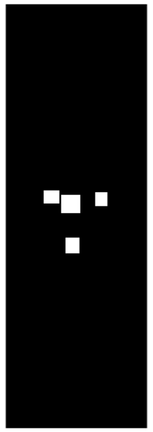
1) Using Correct Mask for training (earlier, in prev exercise, I chose only 2 regions)

Training:

Validation Image (template 4)

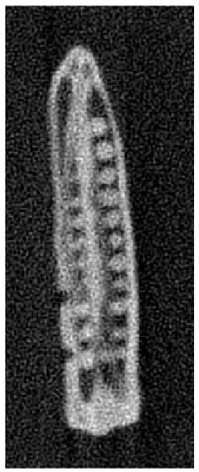


Mask Used for training

Residual for template 4

Parameters used for training SVM:
C = 2
gamma = 0.5
patchsize = 10x10

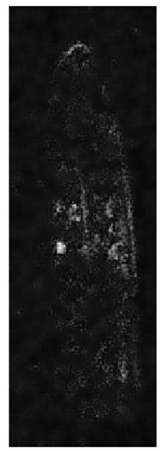
Tesing:



Pilot reconstruction of Test Image (template 3)

Its projection on eigenspace of templates (5,6,7)

Residual image

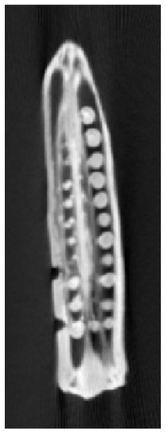


Weiner filter applied to residual image

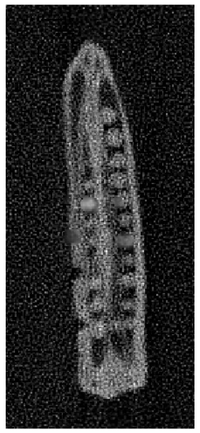
Detected inlier by svm

Imclose() with radius=1

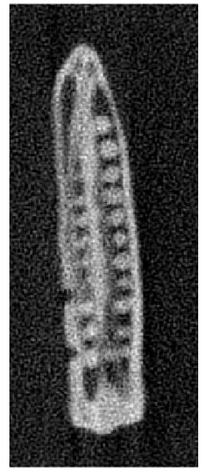
W*pilot + (1-W)*projection



Ground truth of test image (template 3)

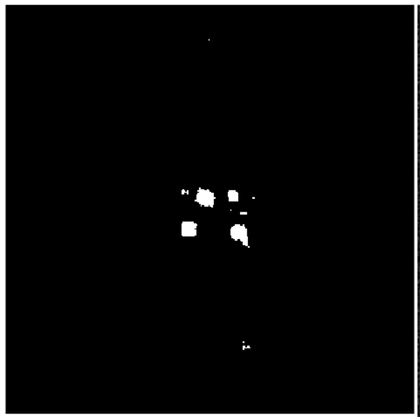


Using weighted prior reconstrucion

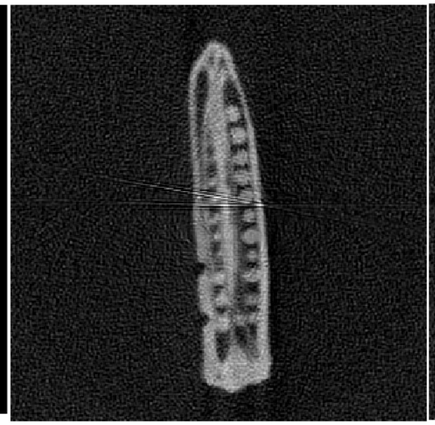


Pilot reconstruction of Test Image (template 3)

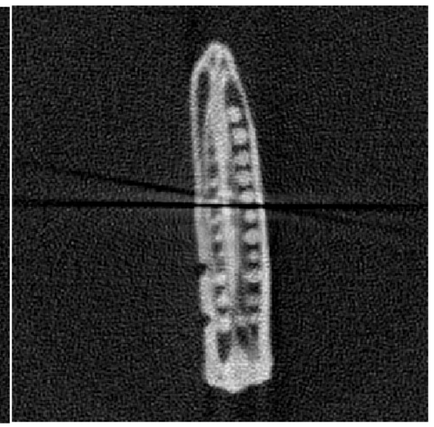
2) Re-Irradiation:



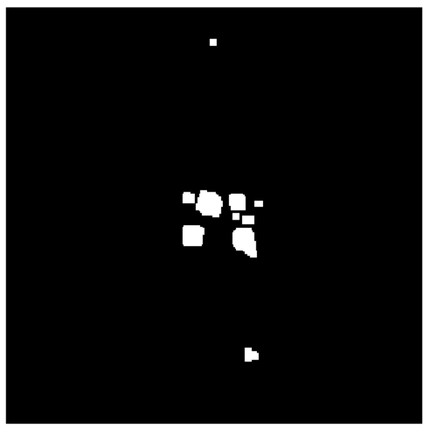
Reirradiation weights



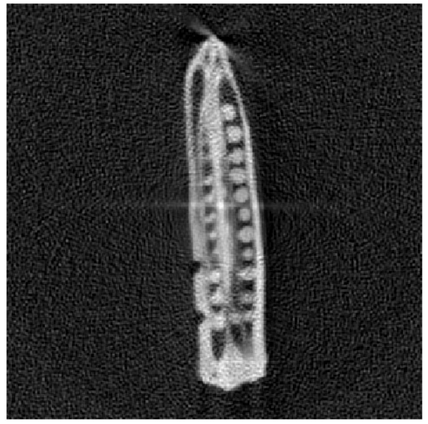
Reconstruction with
Irradiation, with lambda=1



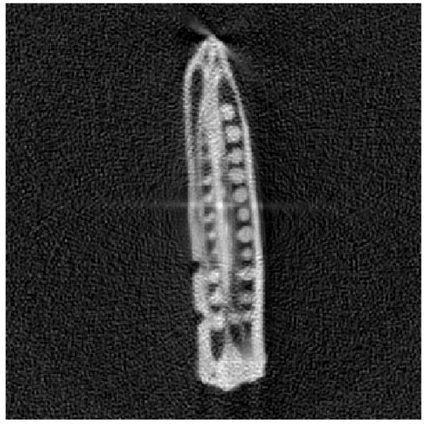
Reconstruction with
Irradiation, with lambda=0.9



Reirradiation weights
(dilated weights)

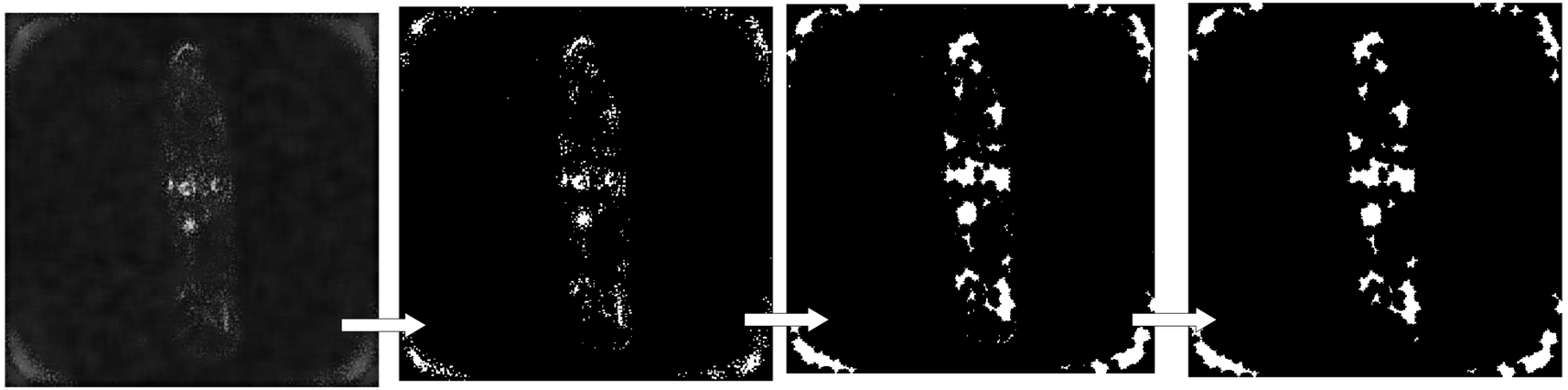


Reconstruction with
Irradiation, with lambda=1



Reconstruction with
Irradiation, with lambda=0.9

1. Auto-detection of mask (Training)

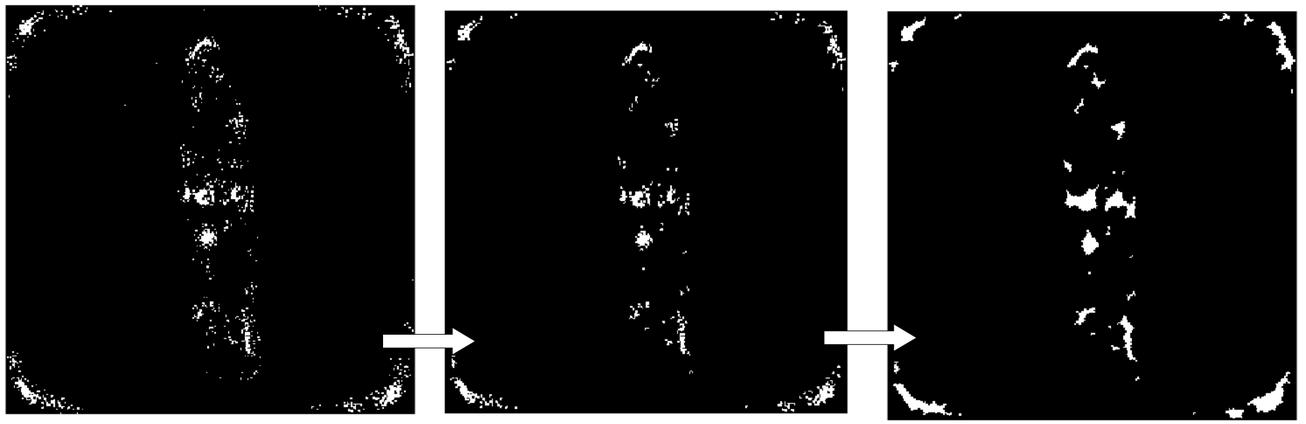


Weiner filtered residual of template 4

Adaptive thresholding in imbinarize()

Imclose() = imdialate+imerode With rad =3

Remove clusters of size<5
(I trained SVM with this)



Adaptive thresholding in imbinarize()

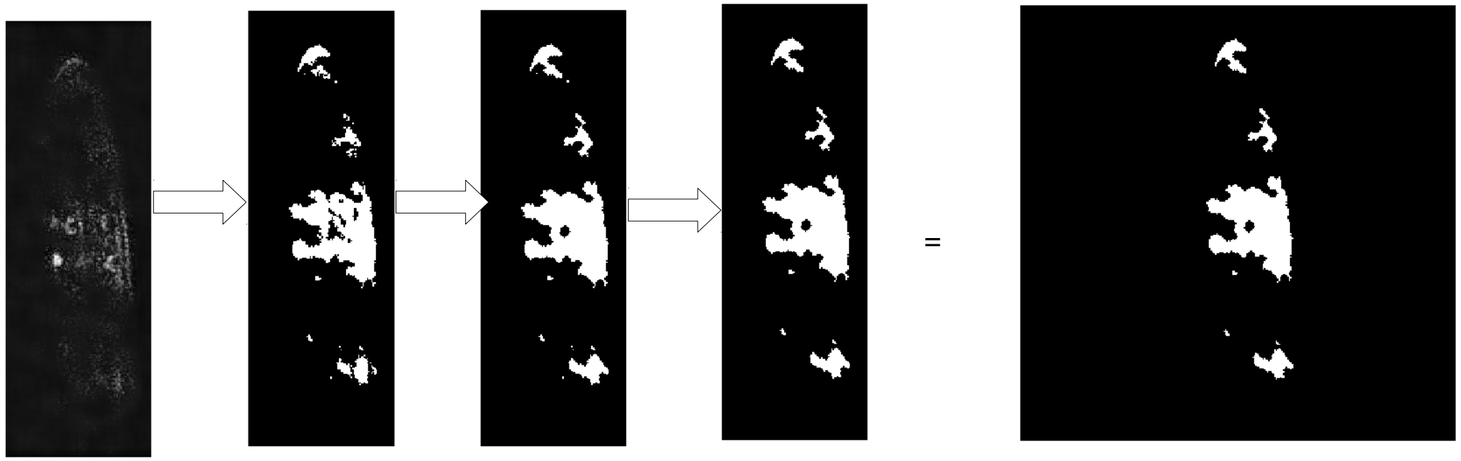
Remove clusters of size<3

Imclose with rad=5

SVM parameter tuning with CrossValidation:

best c=0.1, g=1, rate=91.7488
best c=0.1, g=10, rate=91.7488
best c=0.1, g=100, rate=92.0622)
best c=1, g=10, rate=92.0773)
best c=1, g=100, rate=93.8031)
best c=10, g=100, rate=94.6037)
best c=5, g=50, rate=94.1354)
best c=30, g=50, rate=94.7434)
best c=30, g=100, rate=94.8756)
best c=30, g=100, rate=94.8756)
best c=50, g=100, rate=94.9662)
best c=100, g=100, rate=95.0002)
best c=1000, g=0.1, rate=93.7993)
best c=1000, g=1, rate=94.5999)
best c=1000, g=10, rate=95.0002)
best c=1000, g=100, rate=95.2117)
c=10000, g=10, rate=95.1324 (used this)

Results on Test Image:



Input to SVM (Residual image of test)

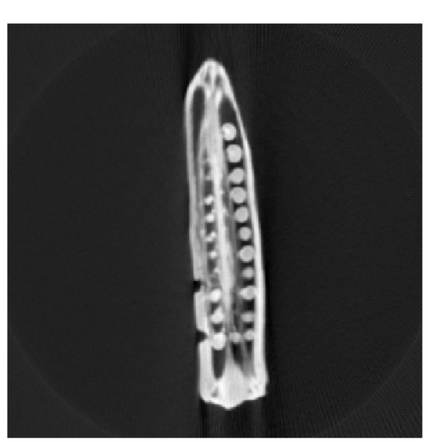
Outputt of SVM

Imclose() with rad=2

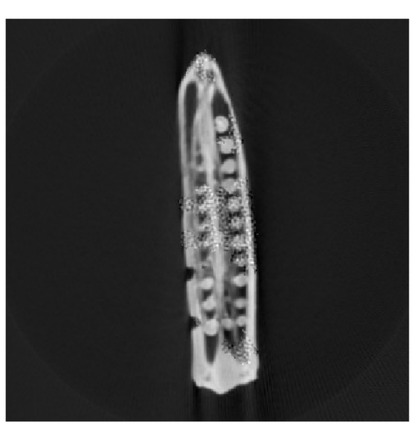
Removing clusters of size<5 pixels

=

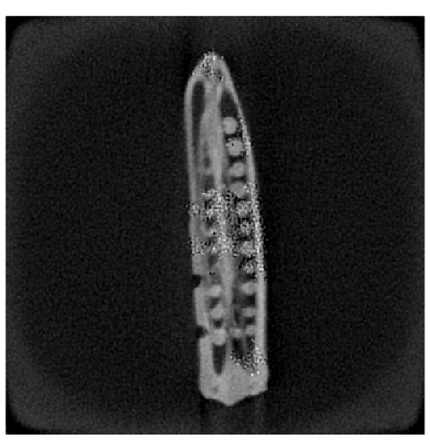
Weights used for following reconstruction



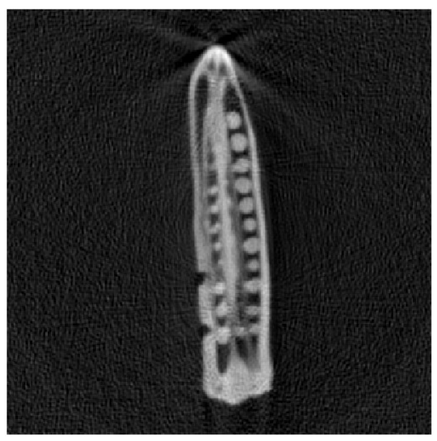
Ground truth
Test Image
(template no 3)



W*pilot + (1-W)*prior



Using compl(W) in rescaled NLLCS construction
Lambda2 = 1200

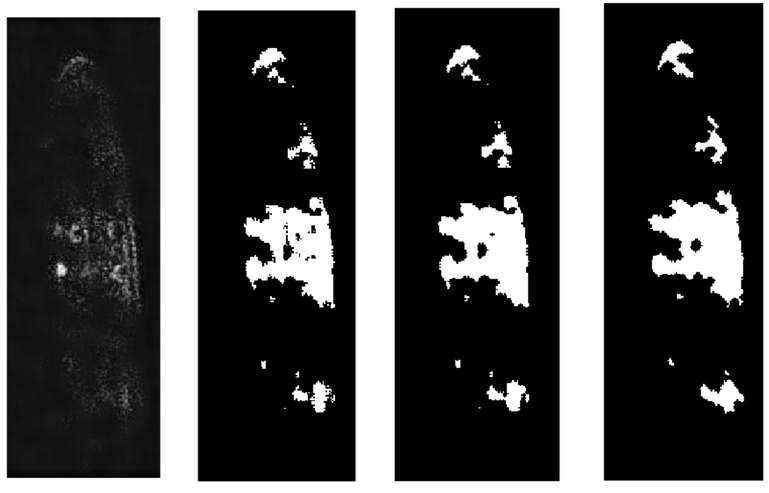


Using irradiation in weights region
I0 = 5000
For pilot, I0=2000

Results using CNN

Architecture Used:

Input: (10x10 Image)
ConvLayer: filter: [3x3], numFilters=5
(output: 5 feature maps of size 10x10)
batchNormalizationLayer
reluLayer
MaxPool: filter: [2x2], stride=2
(output: 5 maps of size 5x5)
ConvLayer: filter: [3x3], numfilters =5
(output: 25 maps of 5x5)
batchNormalizationLayer
reluLayer
MaxPool: filter: [2x2], stride=2
(output: 25 maps of 3x3)
FullyConnectedLayer: 225 x 40
FullyConnectedLayer: 40 x 2
softmaxLayer
classificationLayer;



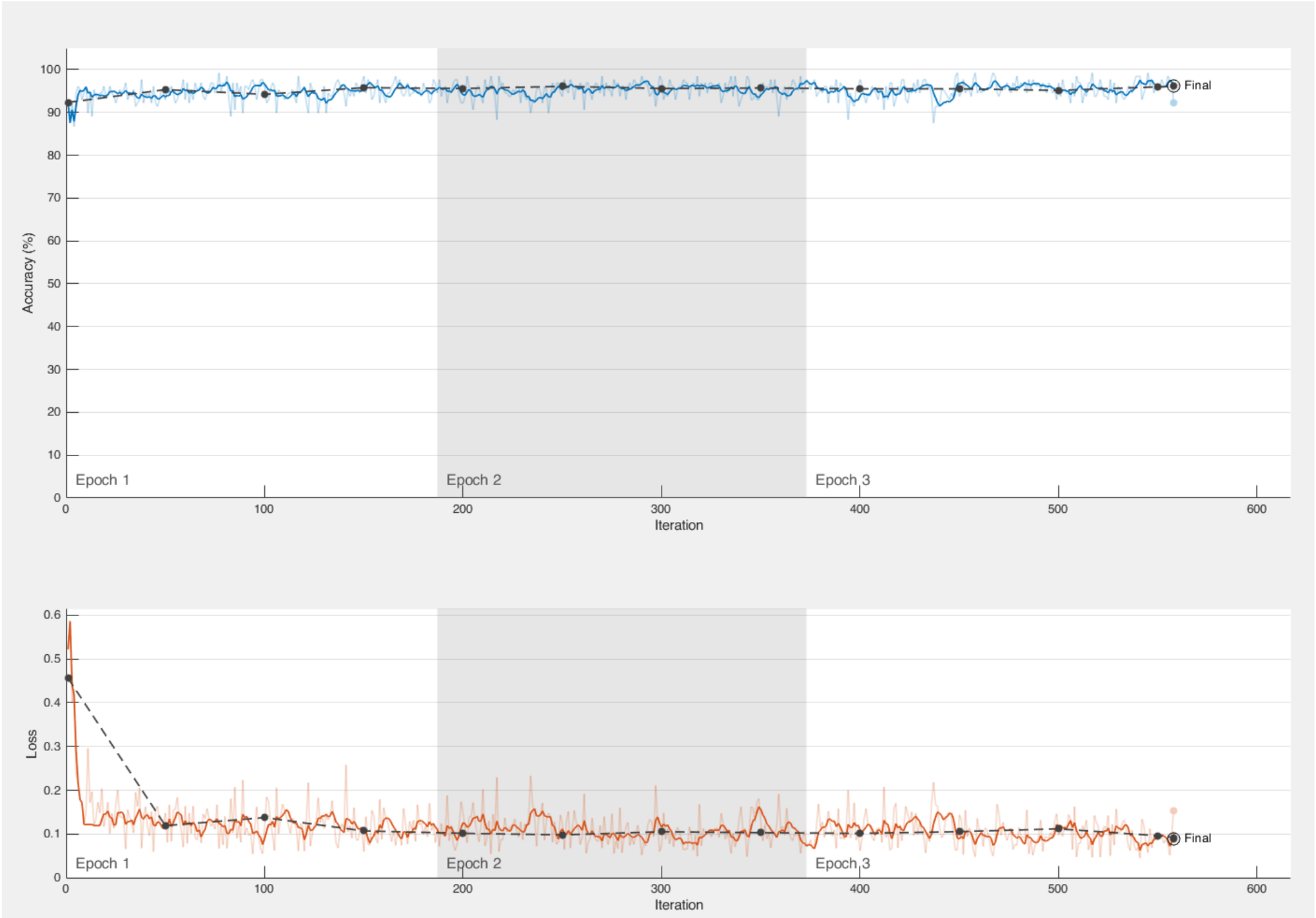
Residual test image (template 3)

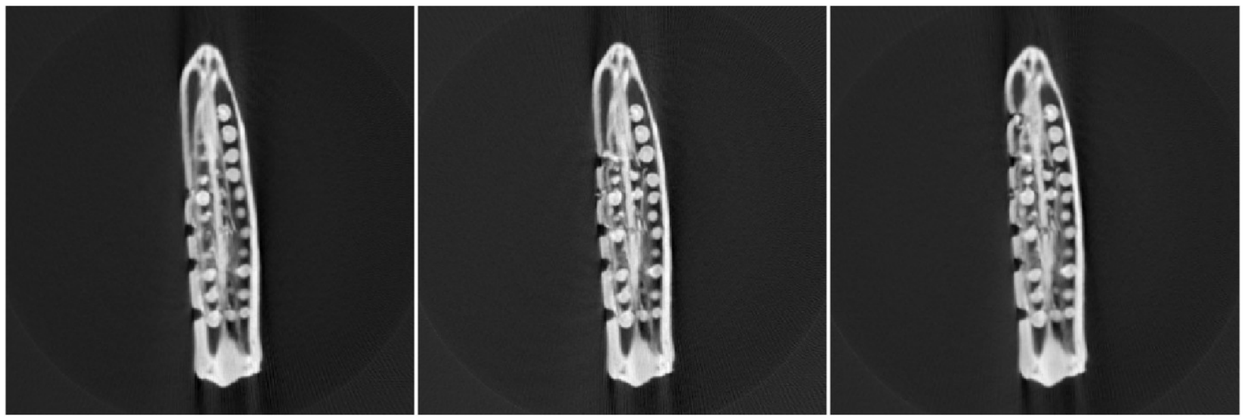
Detected Inlier by CNN

Imclose (on left result) with rad=1

Above SVM Result (for comparison)

Training-Validation Ratio: 90:10
Epochs: 3
Validation accuracy: 96.26%


100
90
80
70
60
50
40
30
20
10
0
Accuracy (%)
Epoch 1
Epoch 2
Epoch 3
Final
0
100
200
300
400
500
600
Iteration
0.6
0.5
0.4
0.3
0.2
0.1
0
Loss
Epoch 1
Epoch 2
Epoch 3
Final
0
100
200
300
400
500
600
Iteration



Template 5

Template 6

Template 7

Used for eigenspace formation

Template 4 (Validation Image)

Template 3 (Test Image)