
    - height = src_height*2
- Debug scale factor = 0.5
    - width = src_width*3*0.5
    - height = src_height*2*0.5

Ouput folders

- Data Directory

    Make sure the folders are given read/write permission

    Note: Stop the Pipeline before changing the Data Directory for changes to reflect.

    Configurable directory - use SD Card directory if available
- Defects Folder - Directory where defects are stored
- Debug Folder - Directory where debug images are saved

FileMonitor

- Trigger cleanup if available memory < _____% of total memory
- Delete till ____% of total memory is avialble during cleanup

    Assume
    - Total Memory = 30 GB
    - Trigger cleanup if available memory < 10% of total memory
    - Delete till 20% of total memory is avialble during cleanup
    - Initial Available Memory = 24 GB
    - After 5 hours Available Memory = 2.9 GB (< 10%)
    - Cleanup is triggered and ~3.1 GB of data is deleted.
    - Now Total Available Memory = ~6 GB (2.9+3.1) (20%)
- File watch counter

    Application tracks file writes and checks for disk usage after the above number of writes

- File watch auto interval

  Application checks for disk usage periodically based on the interval mentioned above