Blind Deconvolution

By Sang Moon

Blind Deconvolution

- Davey blind deconvolution Algorithm.
- https://github.com/hayden-brown-nz/bid_presentation
- May work better if there is one object in the center of image such as a star in the sky.

Algorithm summary:

- Image is blurred by point spread function (psf)

Blurred image (b) = scene (perfect image) (f) $\otimes$ point spread function(psf)

$\otimes$ is convolution

- After taking Fourier transform, convolution is same as multiplication.

B =F x PSF

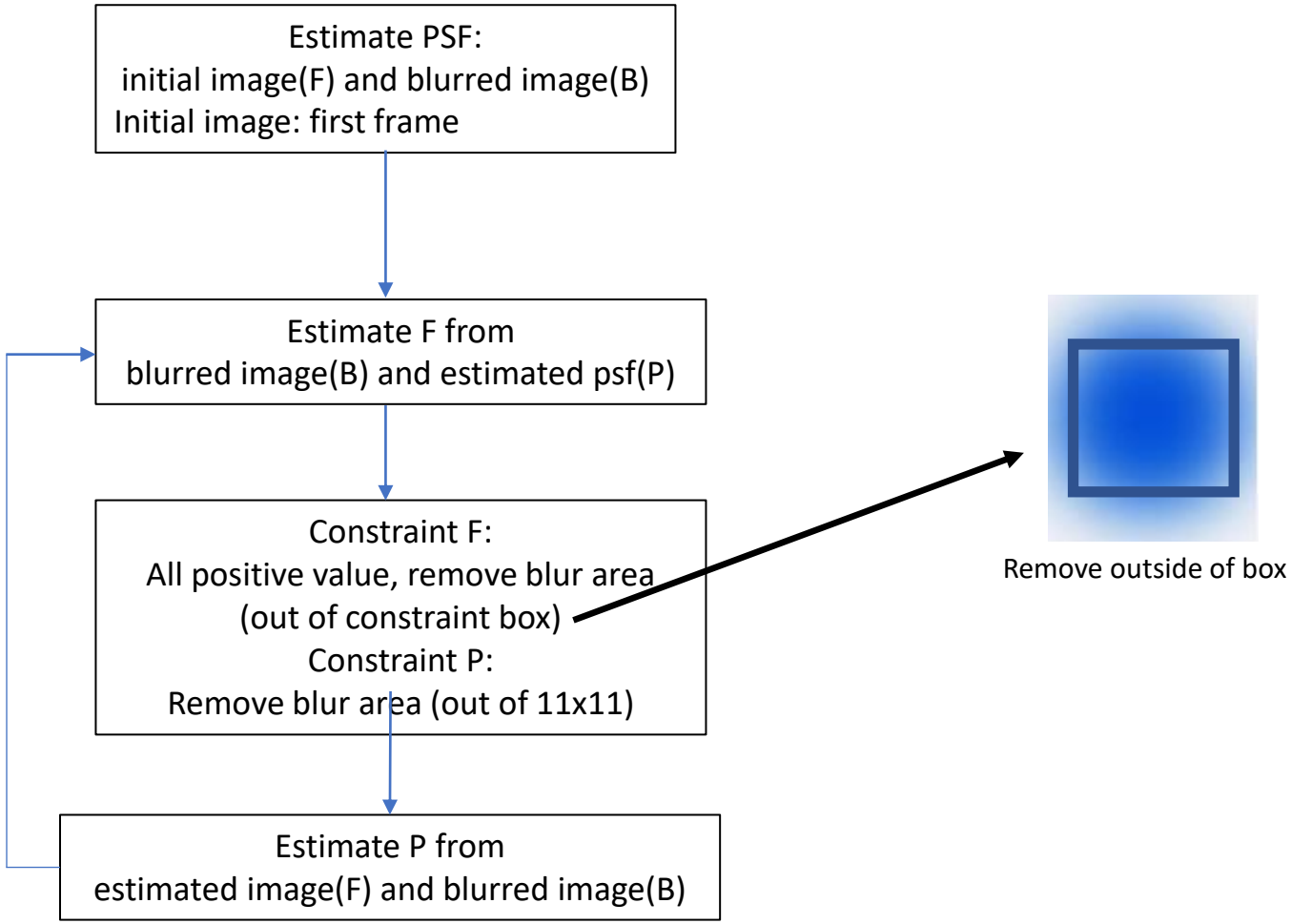
- PSF can be estimated by dividing blurred image by true image.

$$PSF = \frac{B}{F}$$

- True image is estimated by blurred image divided by PSF

$$F = \frac{B}{PSF}$$

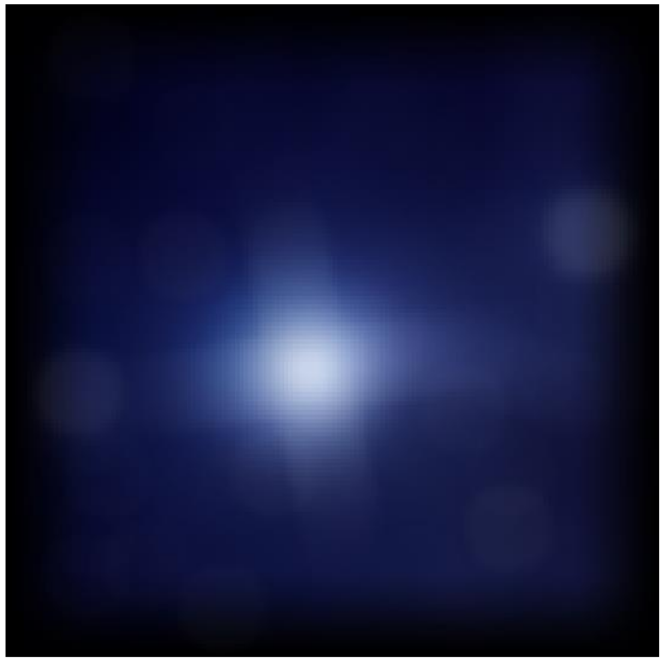
Blind Deconvolution



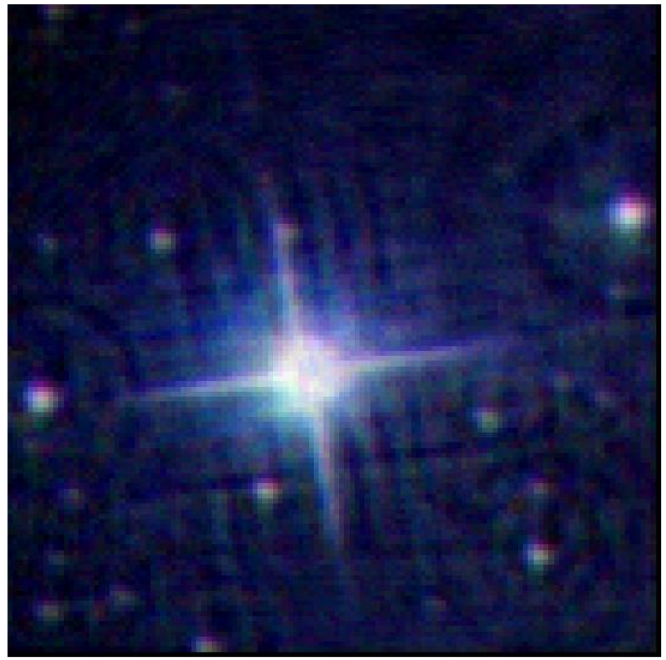
Blind Deconvolution

- Sample image

True image

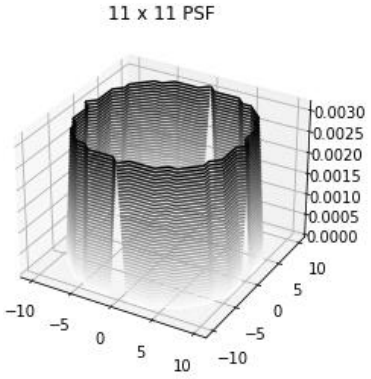


Degraded image



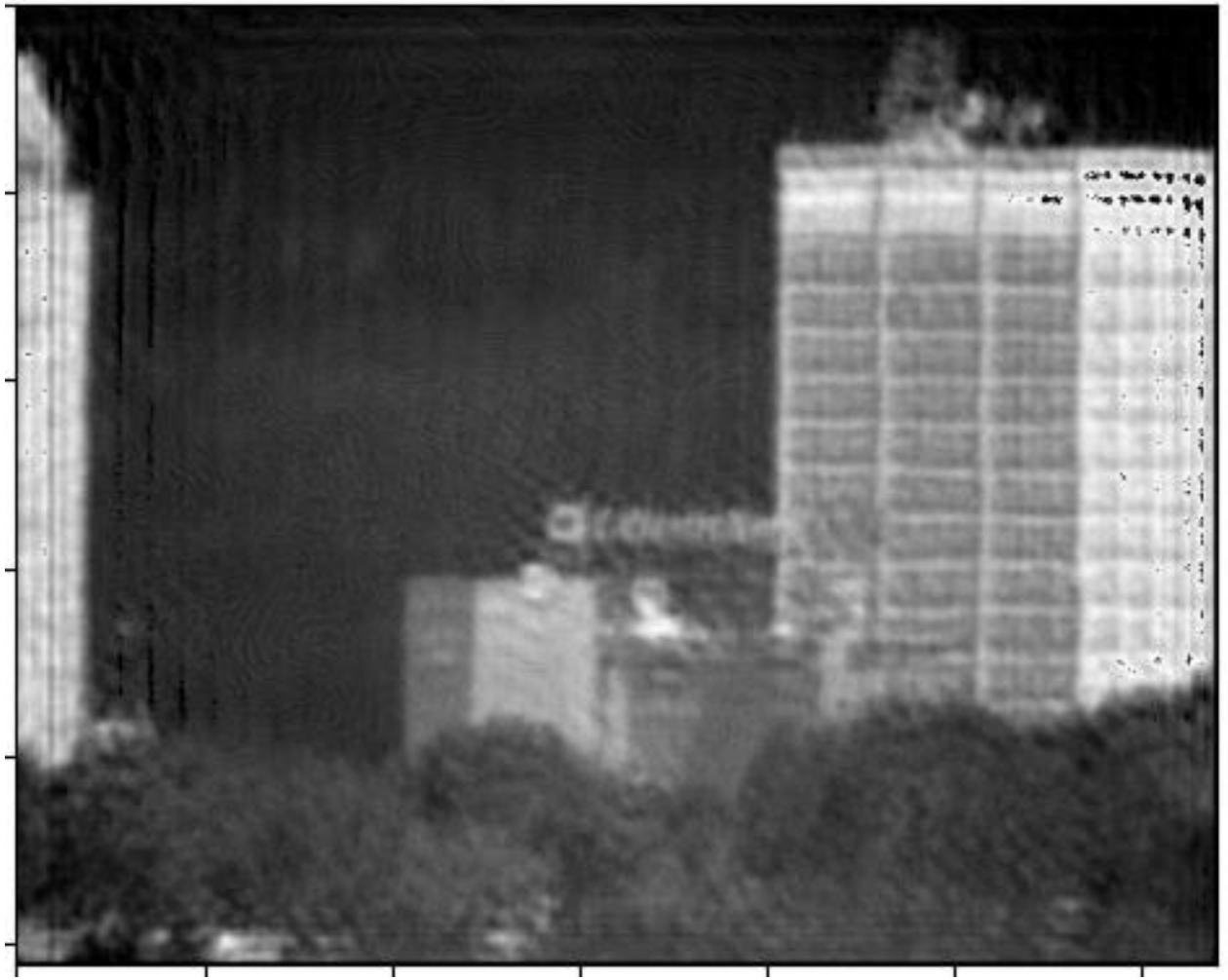
Restored image

Degraded method:
convolve image with 11 x 11 PSF



Blind Deconvolution

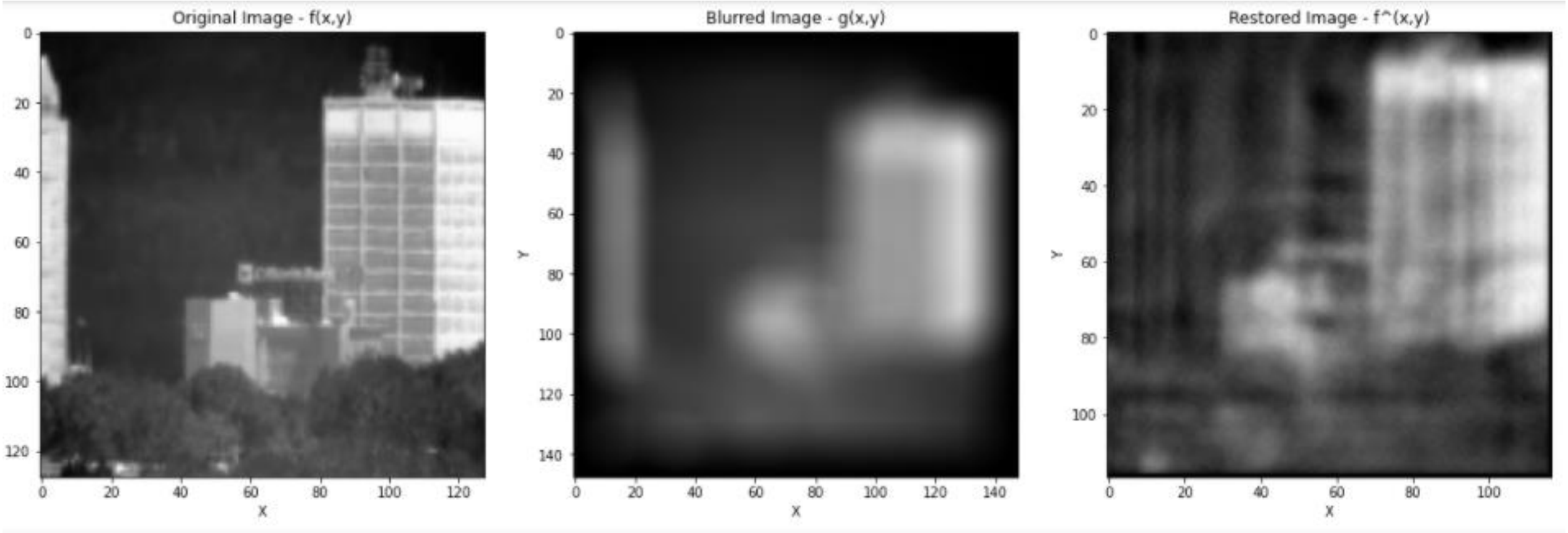
Input image: degraded by 11 by 11 PSF



Result after 873 iterations

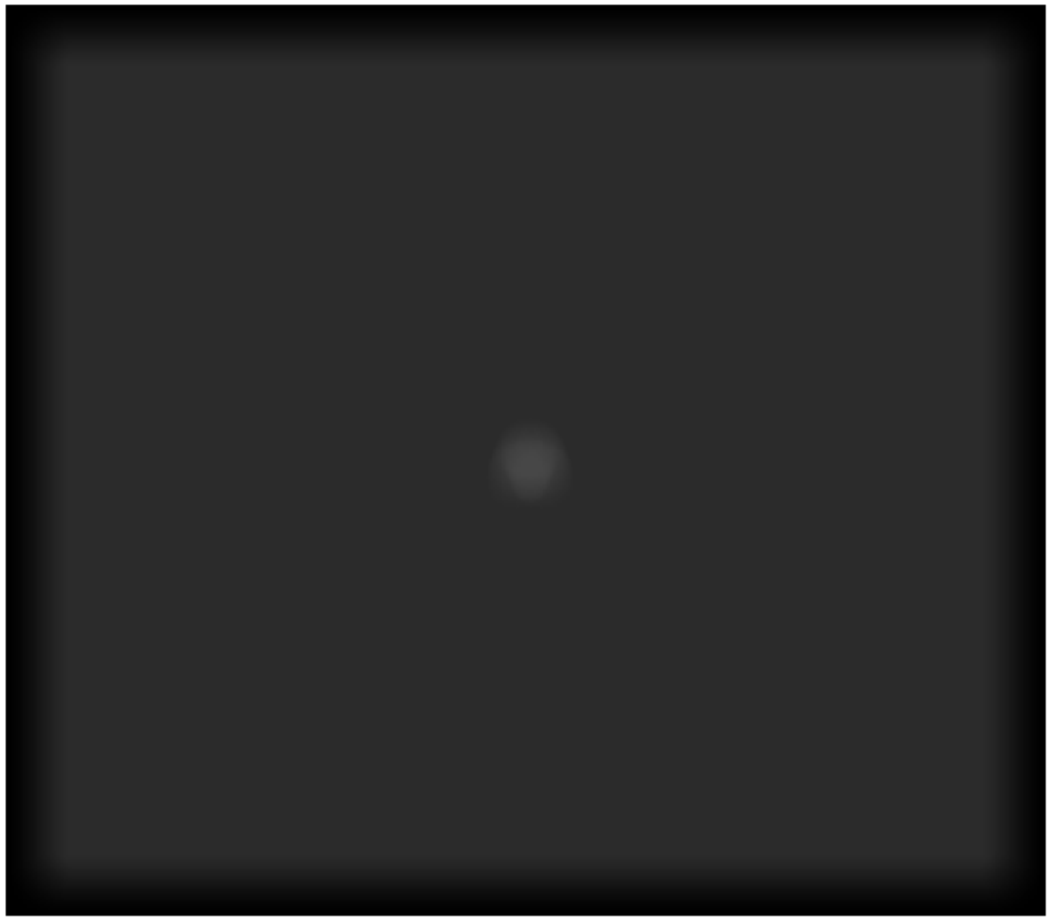
Blind Deconvolution

Result of image with same size as sample image (128 x 128)

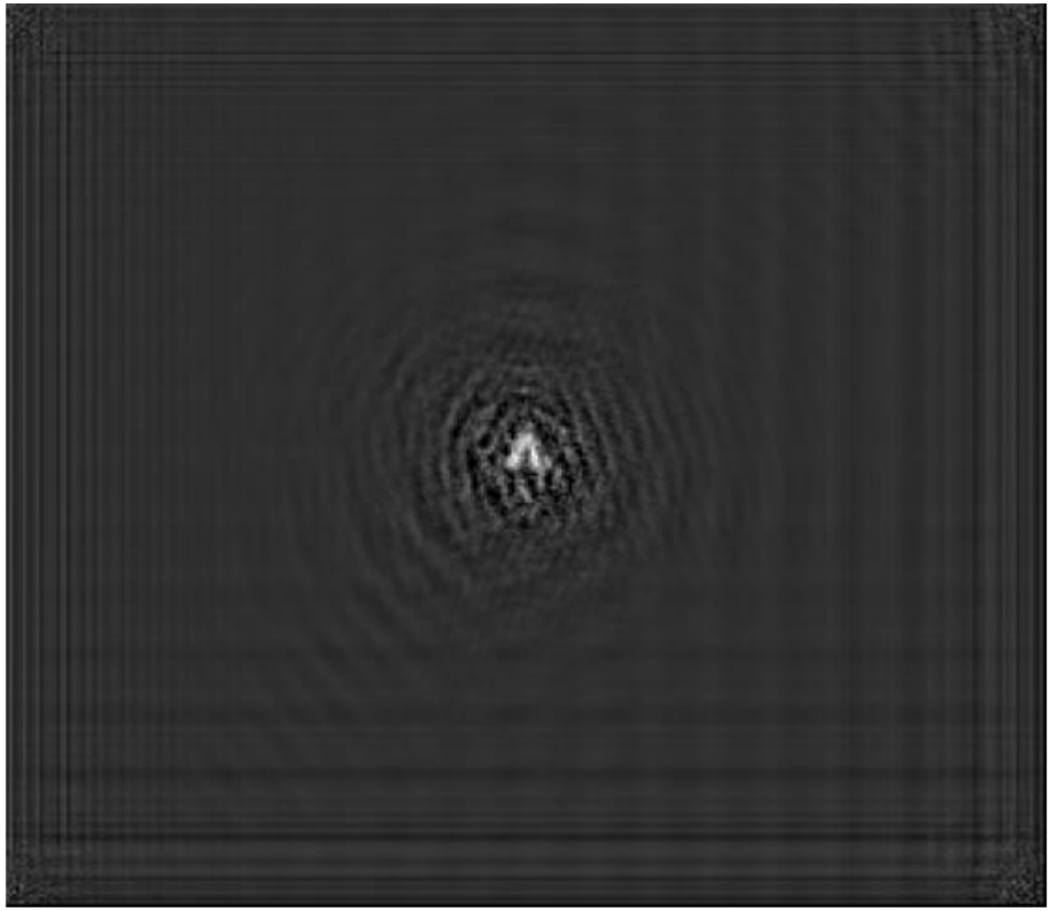


Blind Deconvolution

Synthetic image test: input image is blurred image, “A” in the center in dark background.
Algorithm worked well when object is in the center.



Input



Result