# Ship Detection with SAR: Shanghai

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# Problem Statement

Objective:

- Create a binary mask of ships from SAR image

Challenges:

- Delineation of Coast & Buildings with Similar Attributes
- SAR Speckle
- SAR Error in Ocean Image

# Selection of Methods

Thresholding & Morphology

- Denoise to reduce the effect of speckle
- Otsu thresholding to determine the optimal cutoff for water/non water classes
- Removal of large regions to separate ships from land
- Removal of regions with a high perimeter/area ratio to eliminate long thin non ship objects (bridge segments)
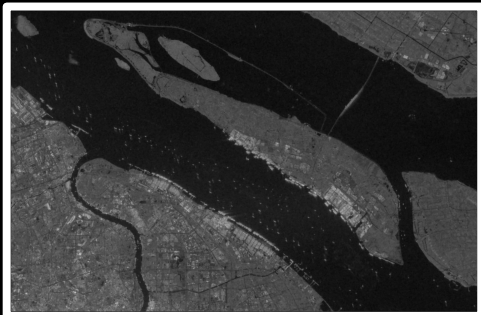
K-Means Clustering:

- Denoise to reduce speckle
- Select optimal k-means cluster count to separate noise
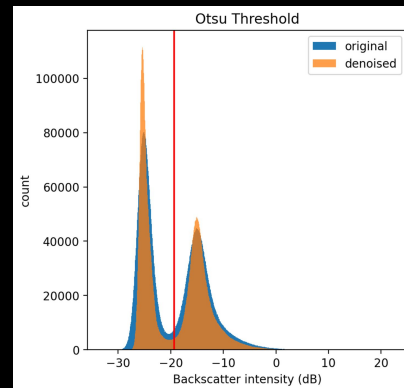- Create binary mask from feature class
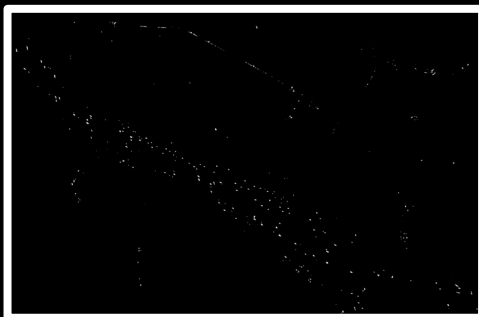
# Methodology (River Image)
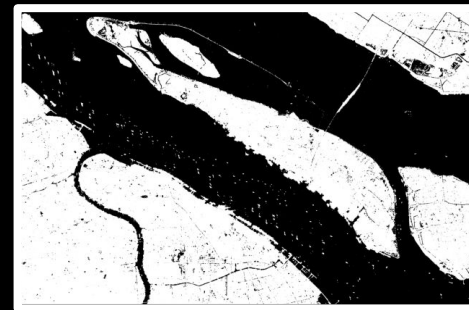


Original Image
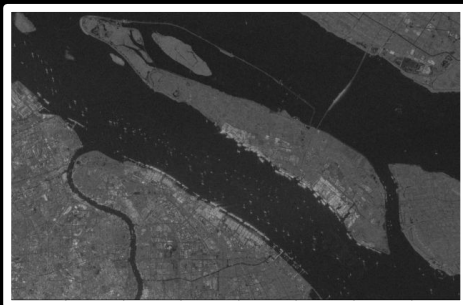
Denoising

Threshold
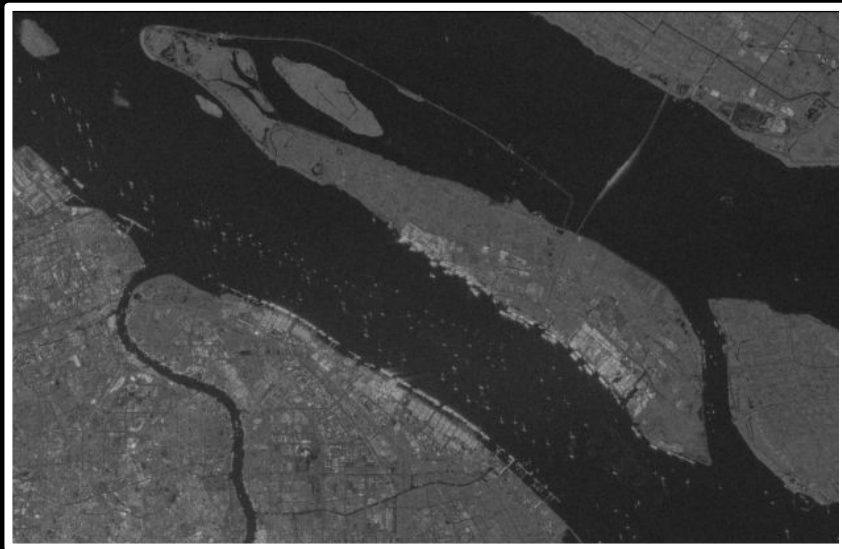
Apply threshold

Remove large regions

Area-Perimeter Ratio Filtering

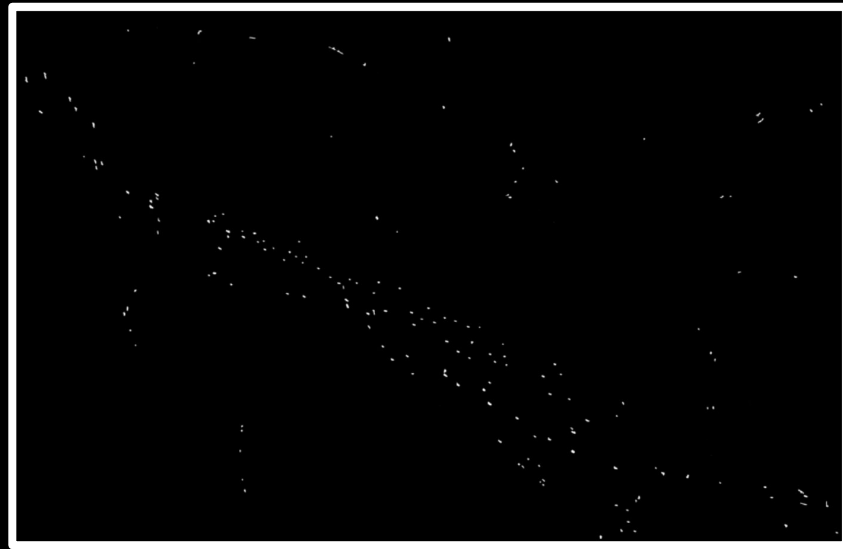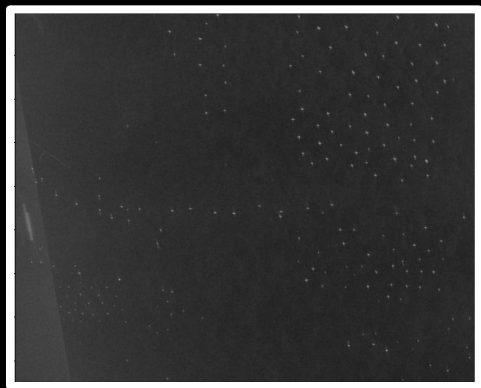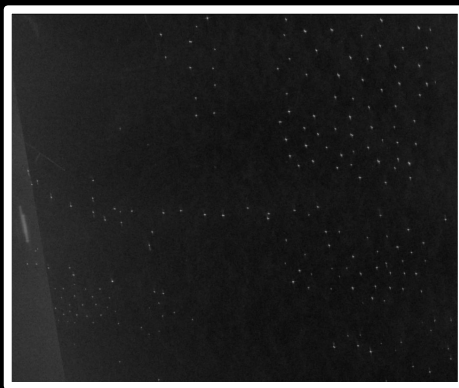# Results (River Image)

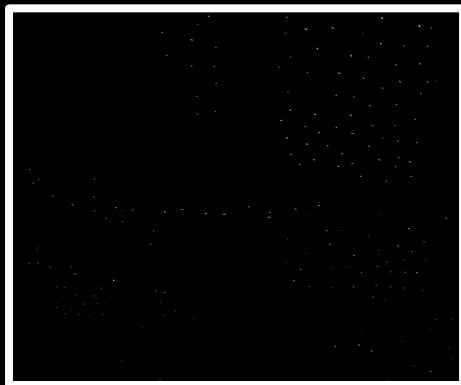Original Image



Resulting Ship Mask
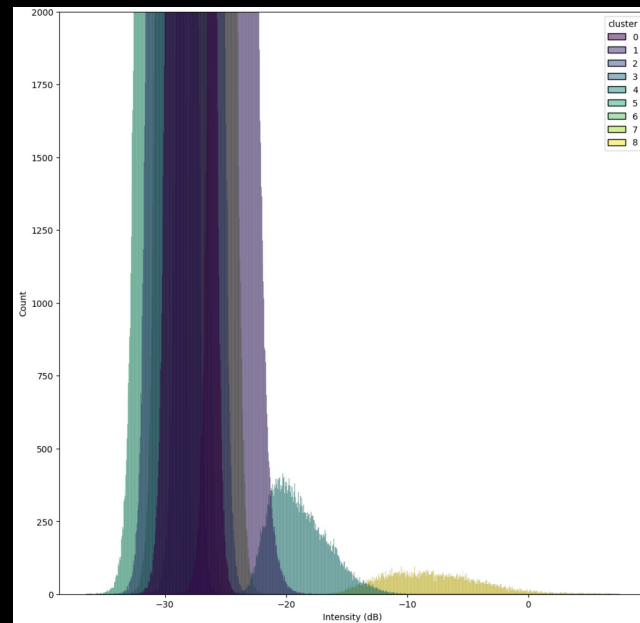
# Methodology (Ocean Image)

Denoise

K-means clustering
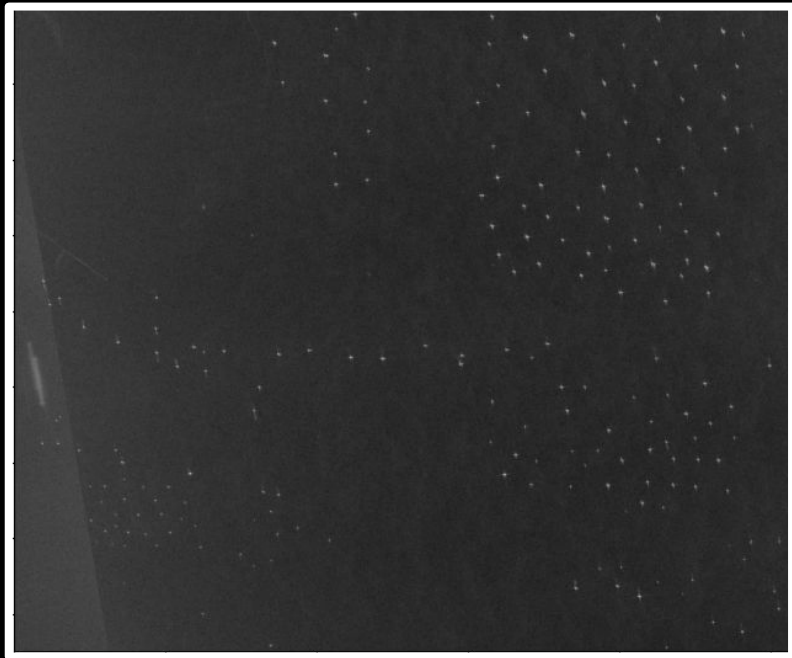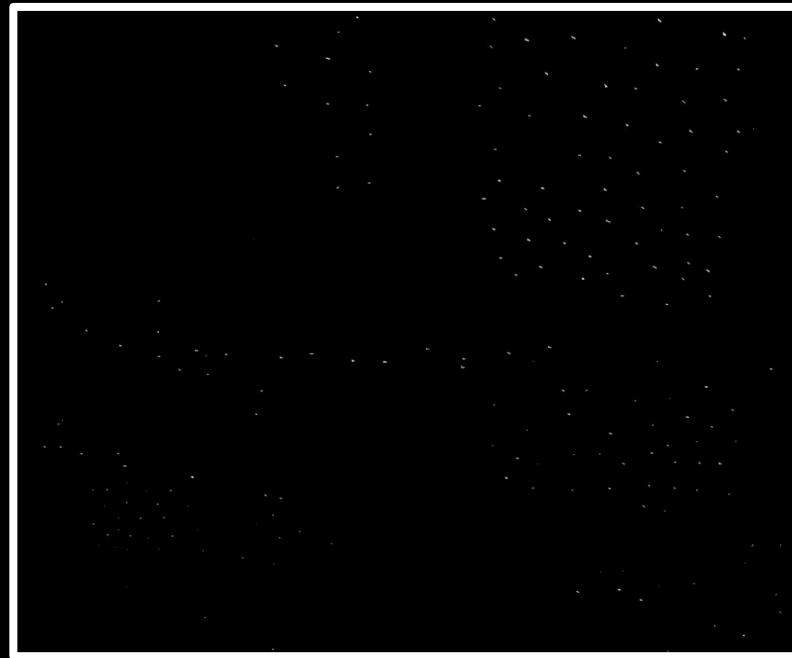
Adjust until noise is separated

Select signal cluster

# Results (Ocean Image)

Original Image



Resulting Ship Mask

# Discussion

- Summary of ships & average vessel size

|  | River | Ocean |
|---|---|---|
| Number of Vessels | 184 | 207 |
| Average Size | 8709m² | 8199m² |

- Accuracy of final masks
- Merits/drawbacks of each method
- Lessons learned

# Question & Answer