

# ML ASSISTED DESPECKLING OF SAR IMAGES

1st December, 2022

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# OBJECTIVES

- Apply a random amount of speckle noise to a set of SAR images.
- Filter these images using the Lee filter and compute the HSV values of the noisy images.
- Use the acquired data to train a decision tree regressor model, to predict optimum kernel size.
- Use the obtained kernel value to filter test SAR images and observe image characteristics.

# SAR IMAGES AND SPECKLING

SAR images are produced by processing received EM waves (usually Radio) from the reflecting surfaces.

The resulting image is built up from the strength and time delay of the received signal.

Speckle noise is caused by the interaction of the out of phase waves reflected from the target.

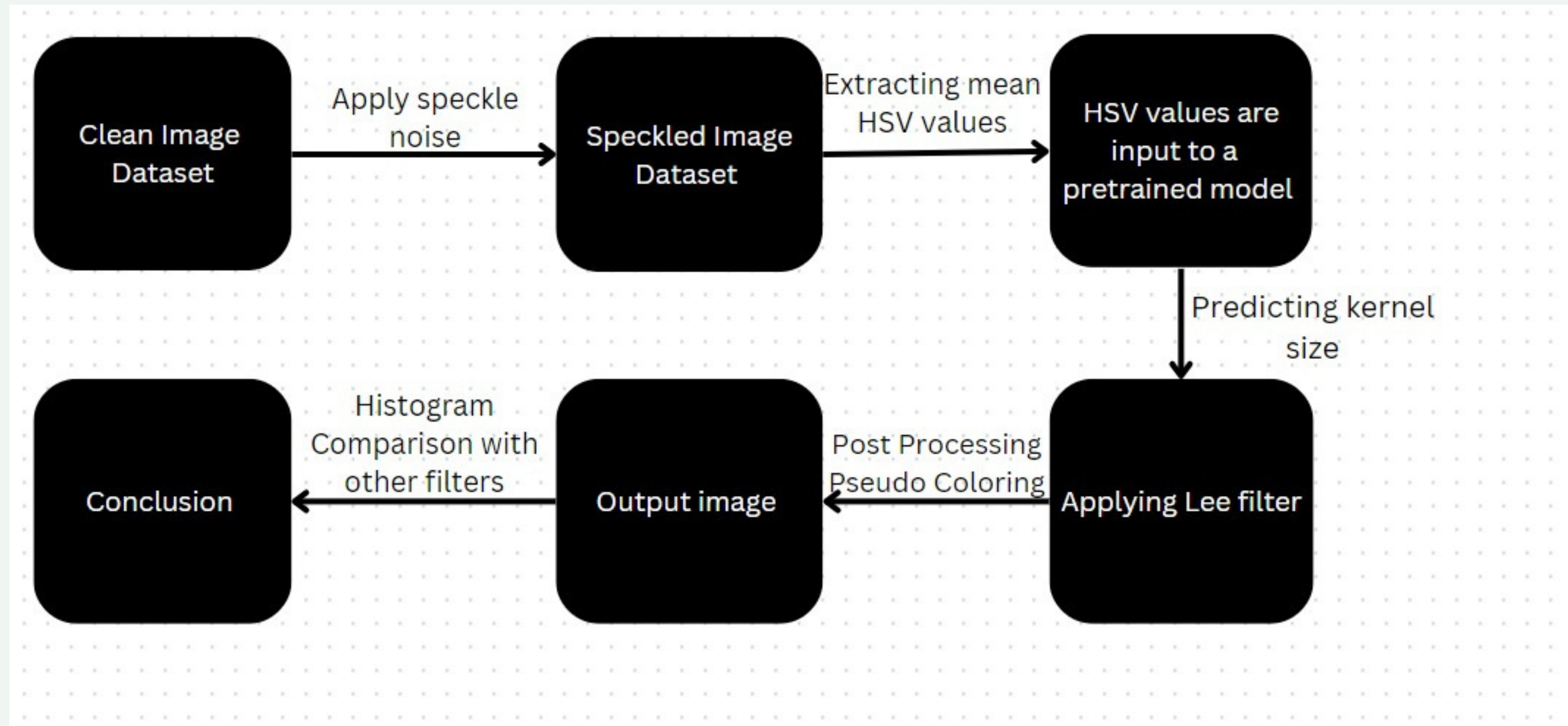
# THE WHY

Kernel size picked for filtering is usually directly proportional to the noise density in an image [1].

This means that larger kernel sizes would work better while filtering very noisy images.

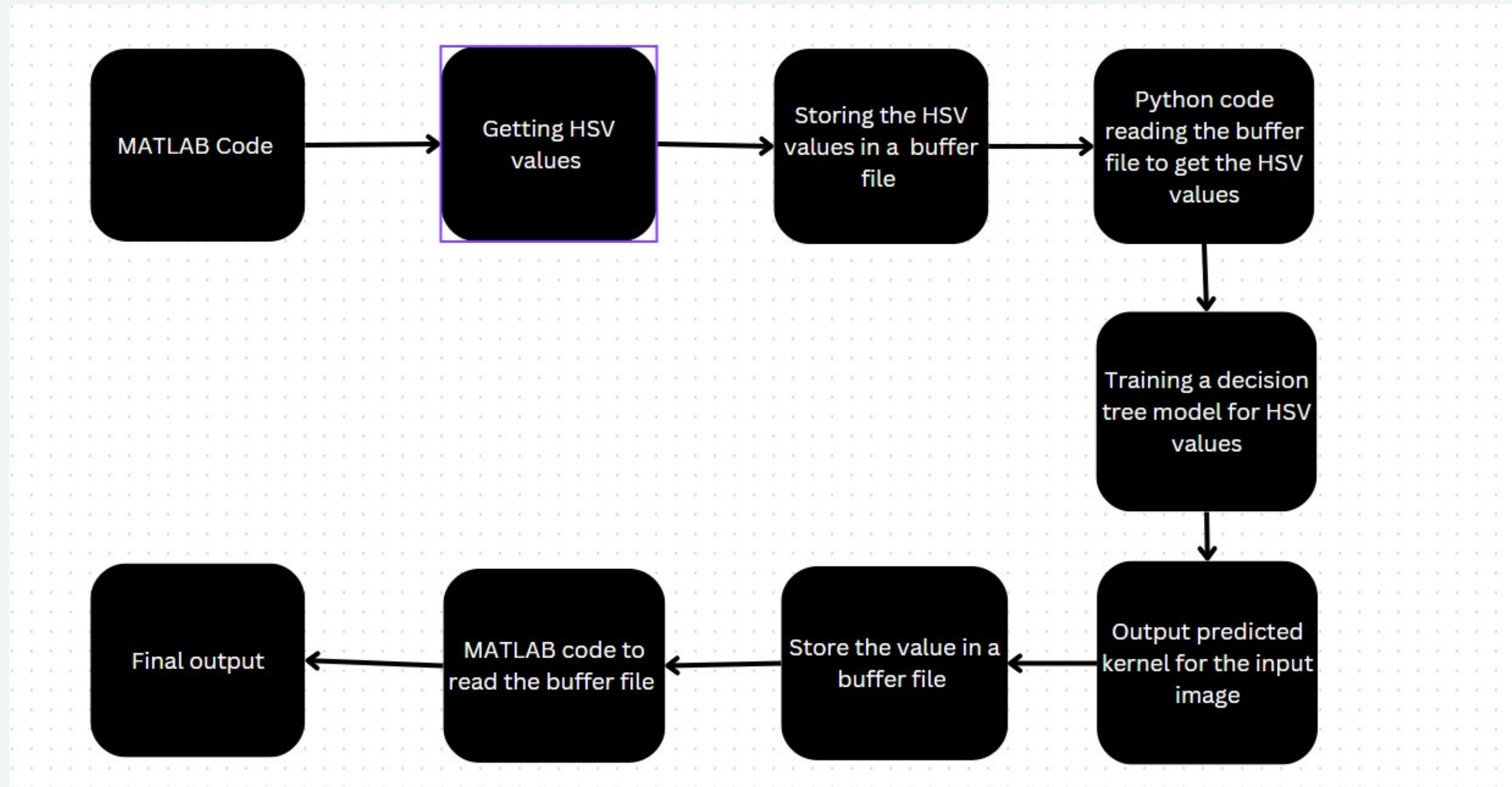
Since noise in an image cannot be quantified without indirect methods, we analyzed the HSV values in an image to find out the optimum kernel size.

# WORKFLOW





# MATLAB AND PYTHON



# RESULTS

**No speckle**



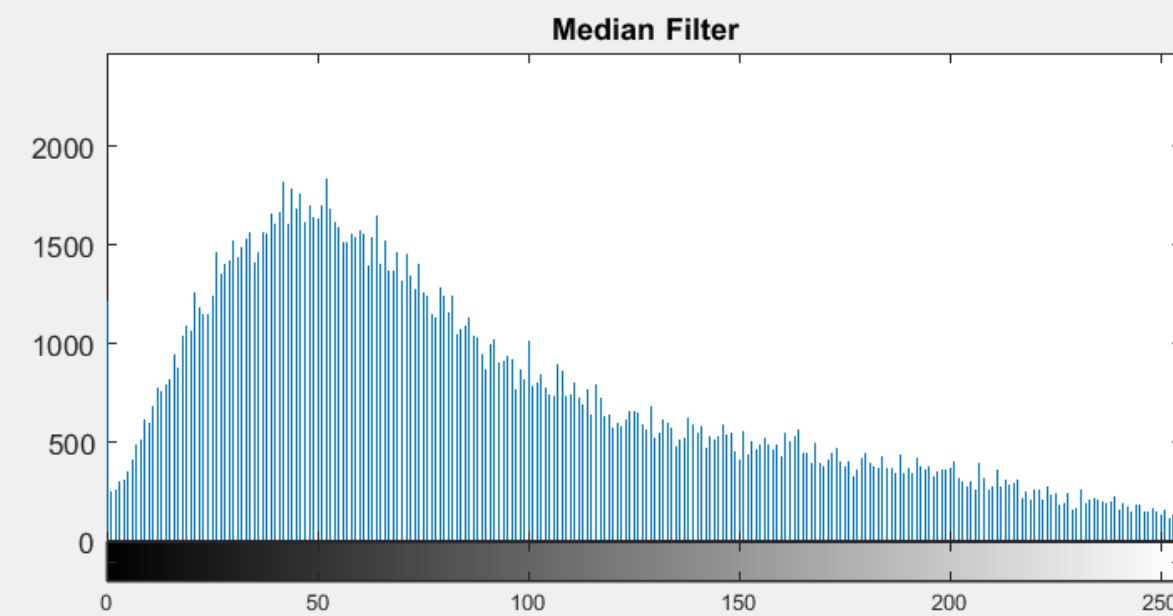
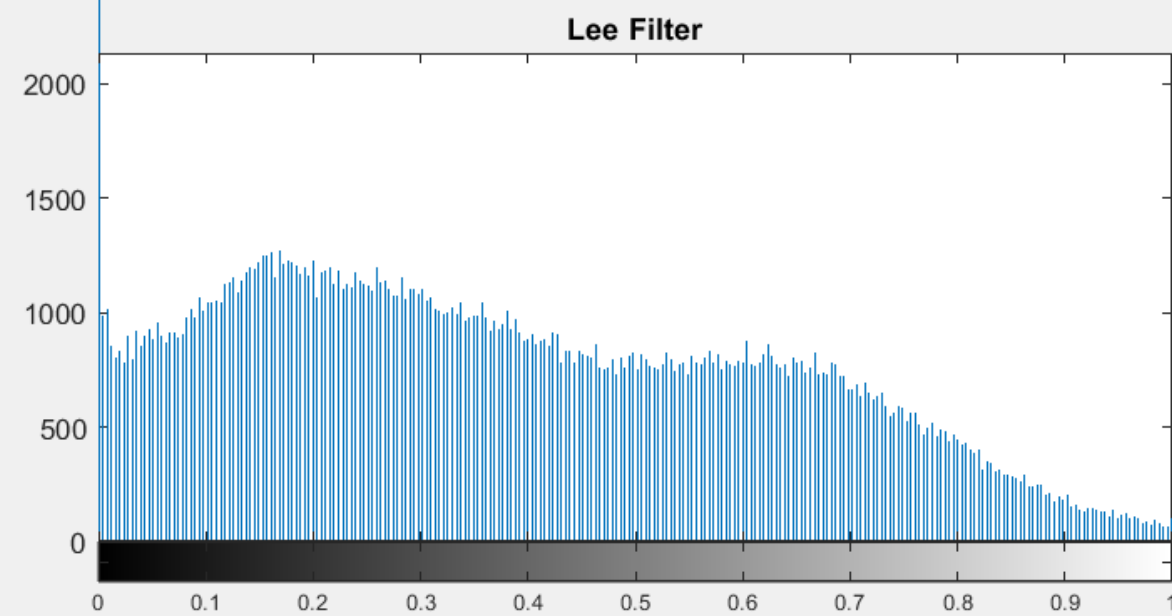
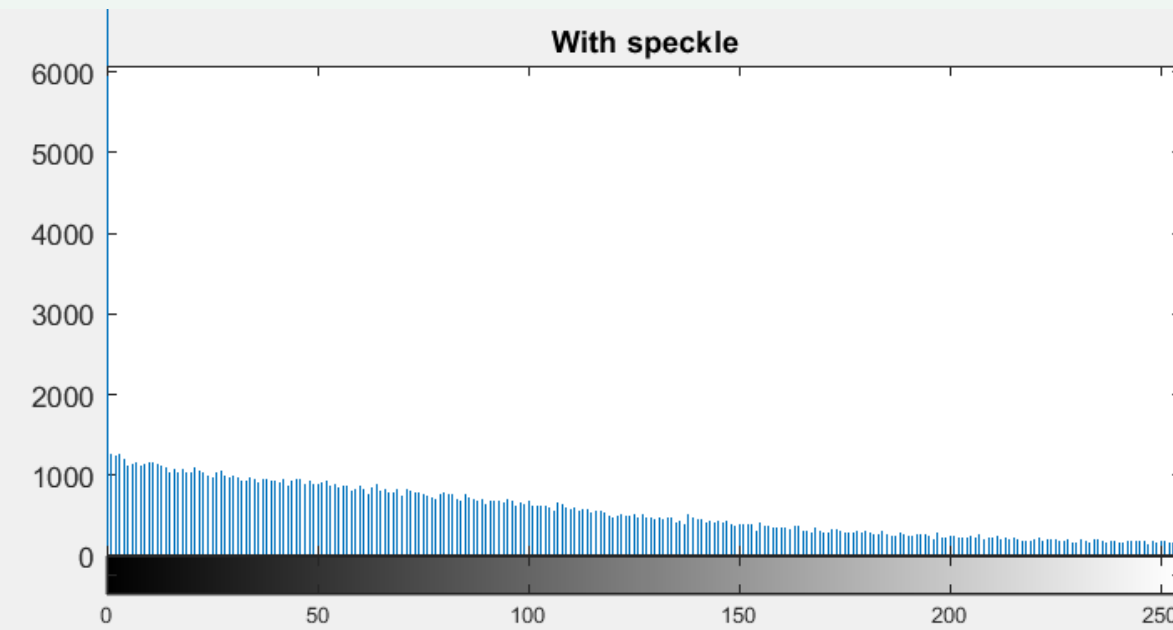
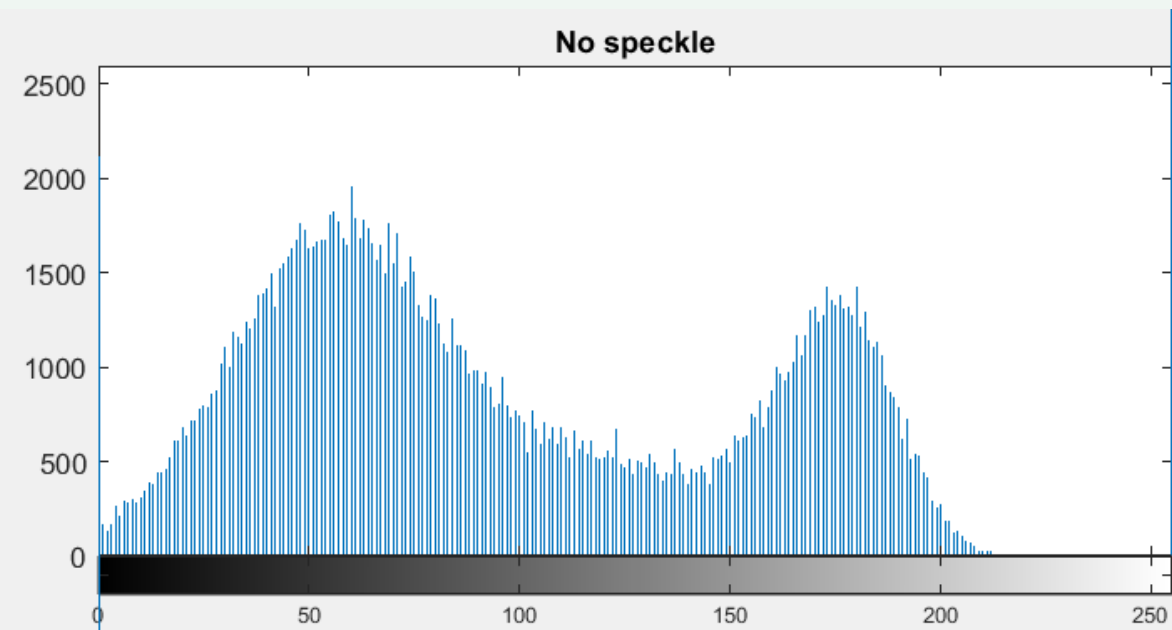
**With speckle**



**Lee Filter**



# HISTOGRAM COMPARISON





# REFERENCES AND DATA

[1]

[https://www.researchgate.net/publication/332625554\\_Effect\\_of\\_kernel\\_size\\_on\\_Wiener\\_and\\_Gaussian\\_image\\_filtering](https://www.researchgate.net/publication/332625554_Effect_of_kernel_size_on_Wiener_and_Gaussian_image_filtering)

## SAR DATA

<https://www.kaggle.com/code/samvram/flood-detection-sar/data>

## SAR IMAGING

[https://crisp.nus.edu.sg/~research/tutorial/sar\\_int.htm](https://crisp.nus.edu.sg/~research/tutorial/sar_int.htm)

# THANK YOU



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