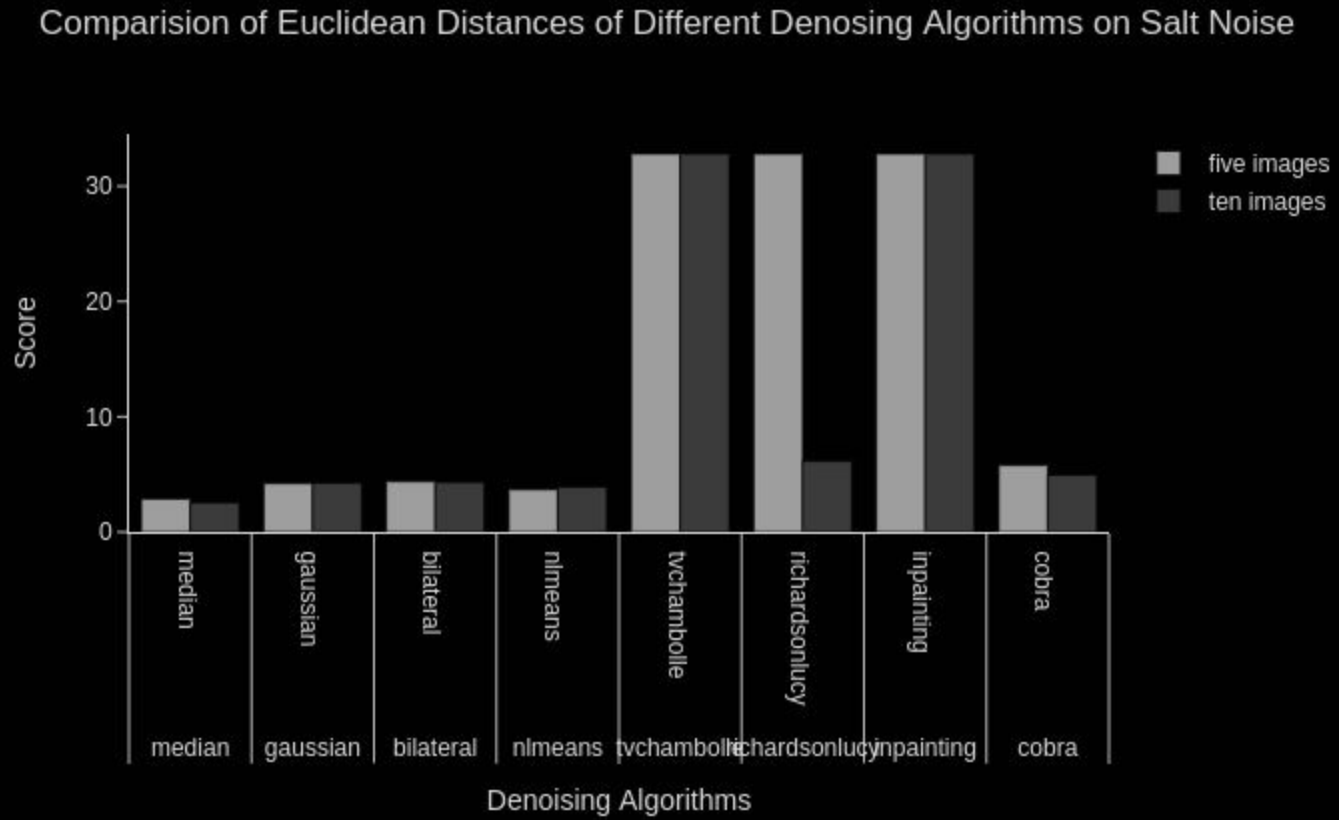
reVision

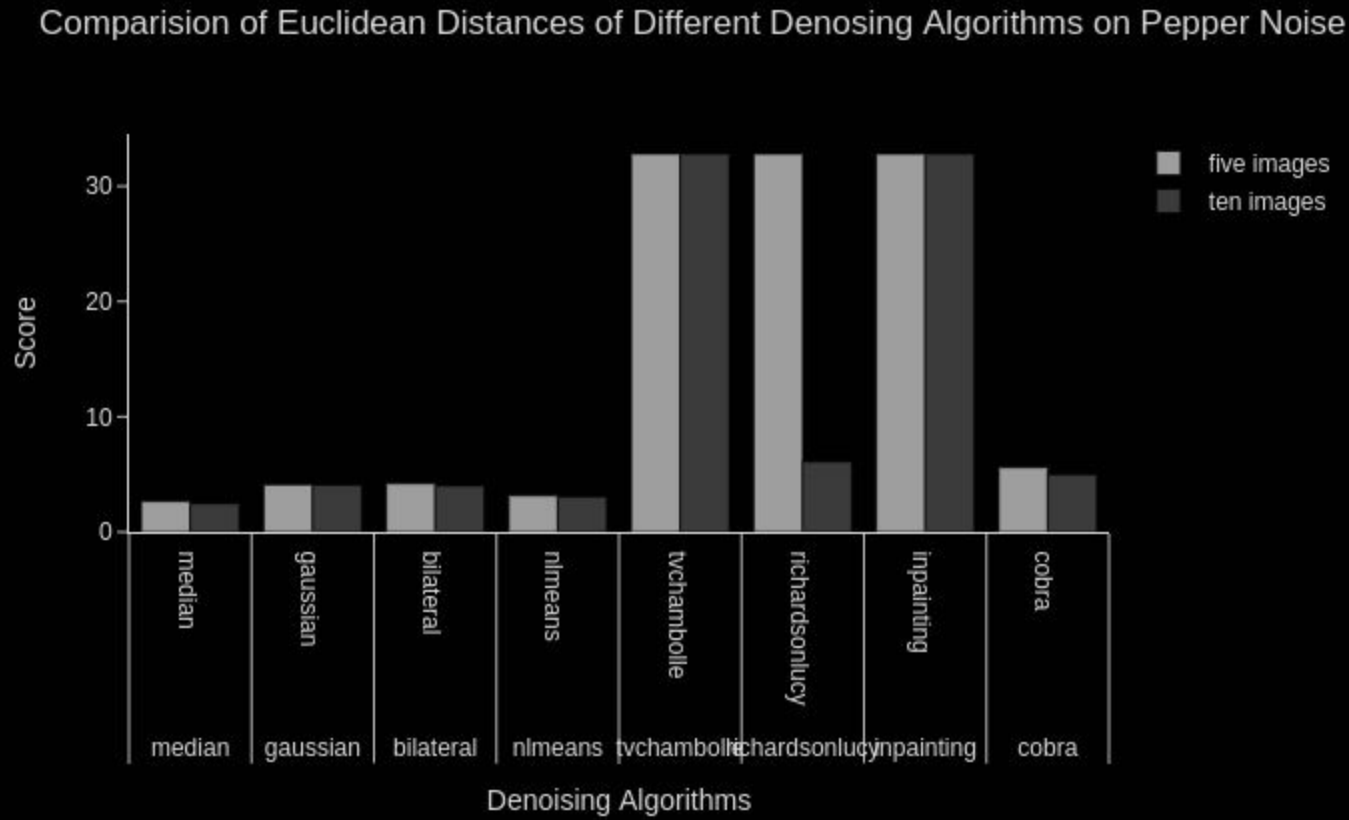
Digital Image Processing Monsoon 2020

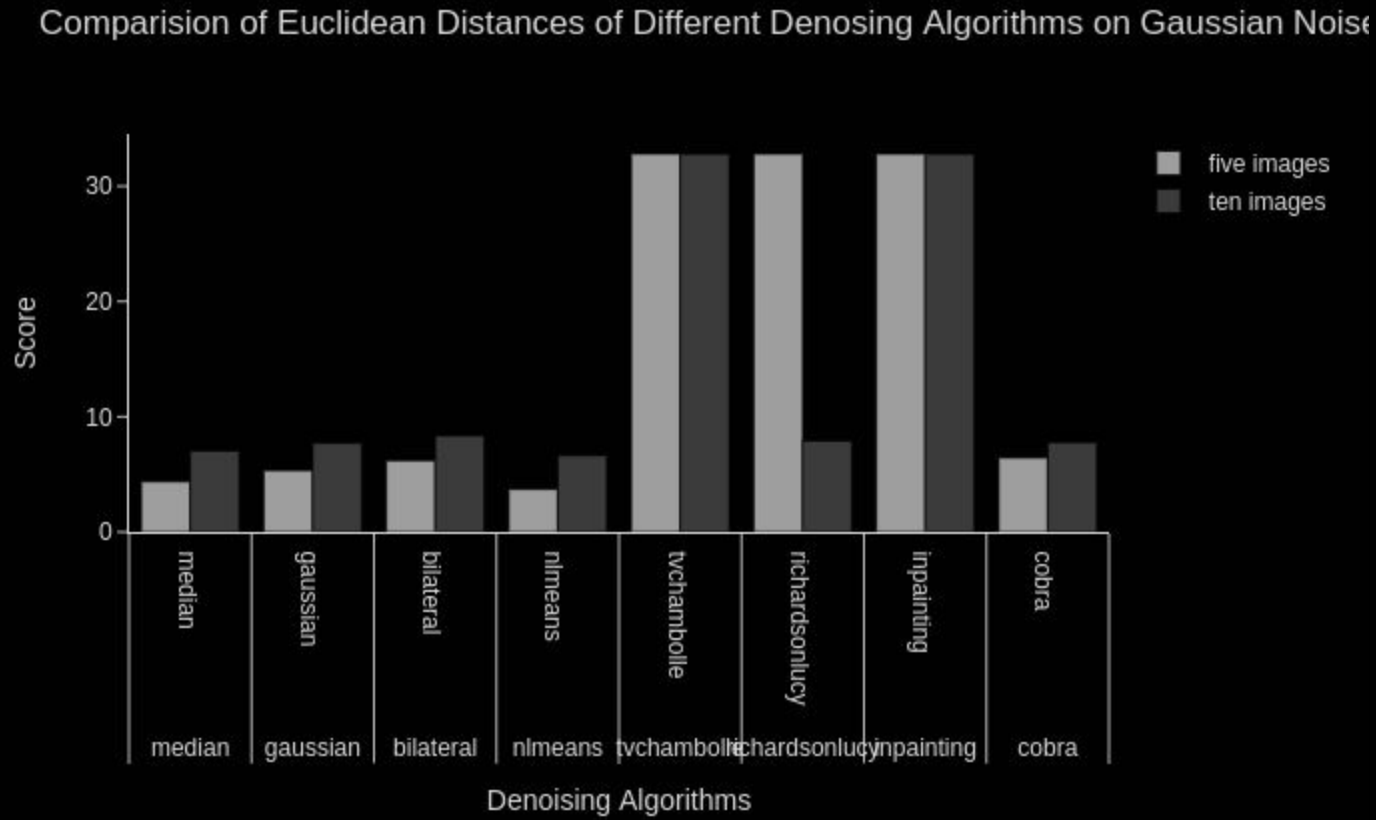
Results on the Test Image Dataset
After Training the COBRA Model

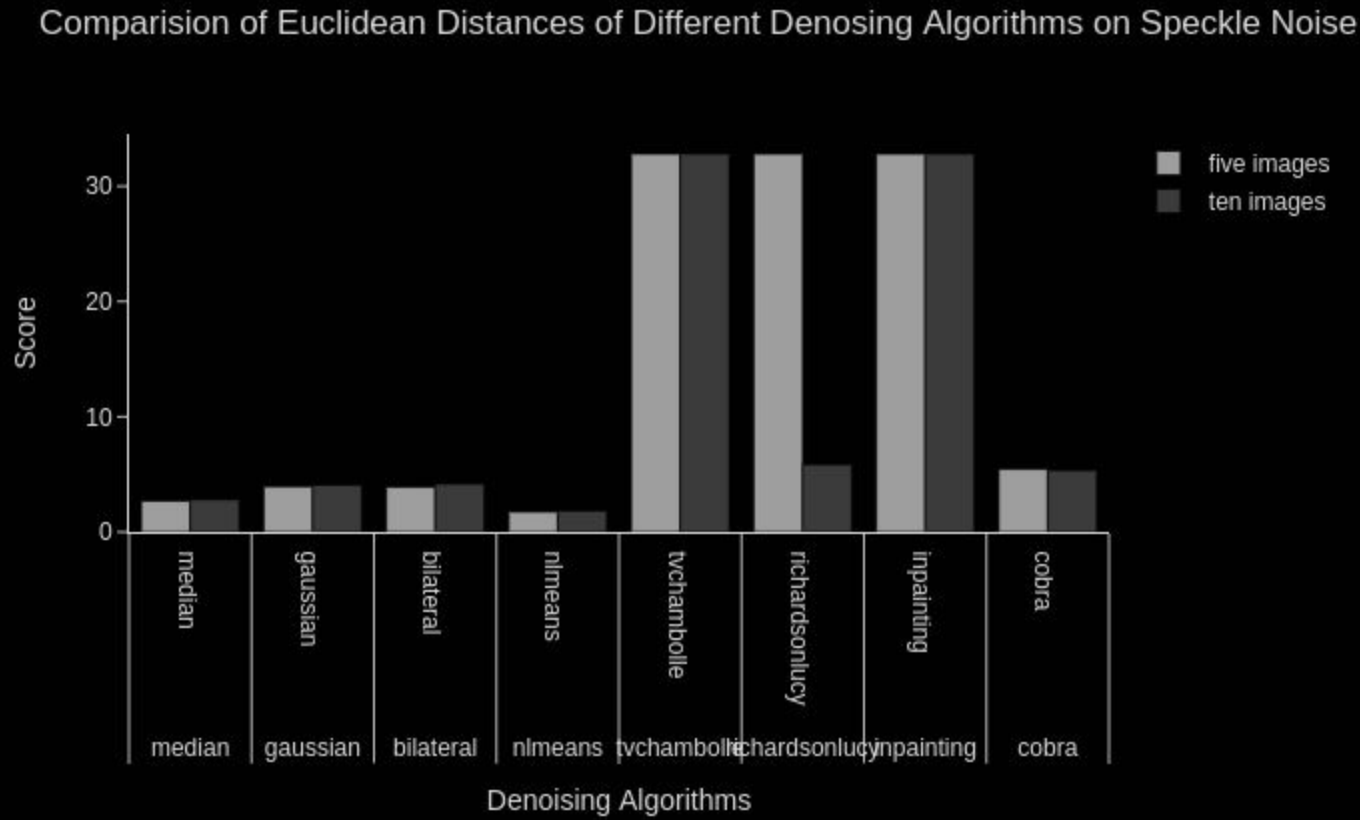
Euclidean Distance

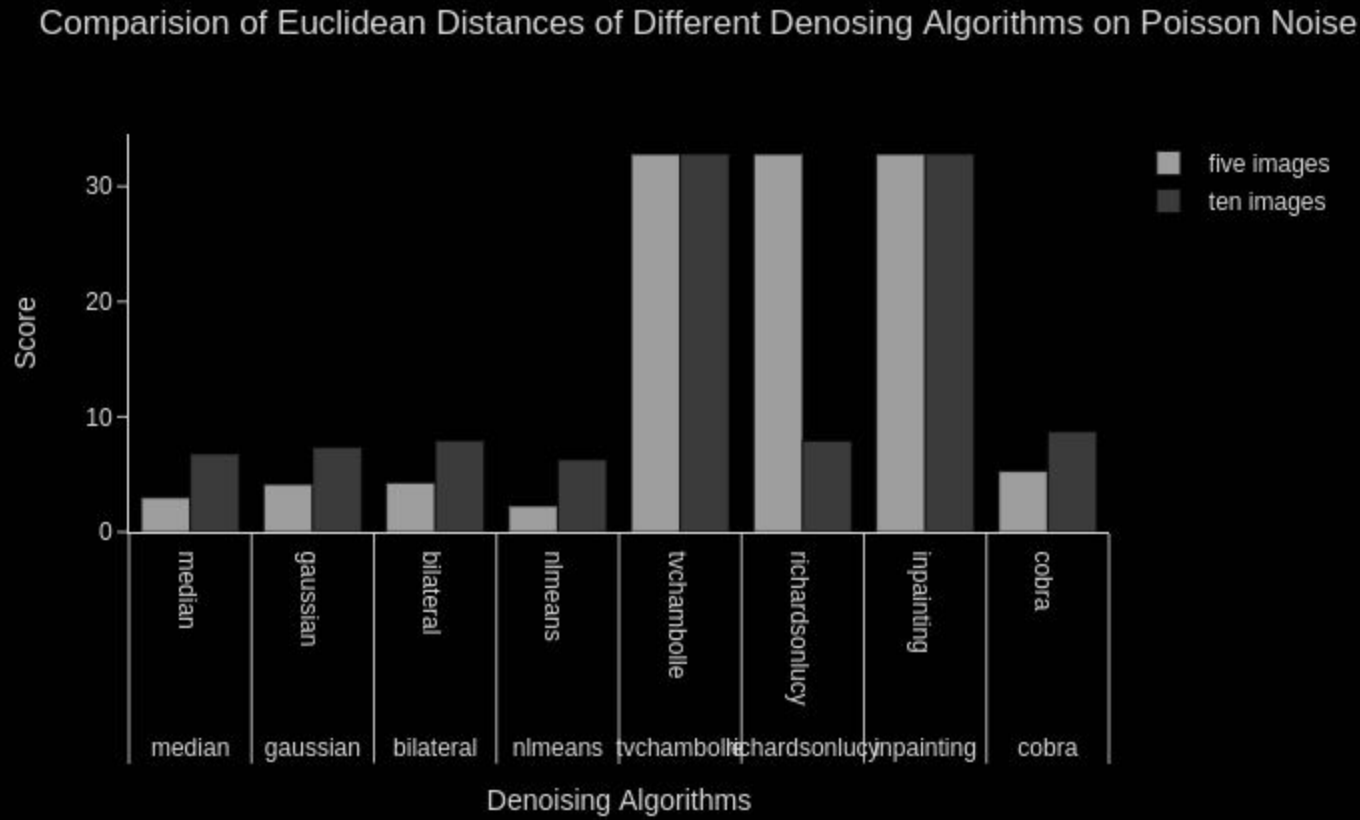
Five vs Ten Image Training Dataset, and Patch = 1

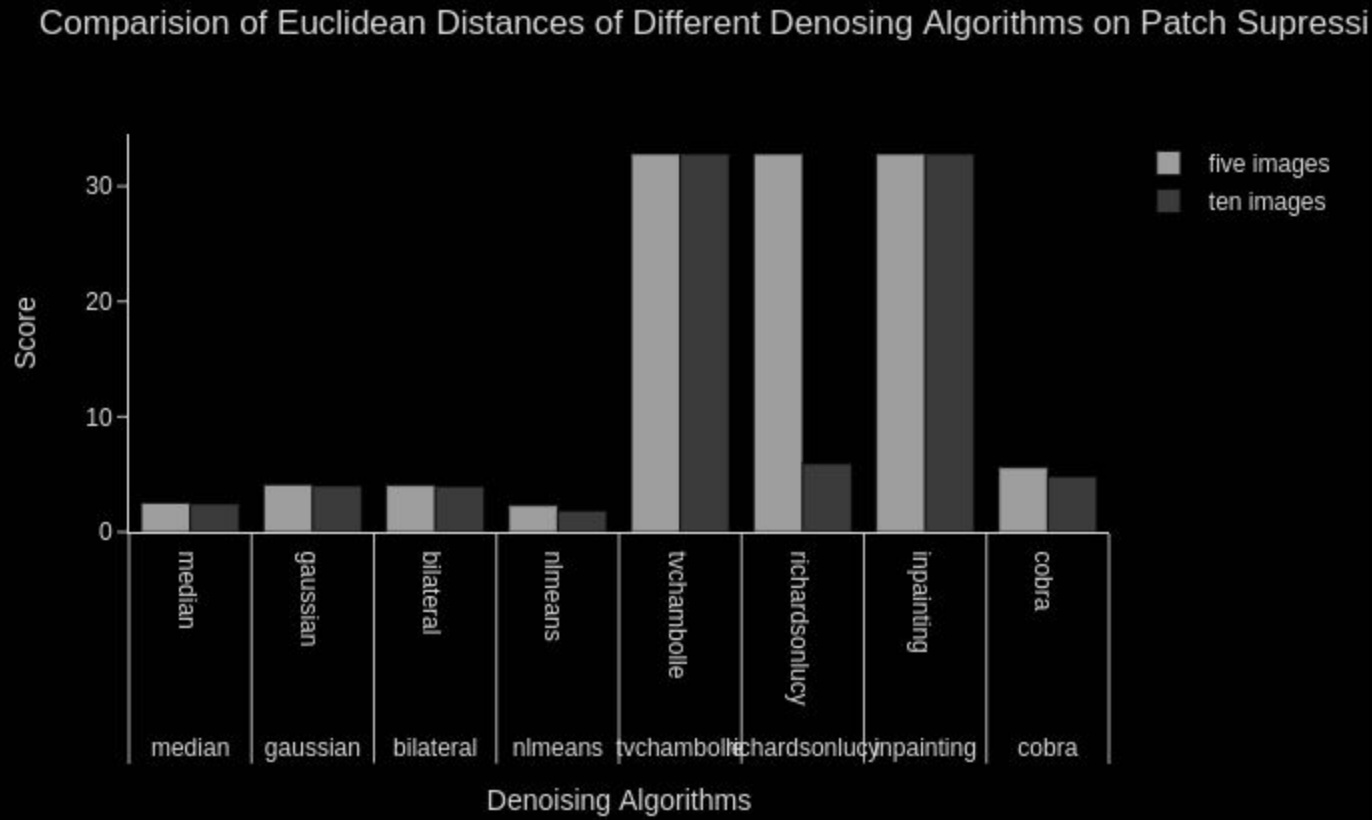

Comparision of Euclidean Distances of Different Denosing Algorithms on Salt Noise
five images
ten images
Score
30
20
10
0
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

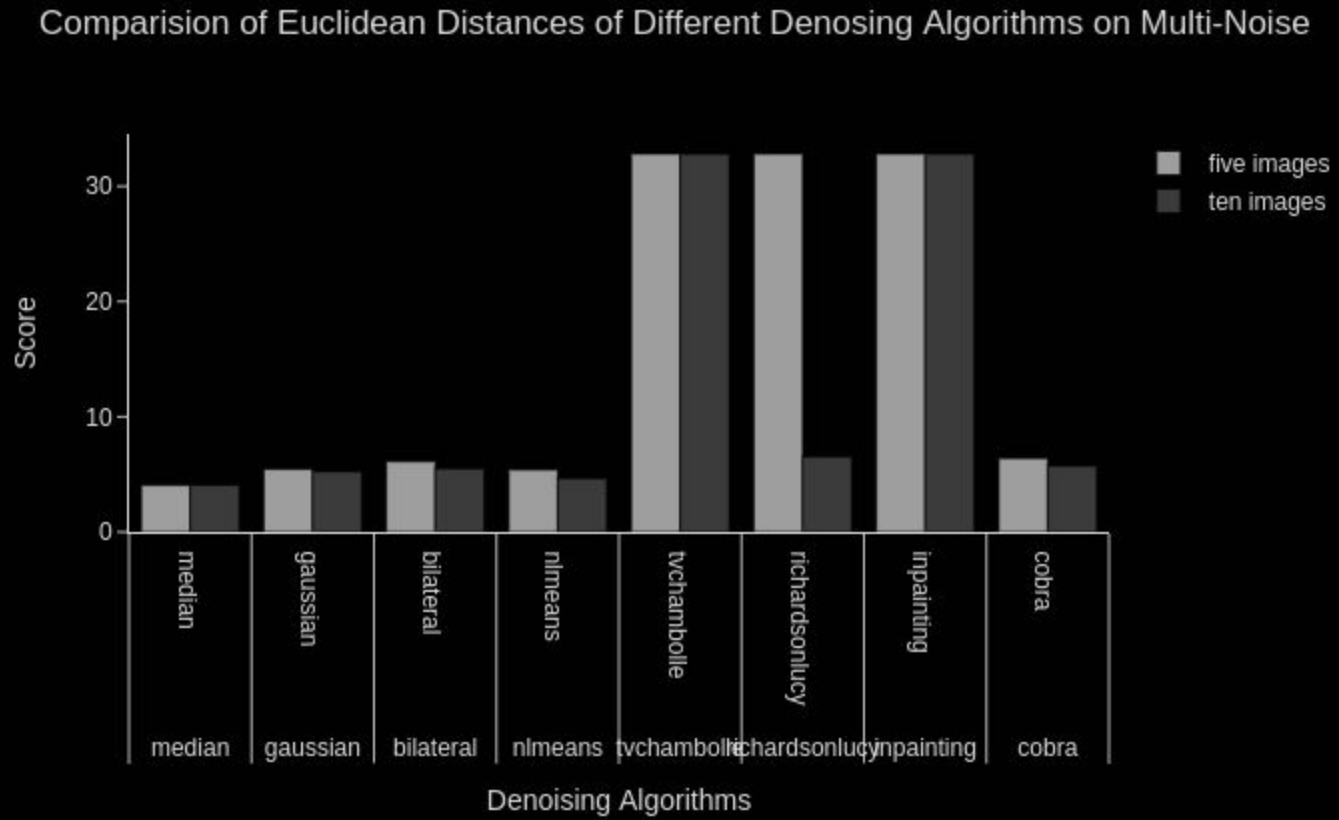

Comparision of Euclidean Distances of Different Denosing Algorithms on Pepper Noise
five images
ten images
Score
0
10
20
30
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms


Comparision of Euclidean Distances of Different Denosing Algorithms on Gaussian Noise
five images
ten images
Score
30
20
10
0
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms


Comparision of Euclidean Distances of Different Denosing Algorithms on Speckle Noise
five images
ten images
Score
30
20
10
0
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

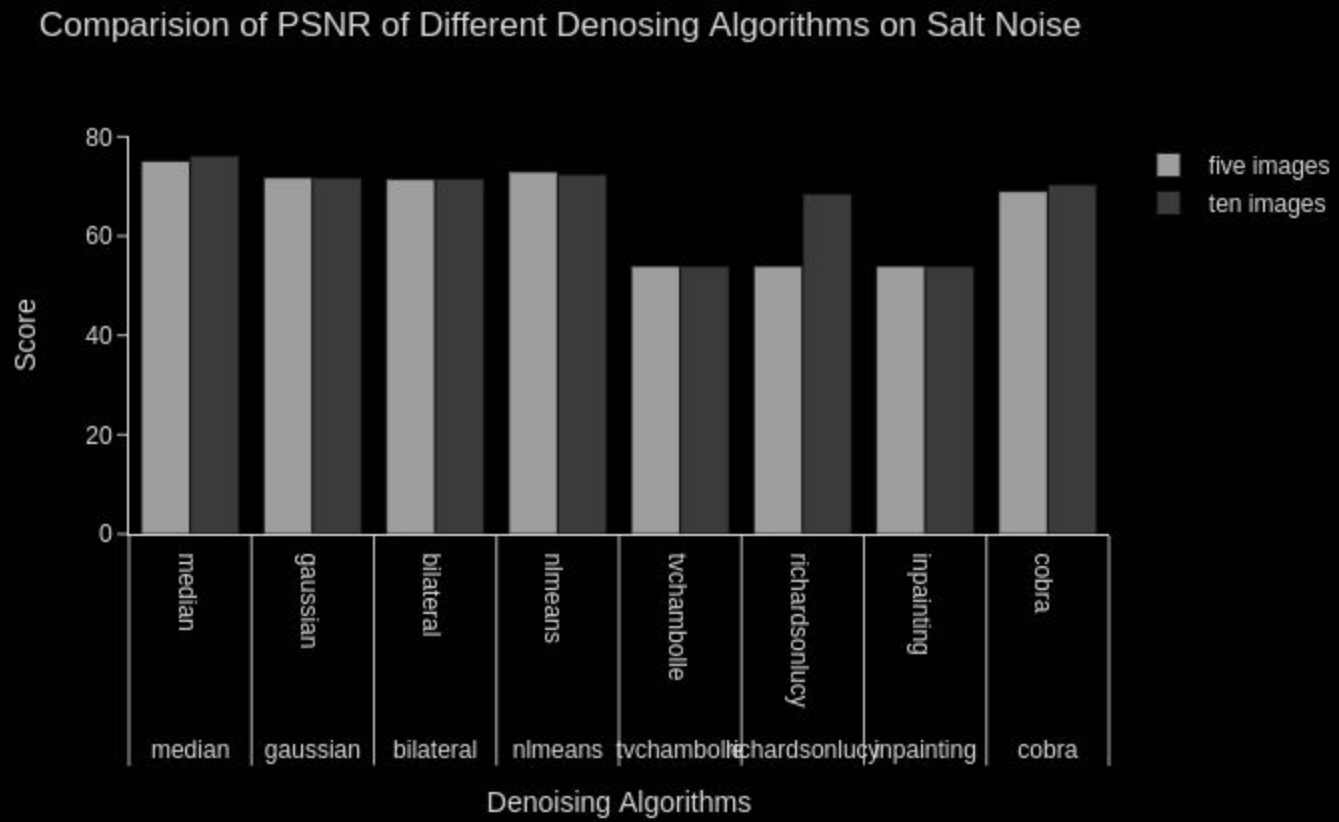

Comparision of Euclidean Distances of Different Denosing Algorithms on Poisson Noise
five images
ten images
Score
0
10
20
30
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

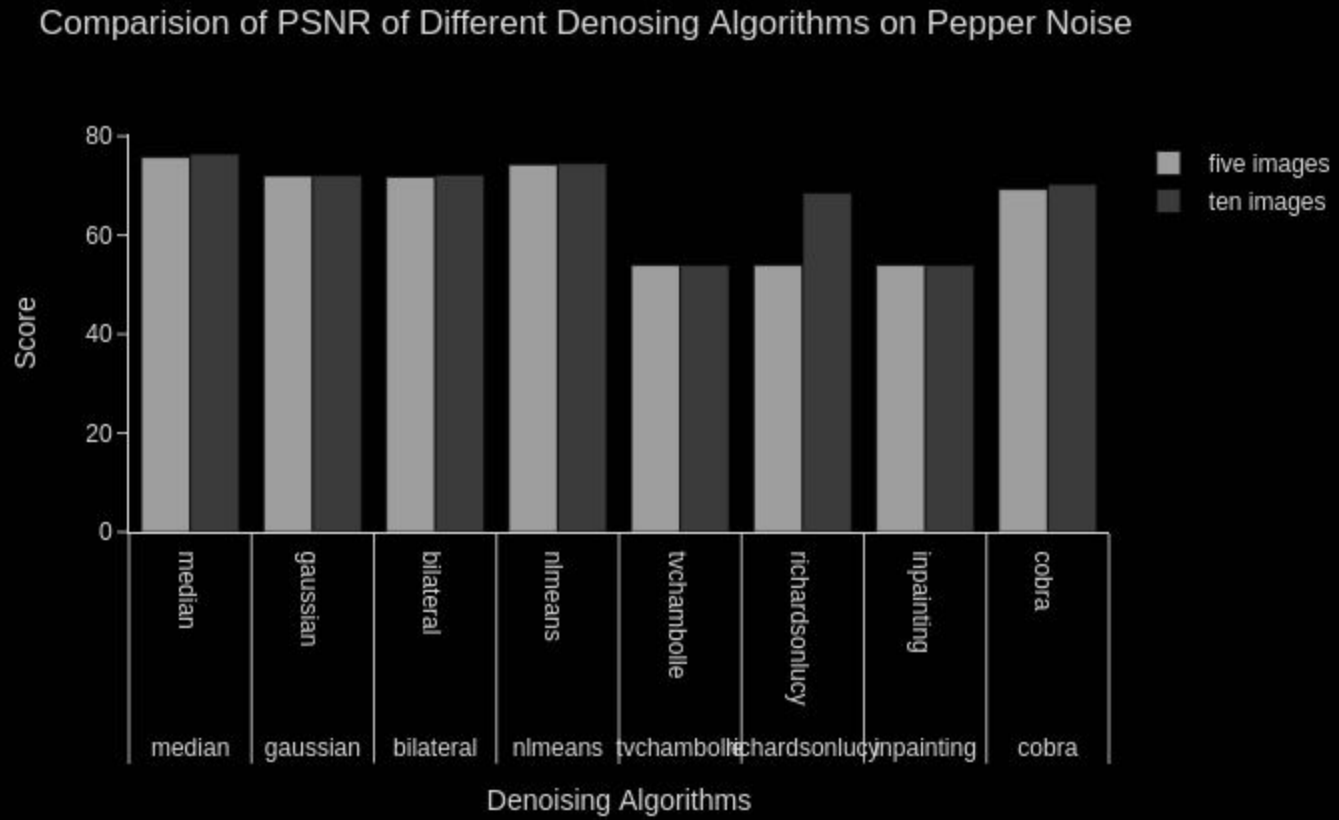

Comparision of Euclidean Distances of Different Denosing Algorithms on Patch Supressi
five images
ten images
Score
30
20
10
0
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

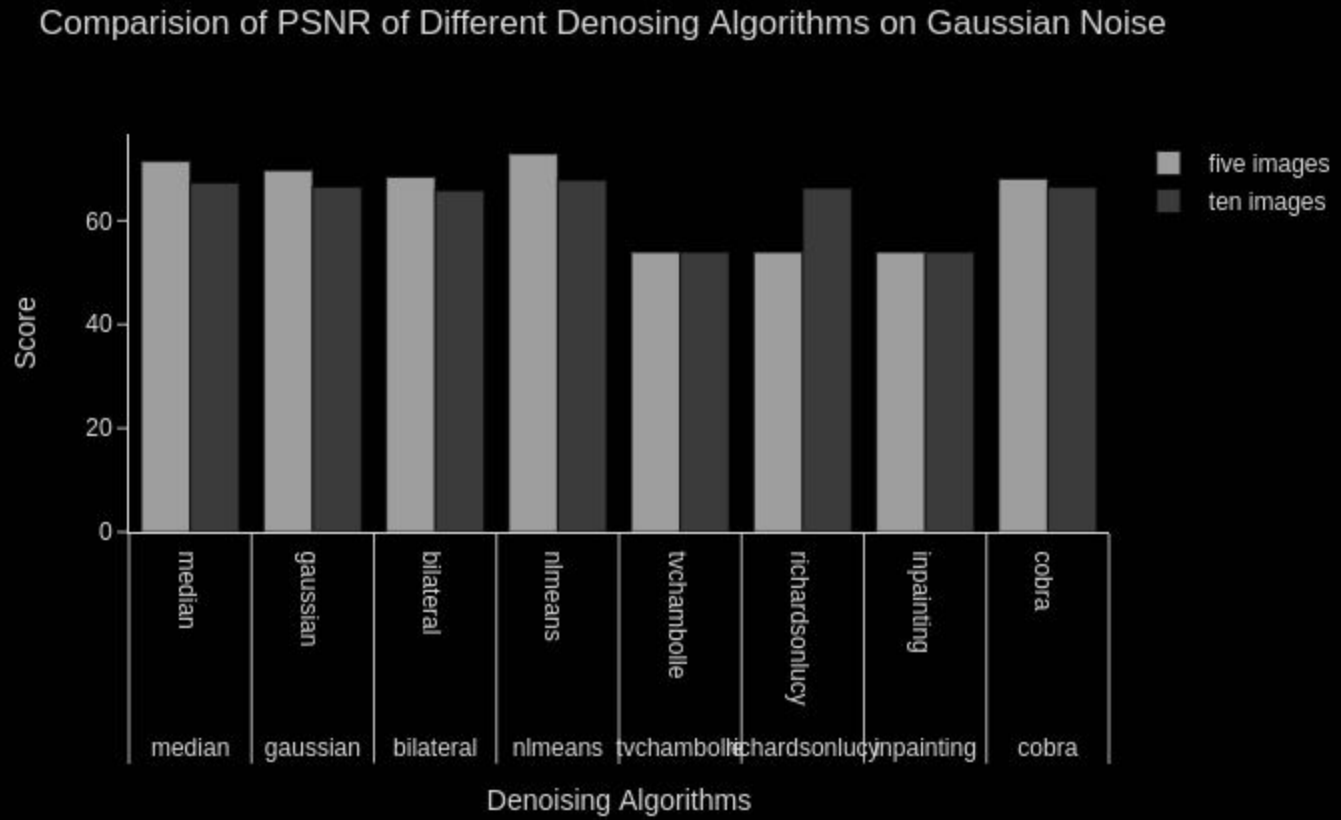

Comparision of Euclidean Distances of Different Denosing Algorithms on Multi-Noise
five images
ten images
Score
30
20
10
0
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

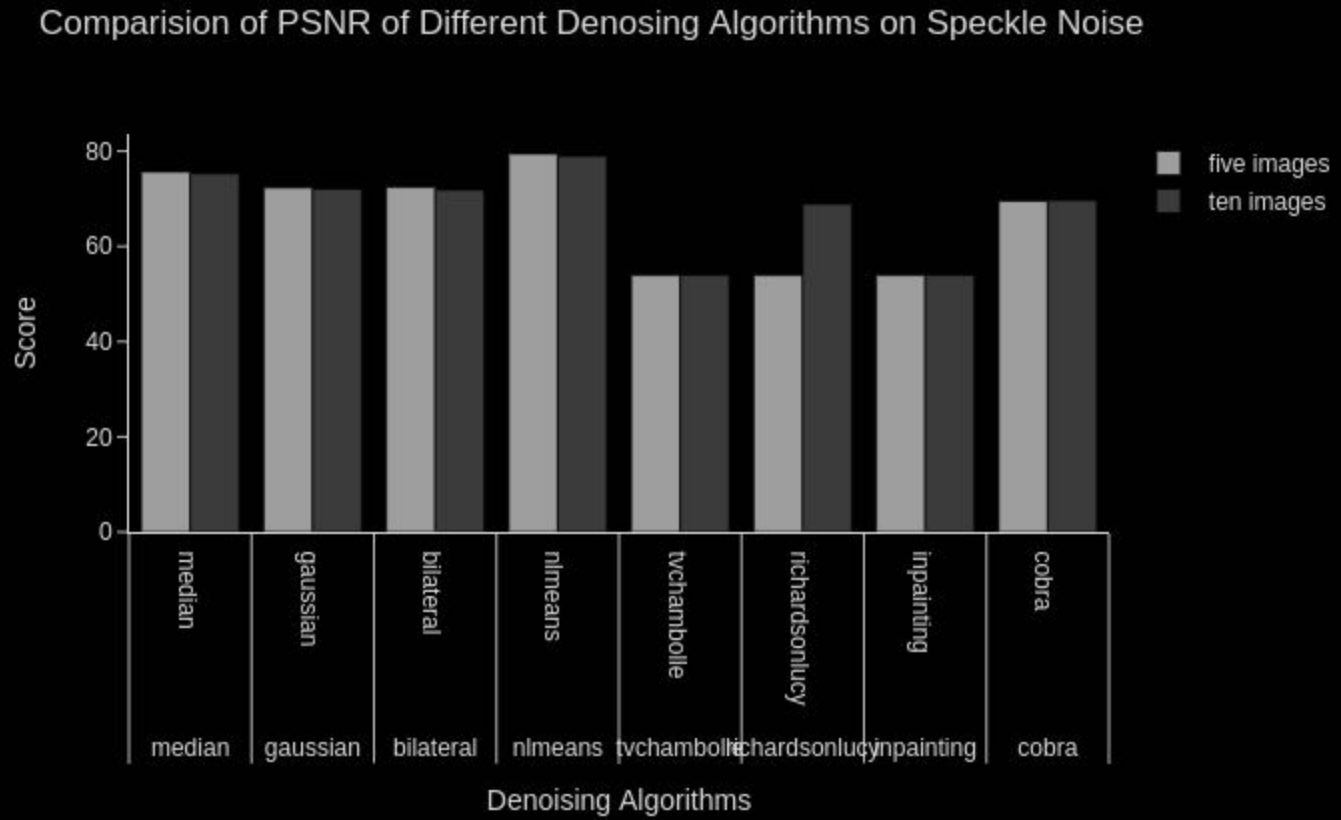
Peak Signal-to-Noise Ratio

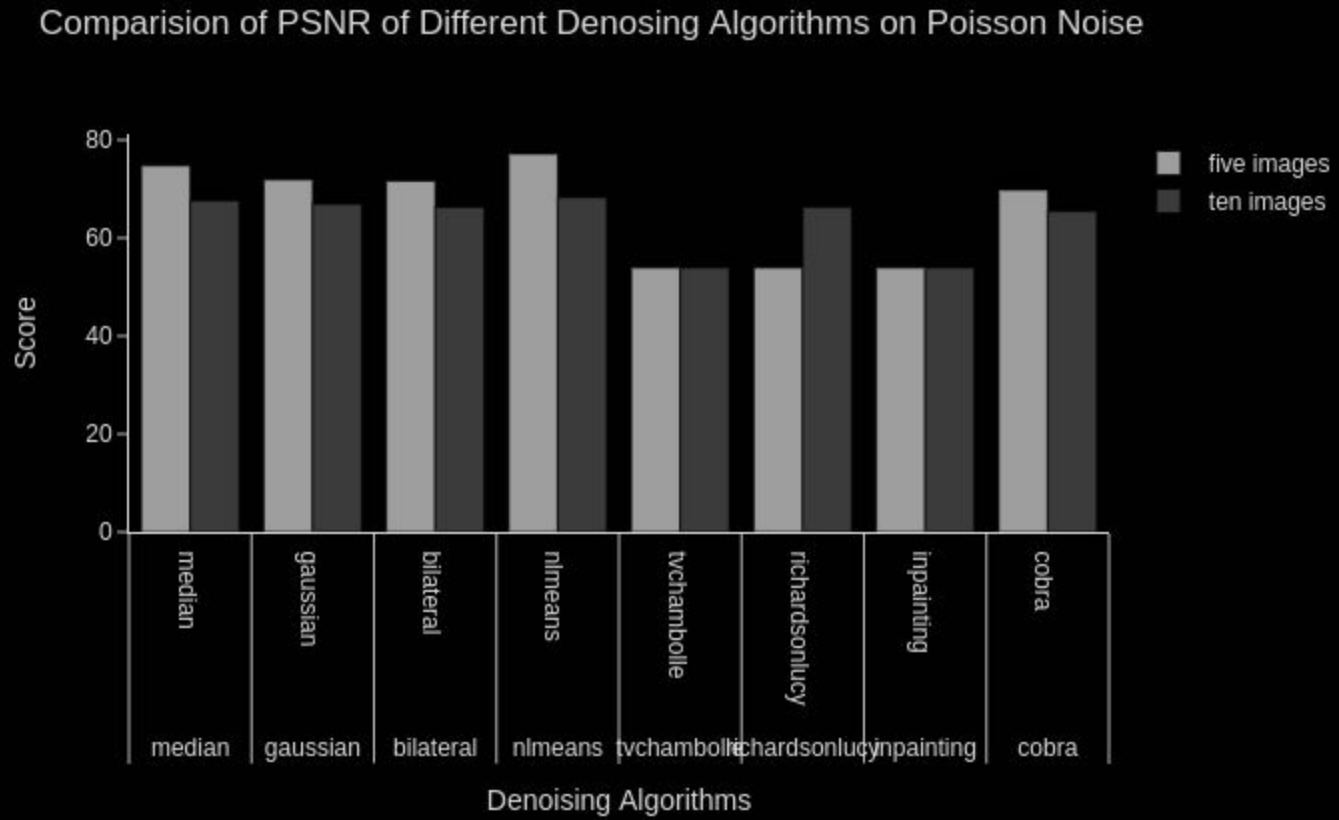
Five vs Ten Image Training Dataset, and Patch = 1

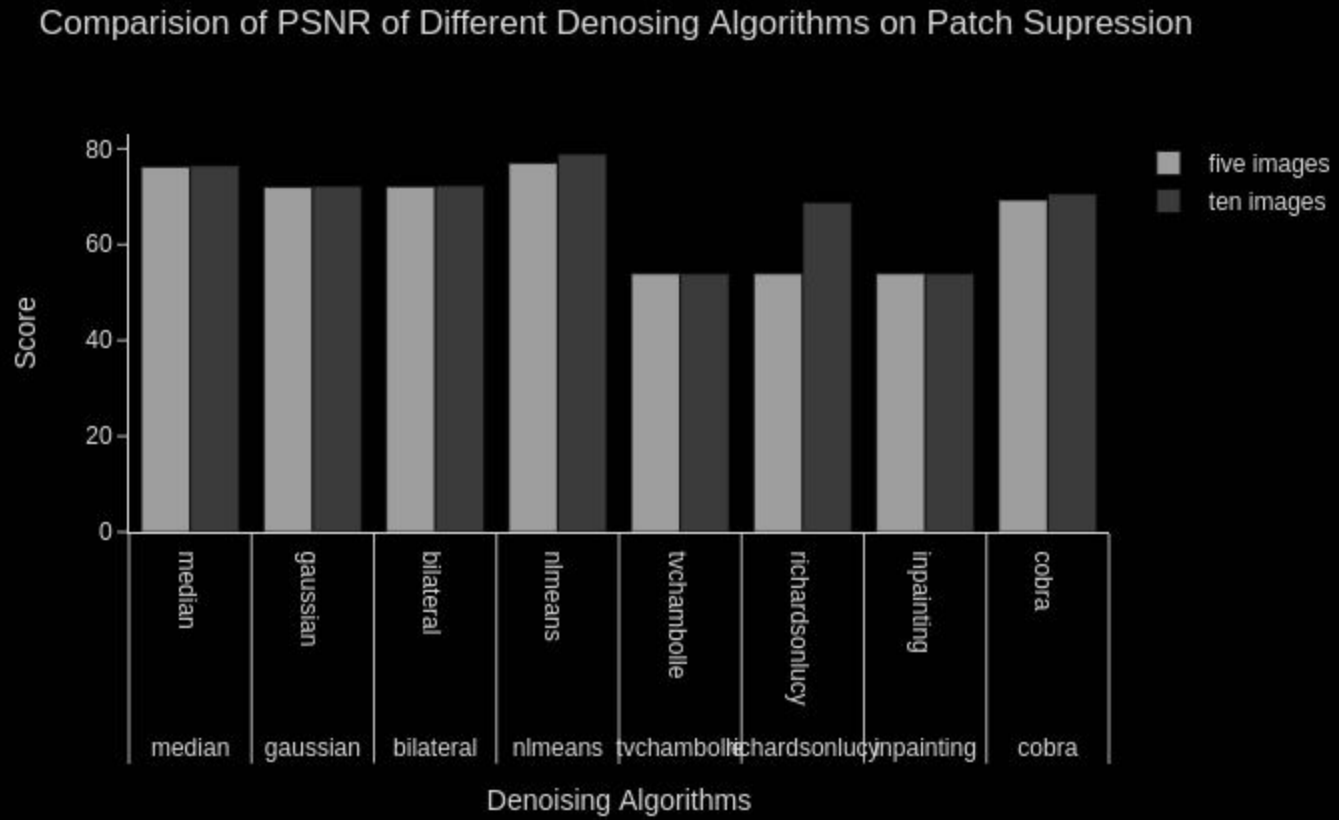

Comparision of PSNR of Different Denosing Algorithms on Salt Noise
Score
80
60
40
20
0
five images
ten images
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

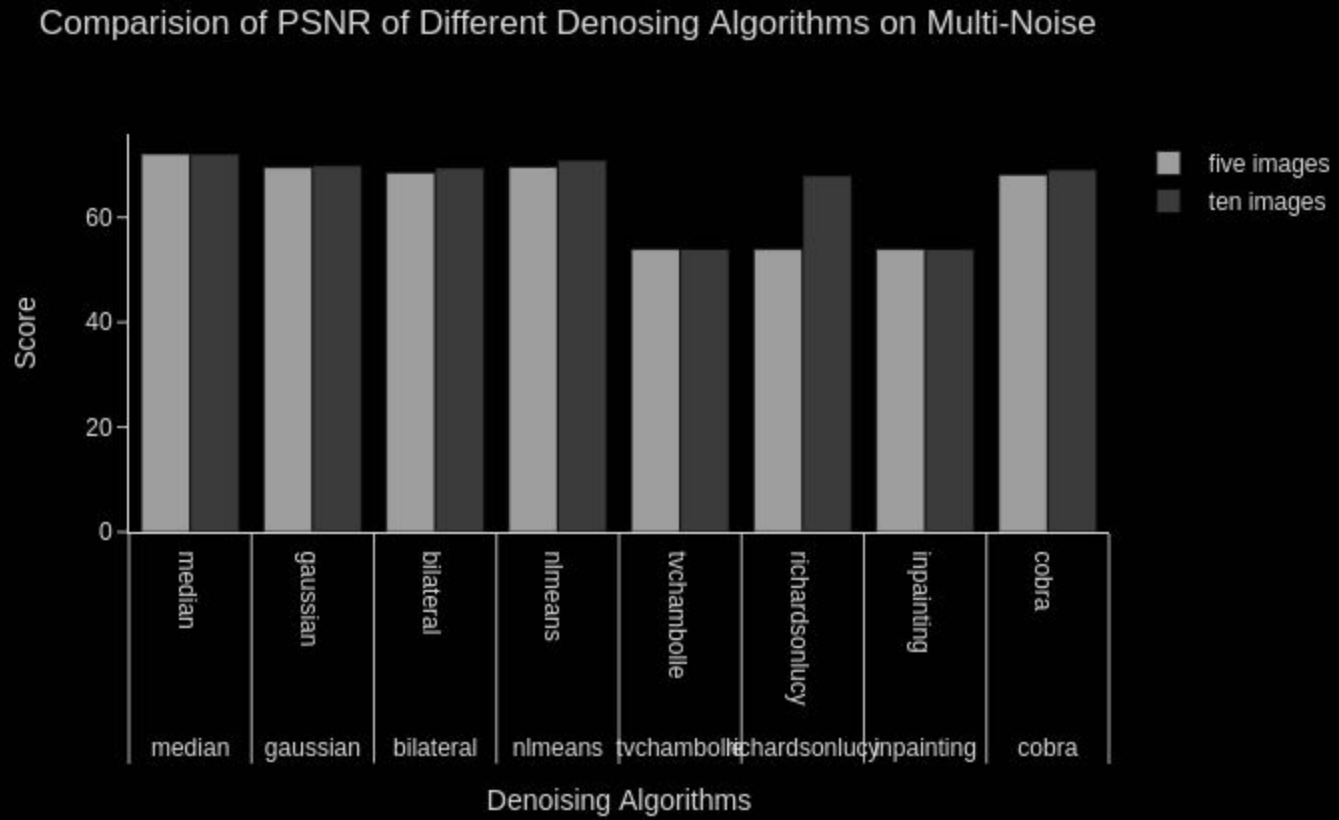

Comparision of PSNR of Different Denosing Algorithms on Pepper Noise
Score
80
60
40
20
0
five images
ten images
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms


Comparision of PSNR of Different Denosing Algorithms on Gaussian Noise
five images
ten images
Score
0
20
40
60
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms


Comparision of PSNR of Different Denosing Algorithms on Speckle Noise
Score
80
60
40
20
0
five images
ten images
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

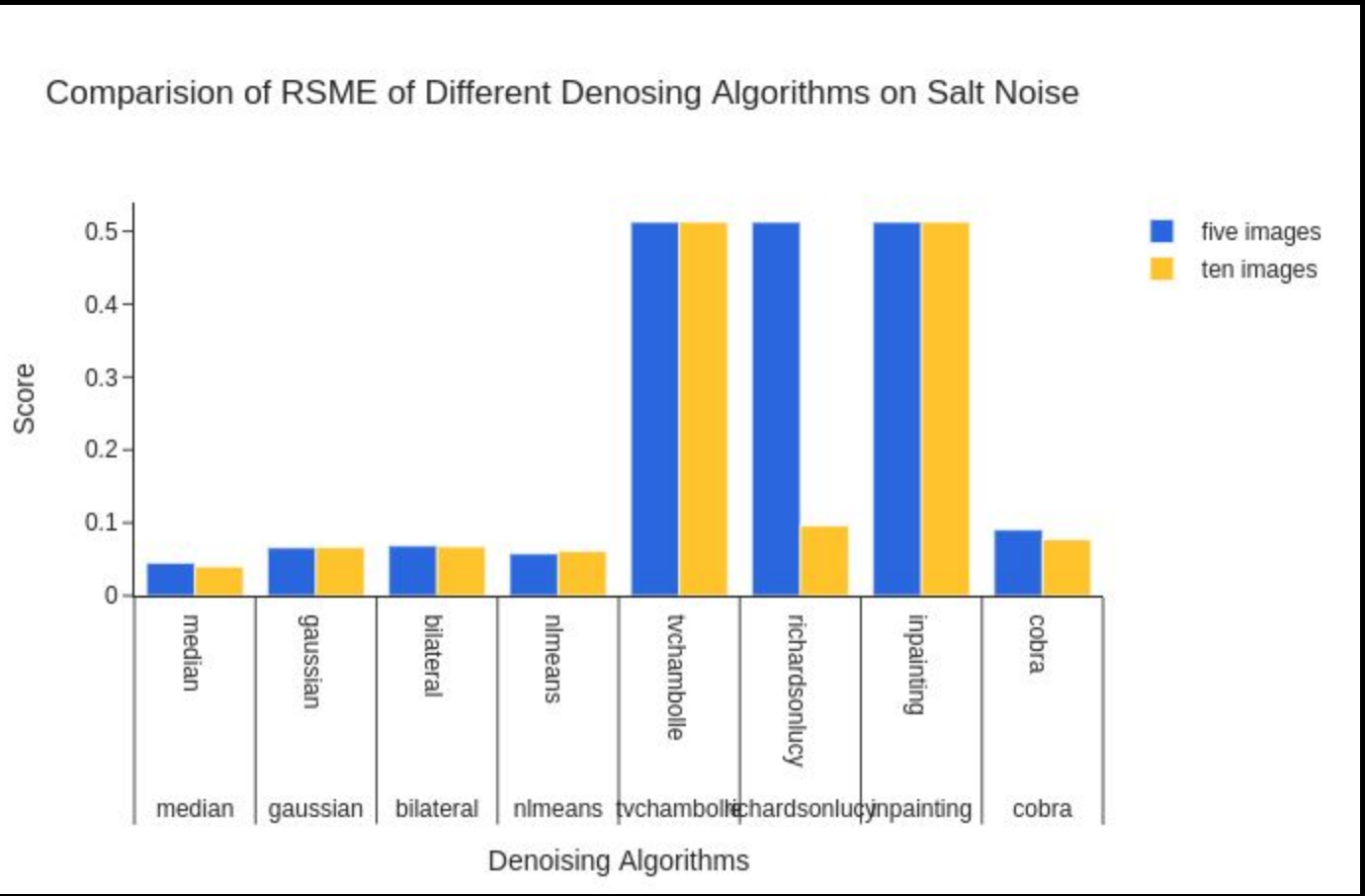

Comparision of PSNR of Different Denosing Algorithms on Poisson Noise
Score
80
60
40
20
0
five images
ten images
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

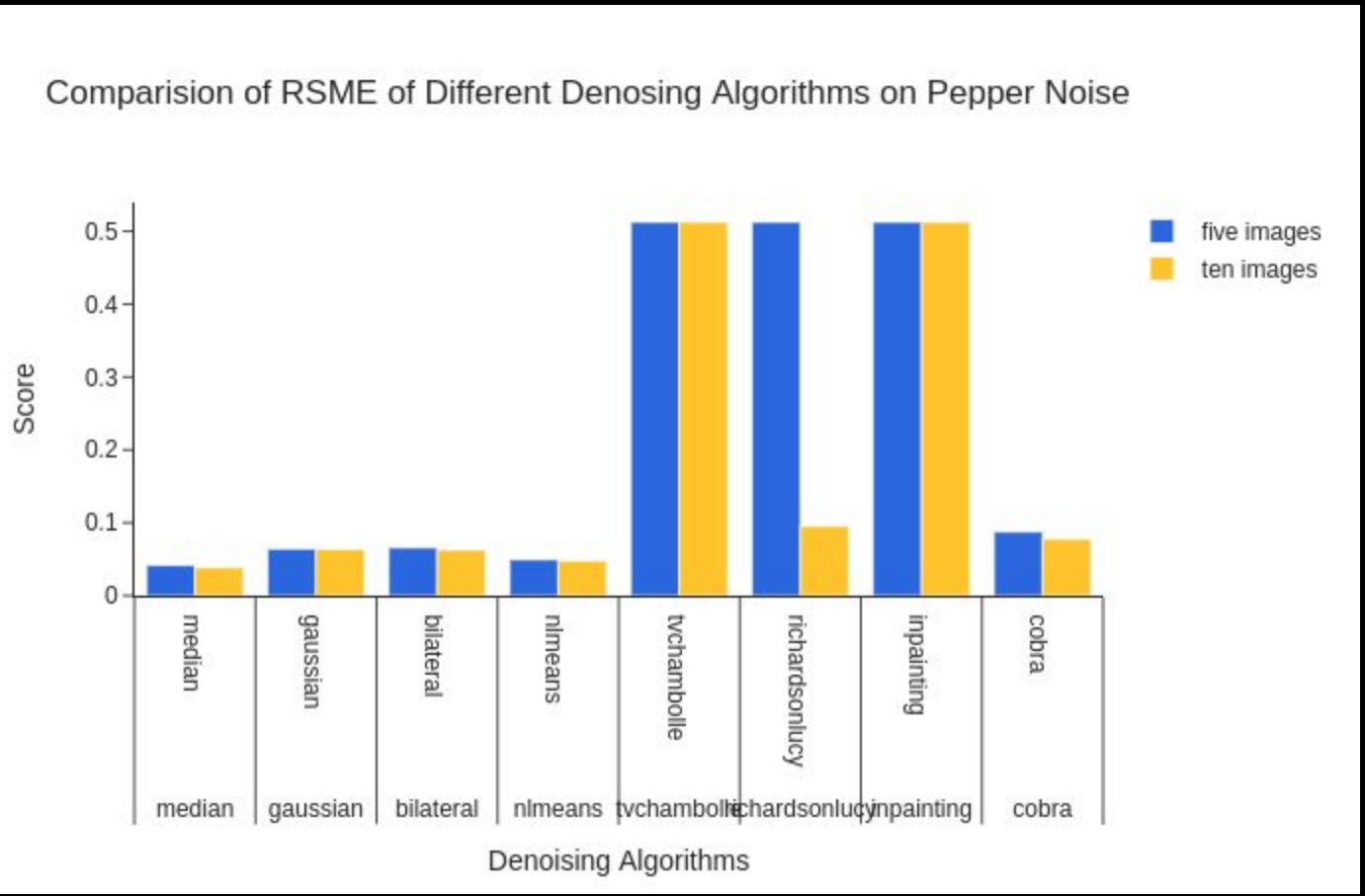

Comparision of PSNR of Different Denosing Algorithms on Patch Supression
Score
80
60
40
20
0
five images
ten images
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

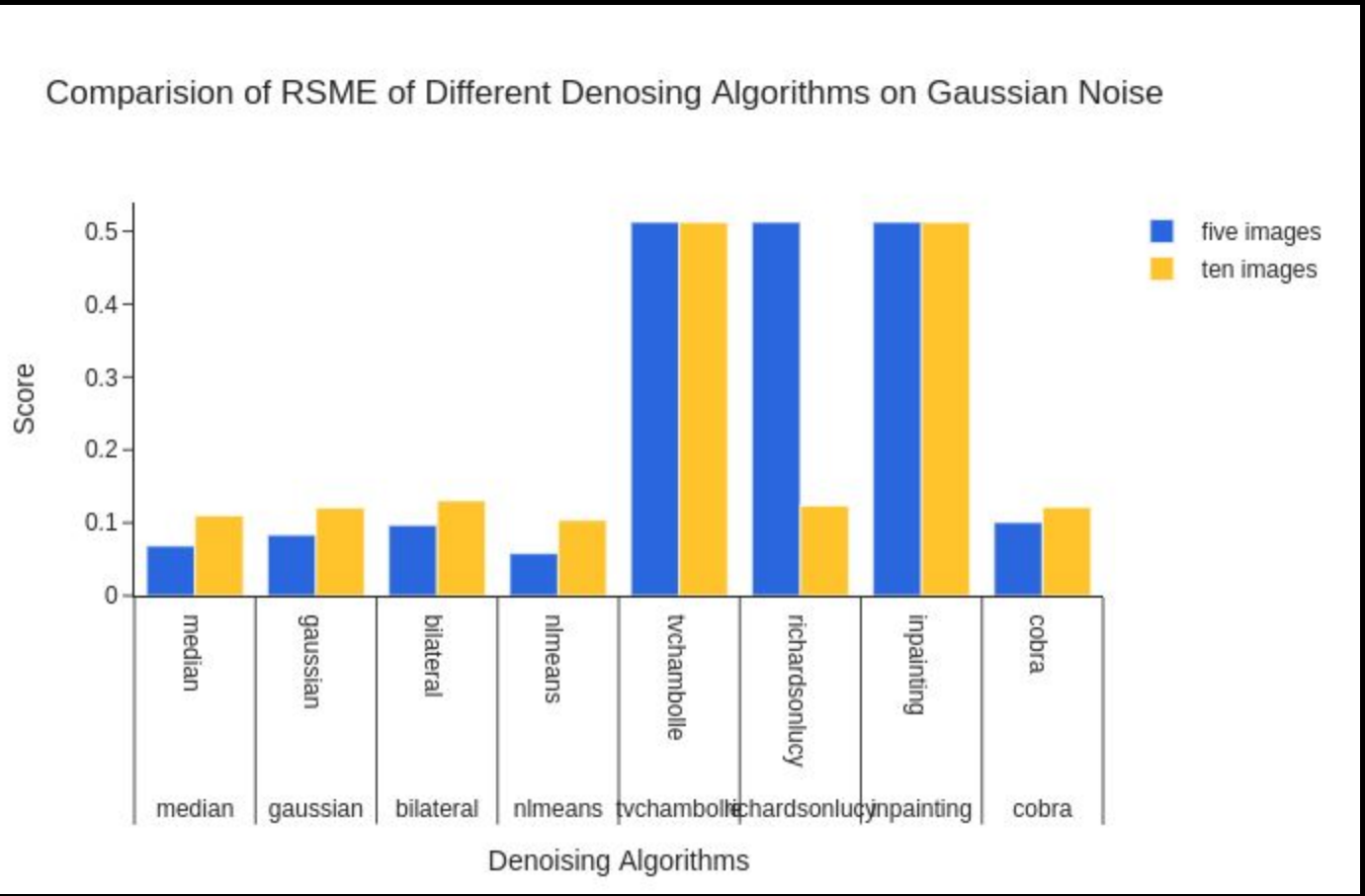

Comparision of PSNR of Different Denosing Algorithms on Multi-Noise
five images
ten images
Score
0
20
40
60
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

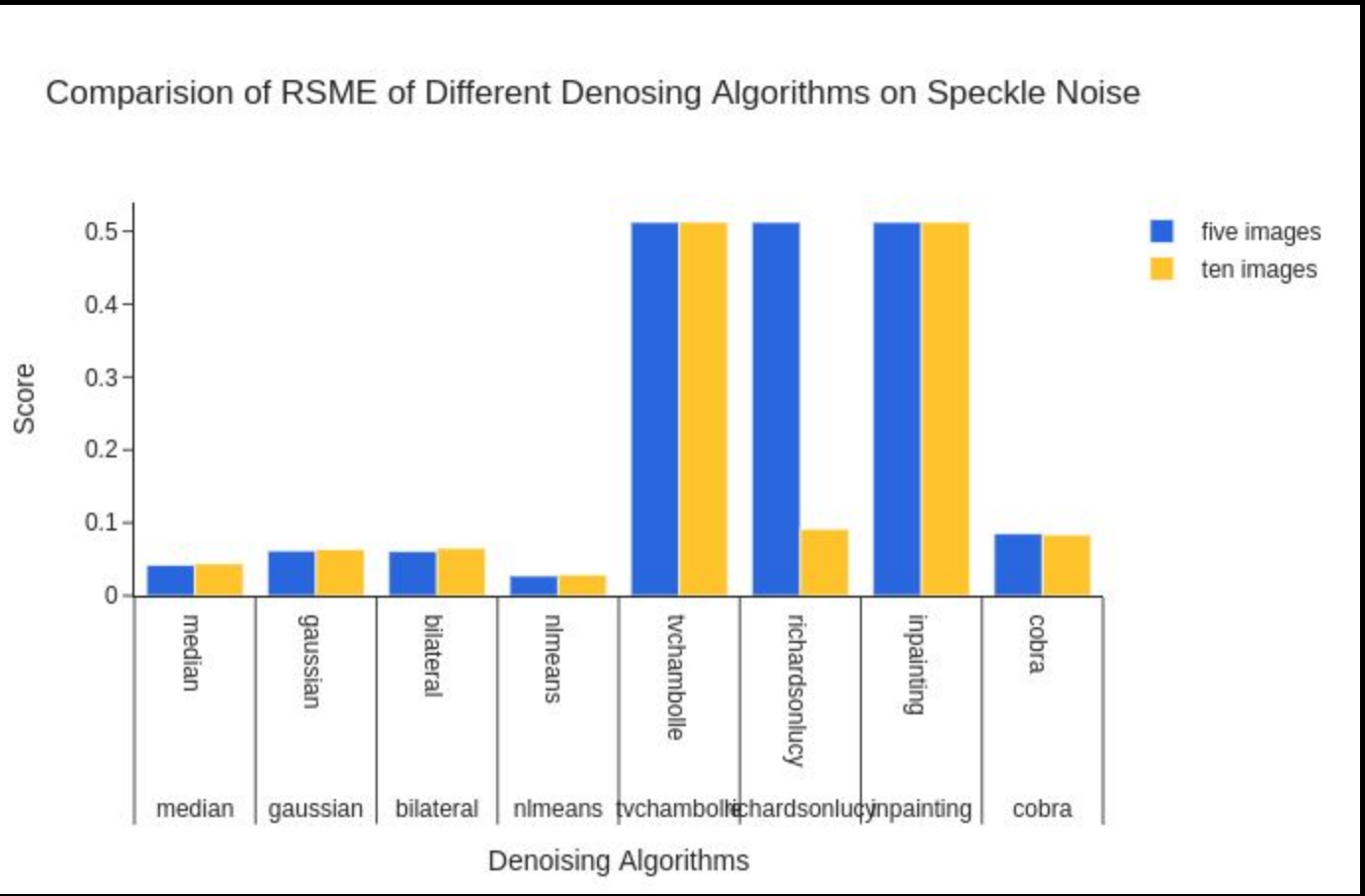
Root Mean Square Error

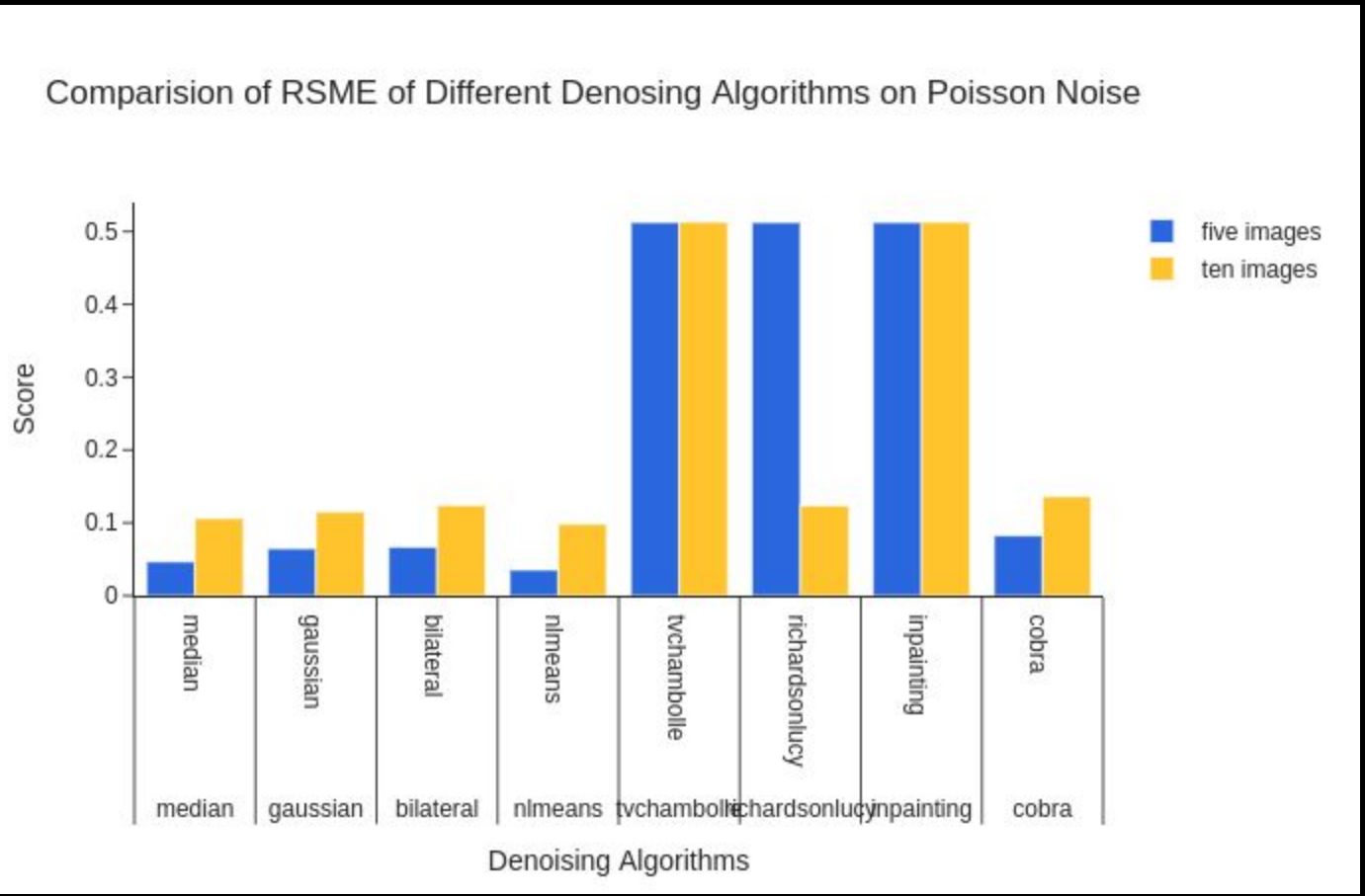
Five vs Ten Image Training Dataset, and Patch = 1

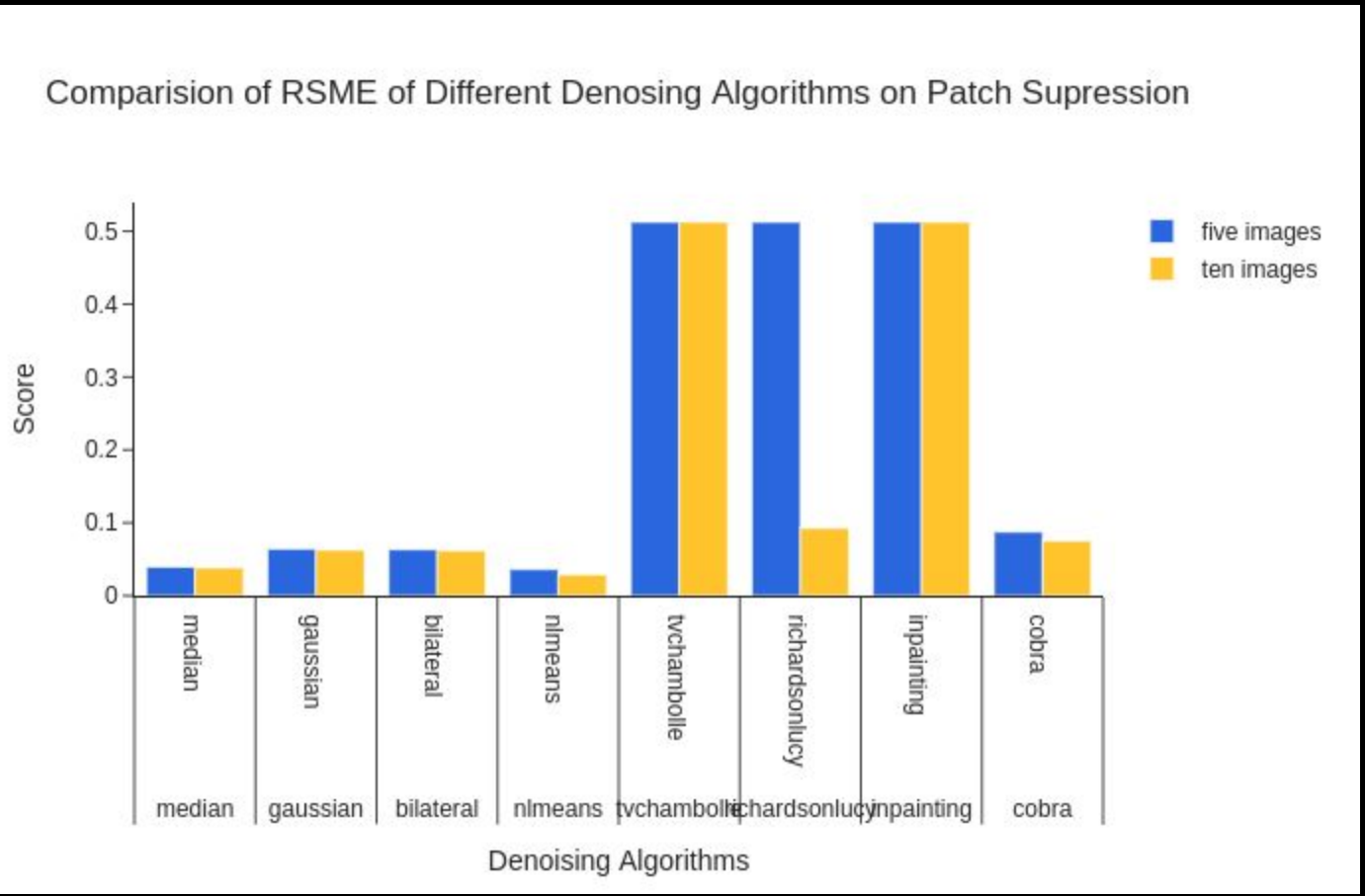

Comparision of RSME of Different Denosing Algorithms on Salt Noise
Score
0.5
0.4
0.3
0.2
0.1
0
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
five images
ten images
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

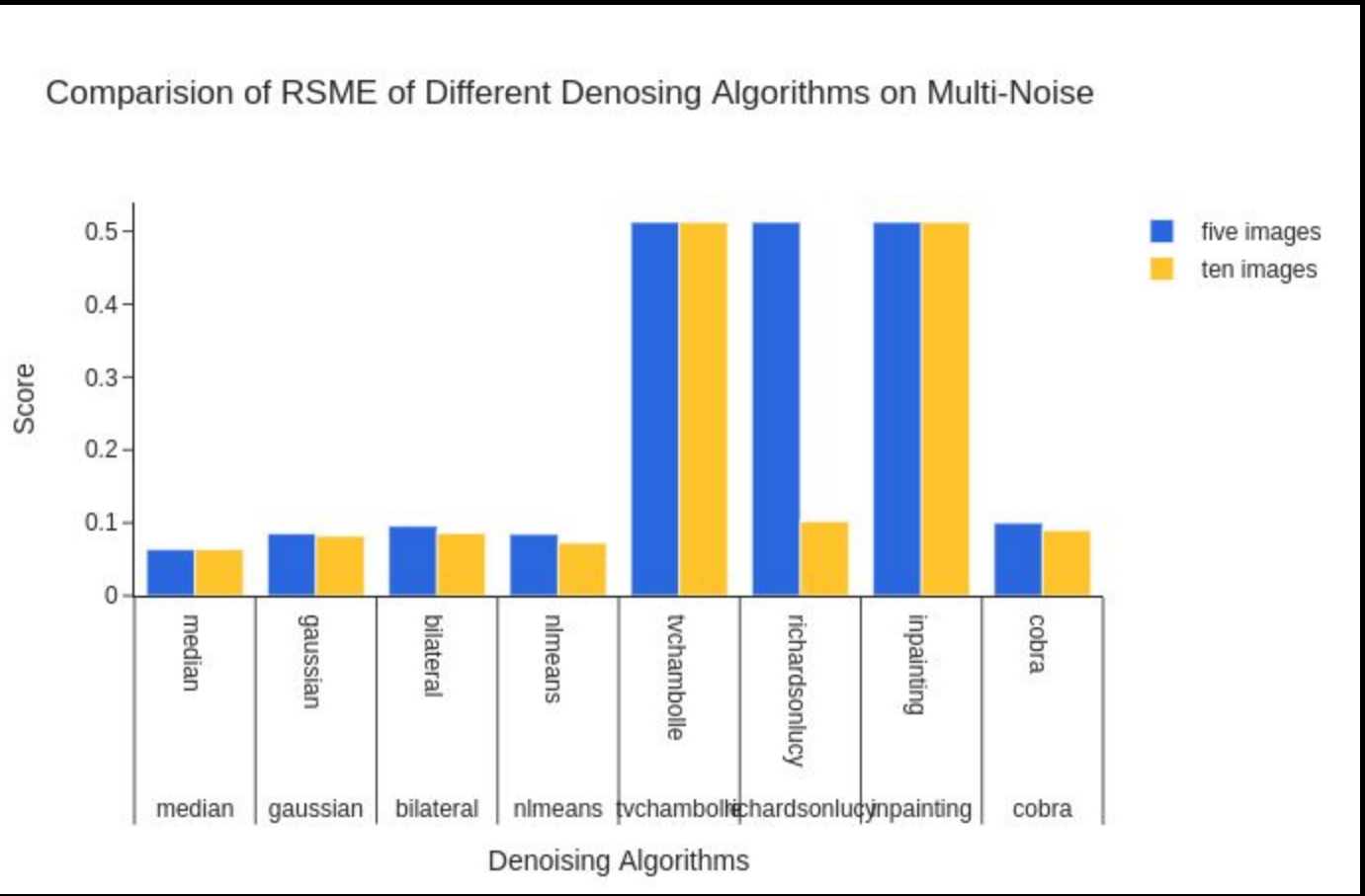

Comparision of RSME of Different Denosing Algorithms on Pepper Noise
Score
0.5
0.4
0.3
0.2
0.1
0
five images
ten images
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms


Comparision of RSME of Different Denosing Algorithms on Gaussian Noise
Score
0.5
0.4
0.3
0.2
0.1
0
five images
ten images
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms


Comparision of RSME of Different Denosing Algorithms on Speckle Noise
Score
0.5
0.4
0.3
0.2
0.1
0
five images
ten images
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

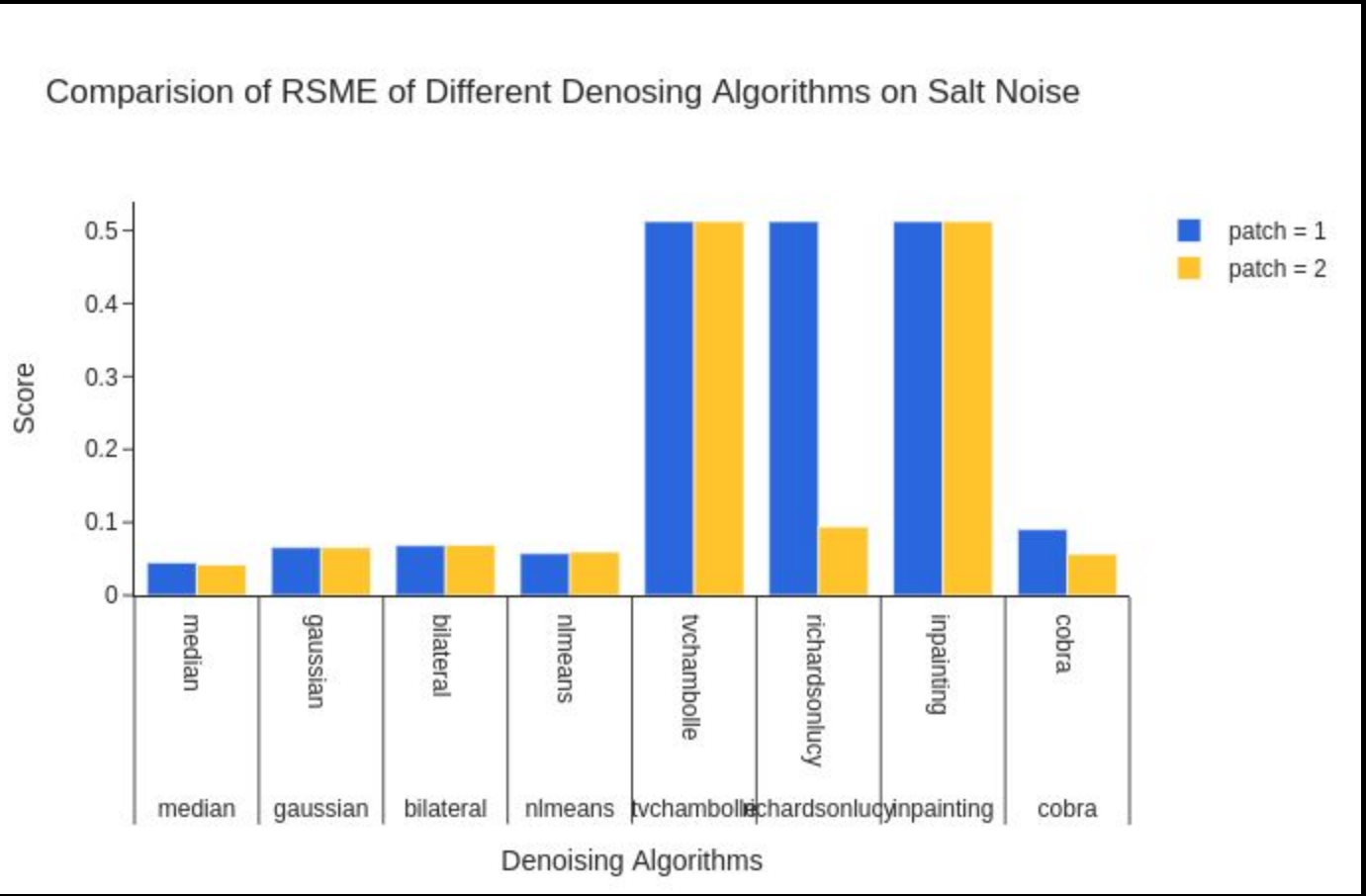

Comparision of RSME of Different Denosing Algorithms on Poisson Noise
Score
0.5
0.4
0.3
0.2
0.1
0
five images
ten images
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

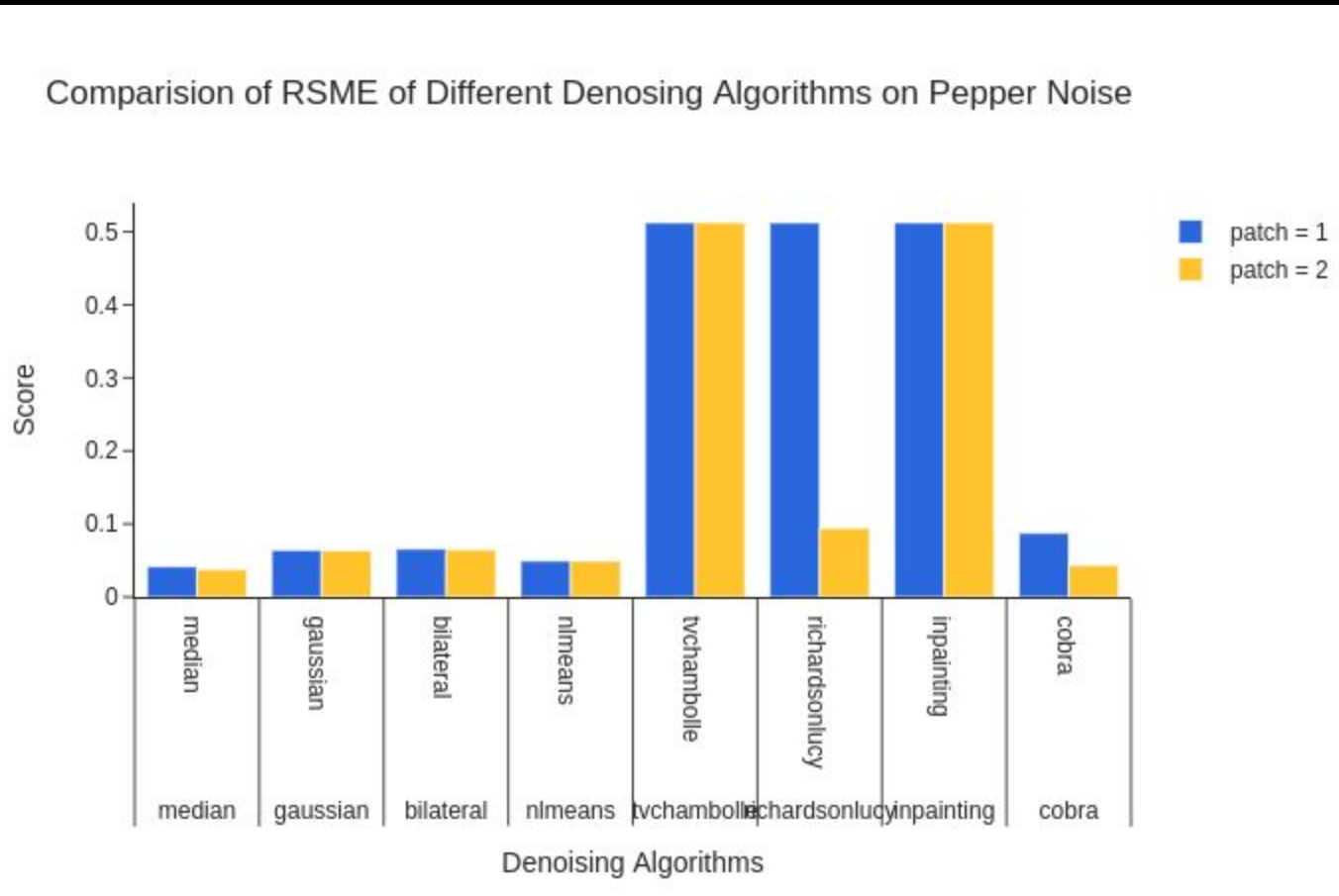

Comparision of RSME of Different Denosing Algorithms on Patch Supression
Score
0.5
0.4
0.3
0.2
0.1
0
five images
ten images
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

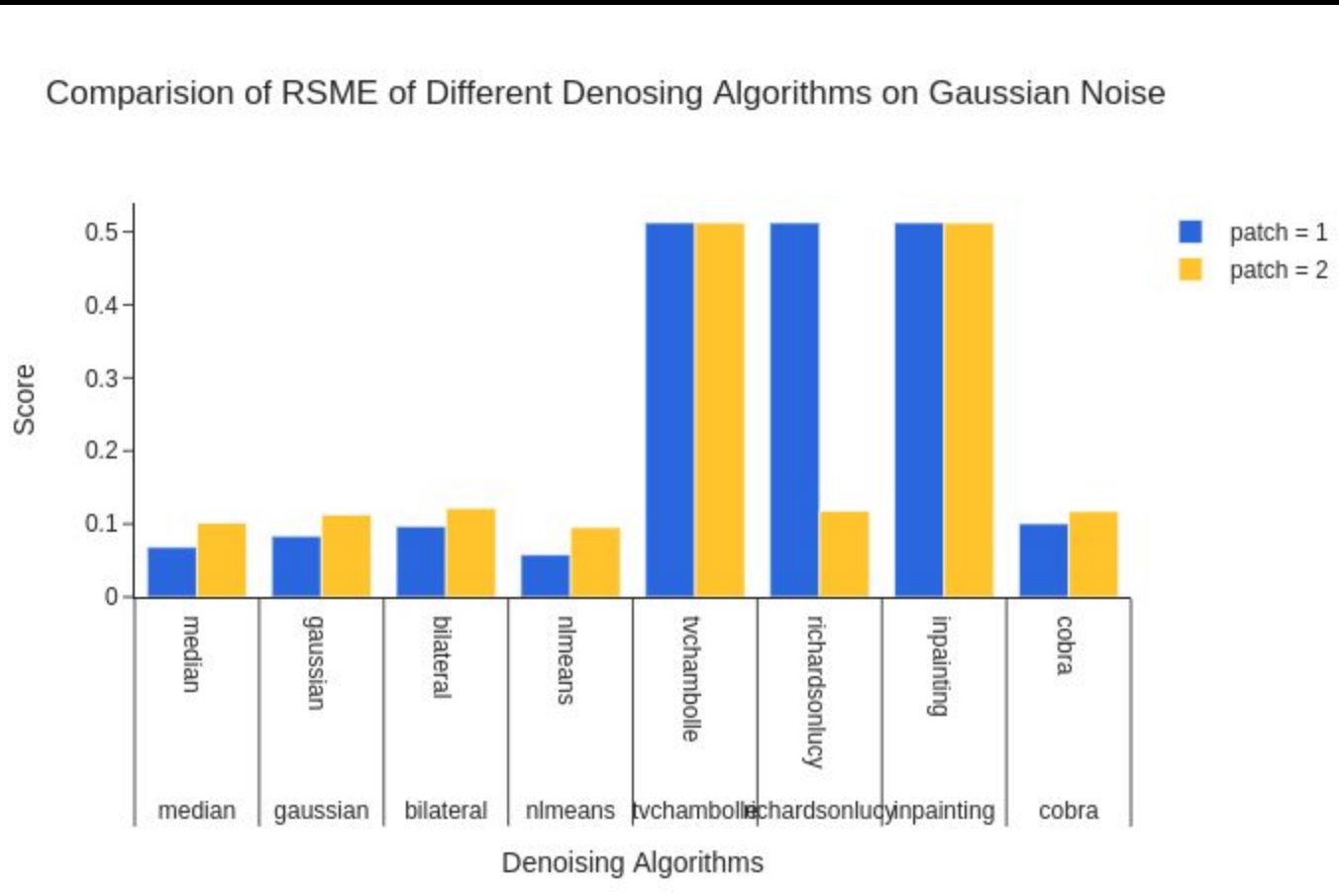

Comparision of RSME of Different Denosing Algorithms on Multi-Noise
Score
0.5
0.4
0.3
0.2
0.1
0
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
five images
ten images
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

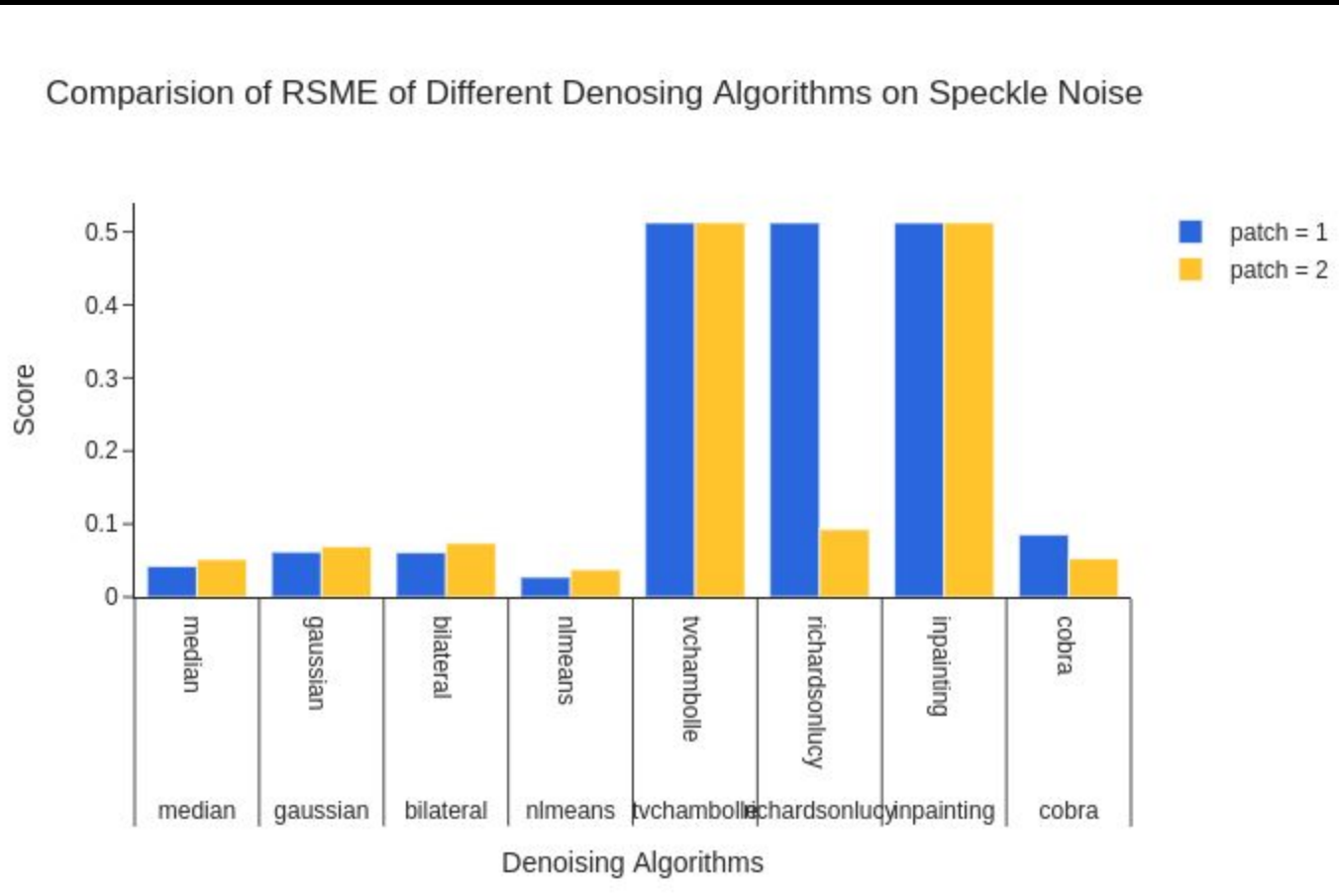
Euclidean Distance

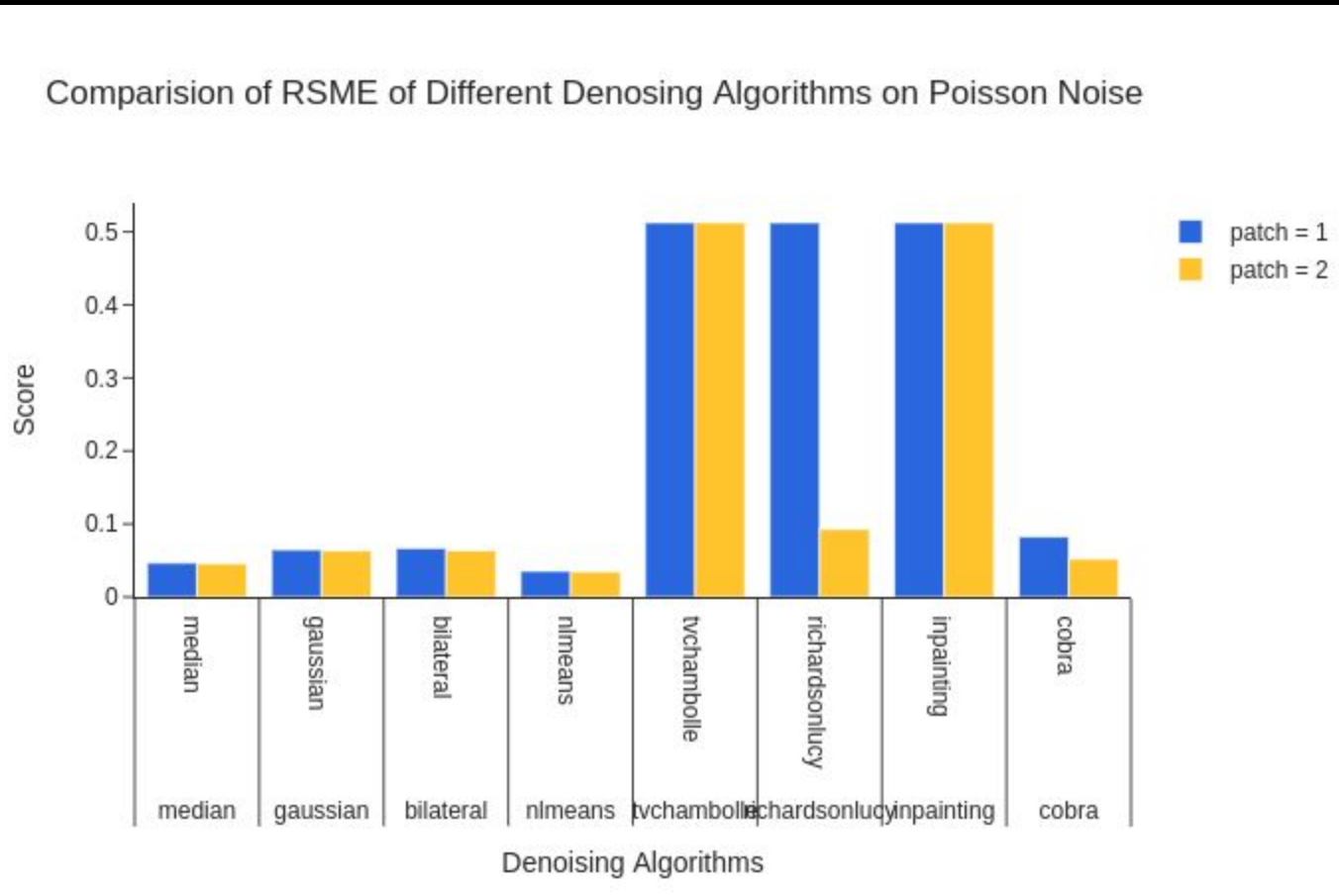
Five Image Training Dataset, and Patch = 1 versus Patch = 2

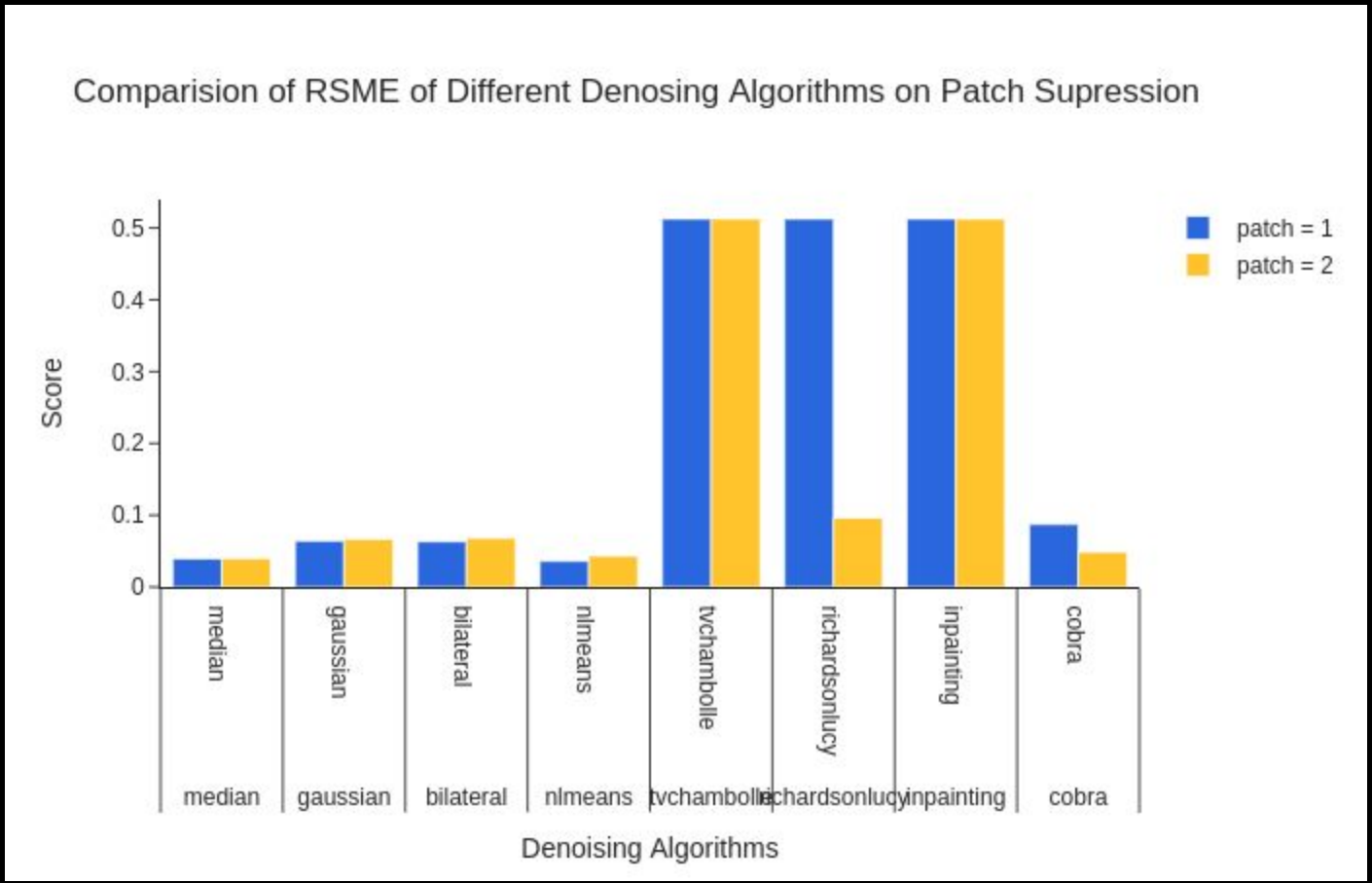

Comparision of RSME of Different Denosing Algorithms on Salt Noise
Score
0.5
0.4
0.3
0.2
0.1
0
patch = 1
patch = 2
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

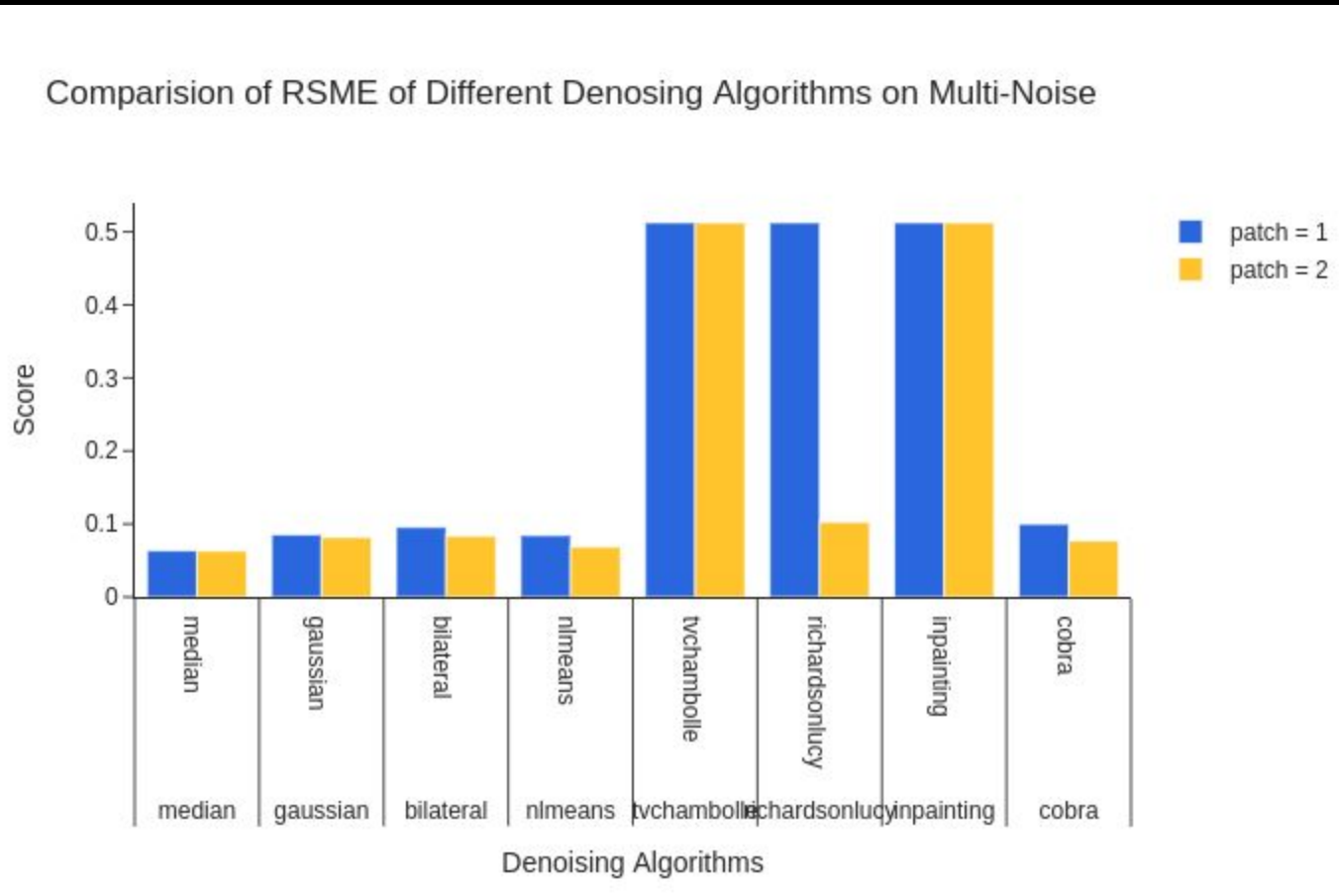

Comparision of RSME of Different Denosing Algorithms on Pepper Noise
Score
0.5
0.4
0.3
0.2
0.1
0
patch = 1
patch = 2
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms


Comparision of RSME of Different Denosing Algorithms on Gaussian Noise
Score
0.5
0.4
0.3
0.2
0.1
0
patch = 1
patch = 2
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms


Comparision of RSME of Different Denosing Algorithms on Speckle Noise
Score
0.5
0.4
0.3
0.2
0.1
0
patch = 1
patch = 2
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms


Comparision of RSME of Different Denosing Algorithms on Poisson Noise
Score
0.5
0.4
0.3
0.2
0.1
0
patch = 1
patch = 2
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

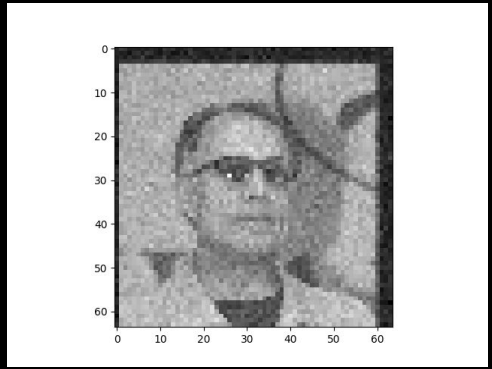

Comparision of RSME of Different Denosing Algorithms on Patch Supression
Score
0.5
0.4
0.3
0.2
0.1
0
patch = 1
patch = 2
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms


Comparision of RSME of Different Denosing Algorithms on Multi-Noise
Score
0.5
0.4
0.3
0.2
0.1
0
patch = 1
patch = 2
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
median
gaussian
bilateral
nlmeans
tvchambolle
richardsonlucy
inpainting
cobra
Denoising Algorithms

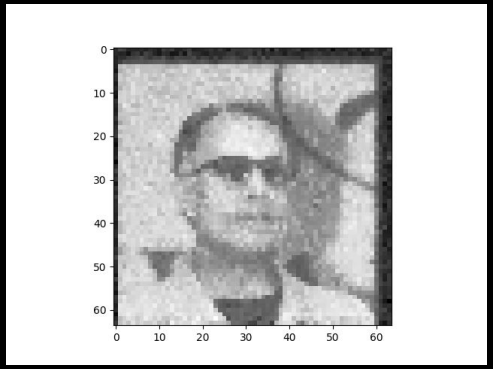
Results for different noises with our model trained on 5 images with patch size = 2

Gaussian Noise

Before



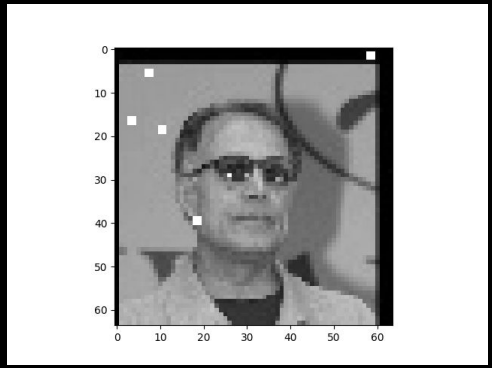
After COBRA denoising



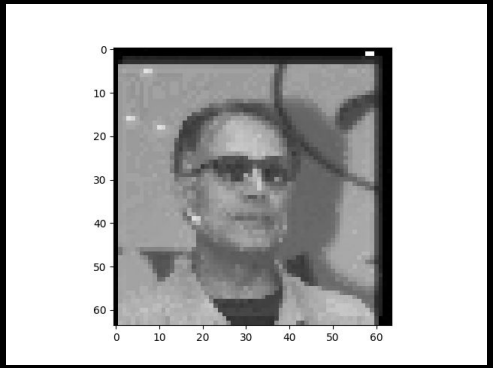
Results for different noises with our model trained on 5 images with patch size = 2

Random Patch Suppression

Before



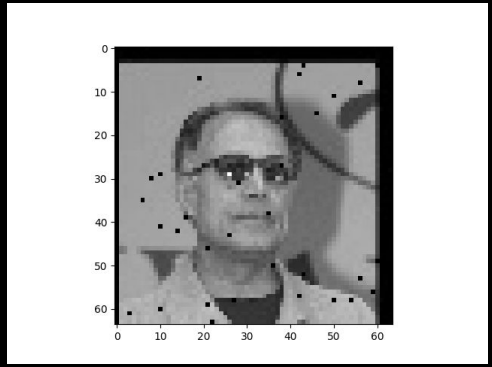
After COBRA denoising



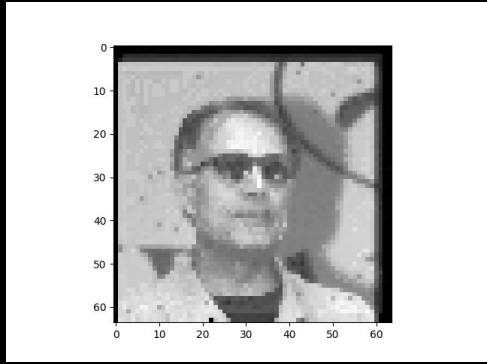
Results for different noises with our model trained on 5 images with patch size = 2

Pepper Noise

Before



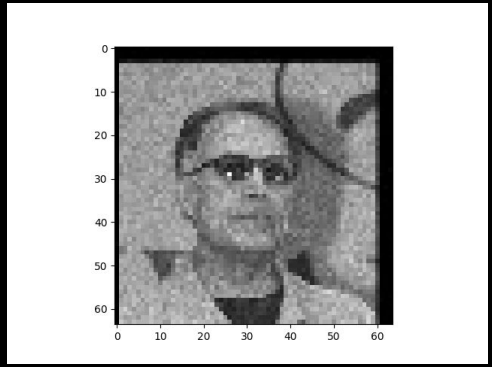
After COBRA denoising



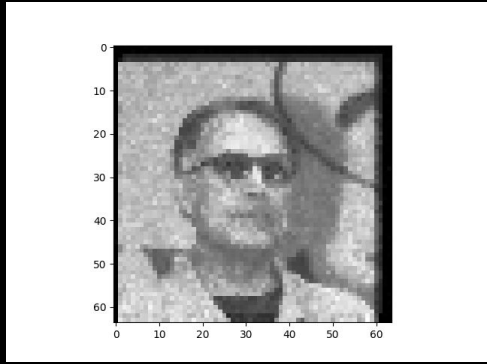
Results for different noises with our model trained on 5 images with patch size = 2

Poisson Noise

Before



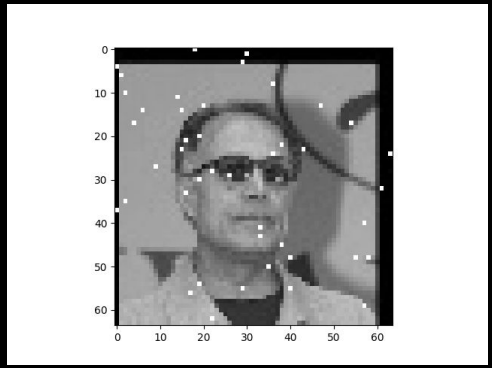
After COBRA denoising



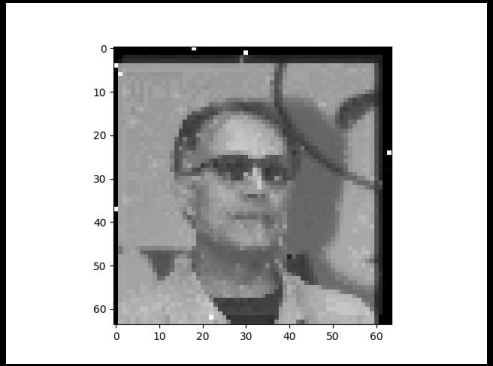
Results for different noises with our model trained on 5 images with patch size = 2

Salt Noise

Before



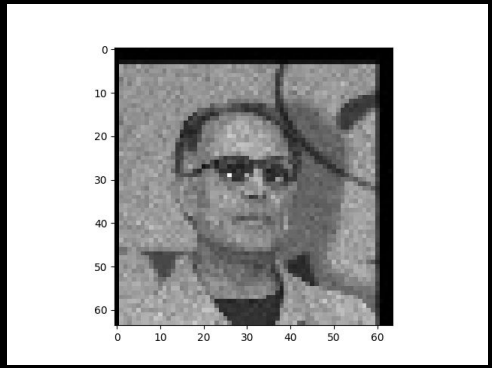
After COBRA denoising



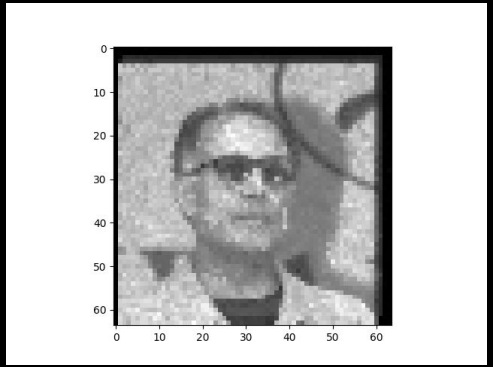
Results for different noises with our model trained on 5 images with patch size = 2

Speckle Noise

Before



After COBRA denoising

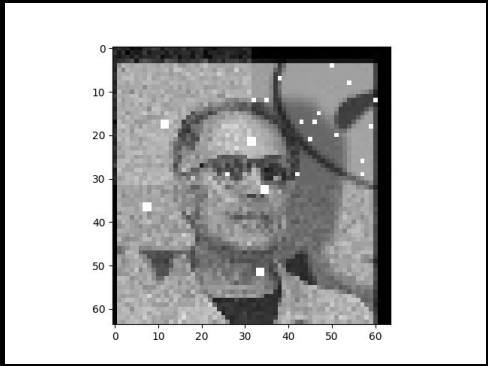


Results for different noises with our model trained on 5 images with patch size = 2

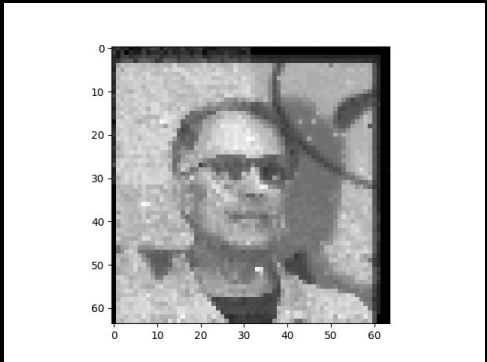
The Ultimate Test!!!

Multi-Noise

Before



After COBRA denoising



Thank you!