

Deconvolution in images

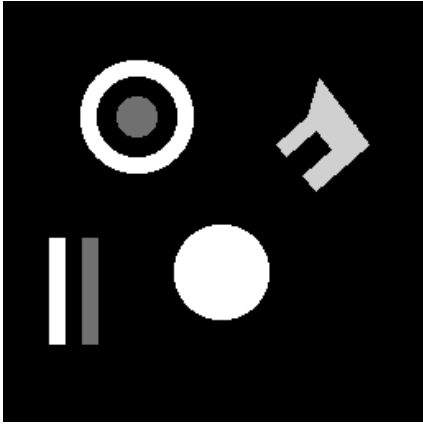


Shira Faigenbaum

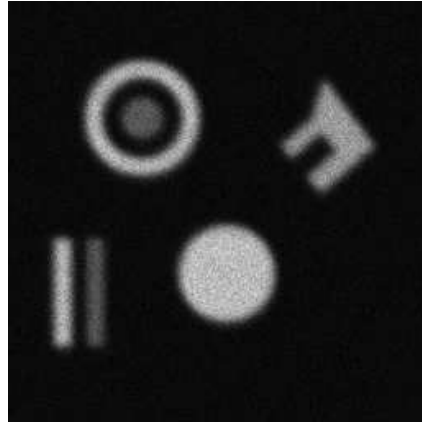
Non blind deconvolutions

Richardson-Lucy

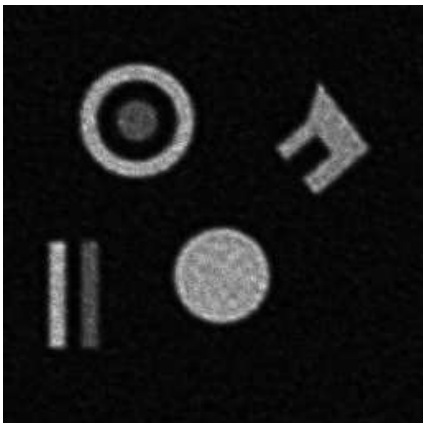
Richardson-Lucy



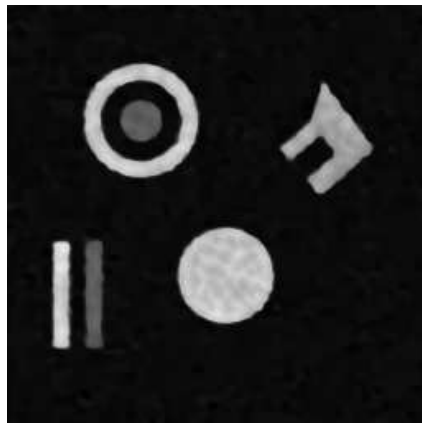
a) Original image



b) Blurred image. This is the original convolved with poison noise



c) Deconvolved from (b) using RL



d) Deconvolved using RL with TV regularization

Richardson-Lucy



Deconvolution - Moon
Even when an image is reasonably good to the naked eye, deconvolution can bring



After a little processing with Lucy Richardson deconvolution, a lot more detail is visible, especially in the seas and around the rims of the craters

Non blind deconvolutions

MAP – Maximum a posteriori

MAP



a)Original image



b)Blurred image



$\sigma_D^2 = 100$



$\sigma_D^2 = 25$

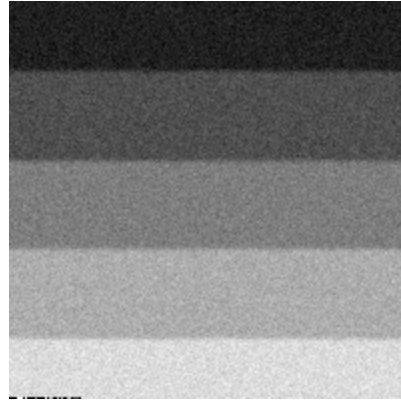


$\sigma_D^2 = 1$

MAP with weights



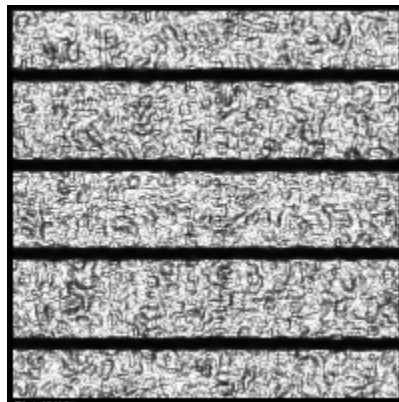
a)Original image



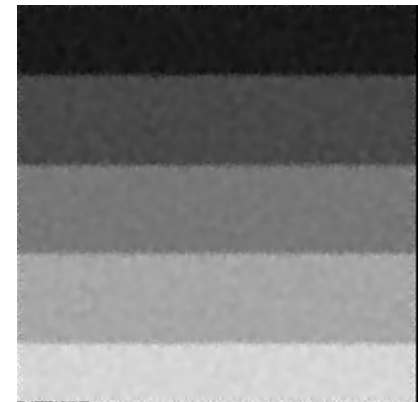
b)Blurred image



Map



weights Matrix



Map with weights

Blind deconvolutions

$\text{MAP}_{x,H}$

MAP_{x,H}



a)Original image



b)Blurred image



MAP_{x,H}, no edges reweighting



MAP_{x,H}, edges reweighting

Blind deconvolutions

MAP H

MAP H



a)Original image



b)Blurred image

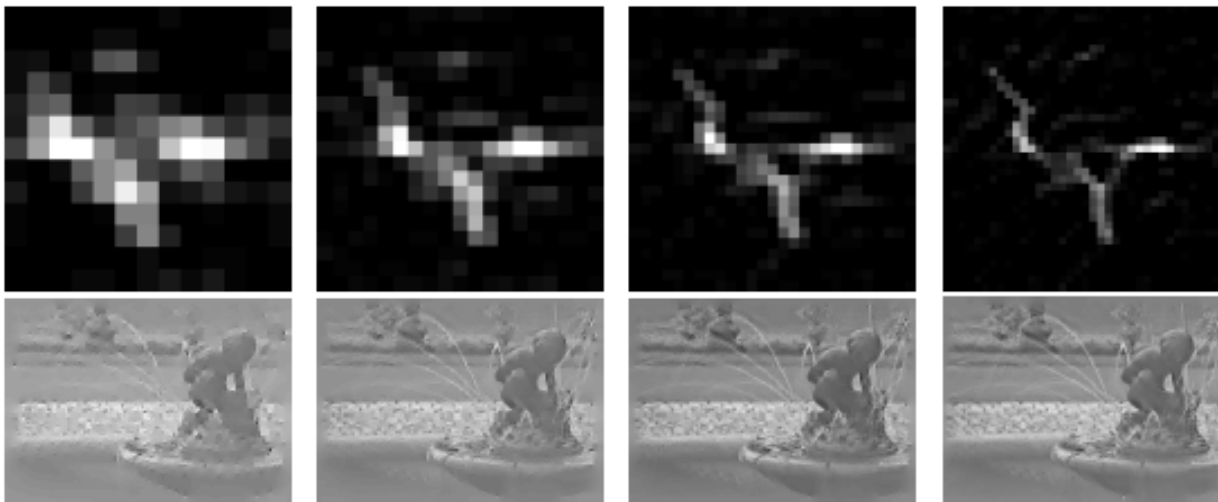
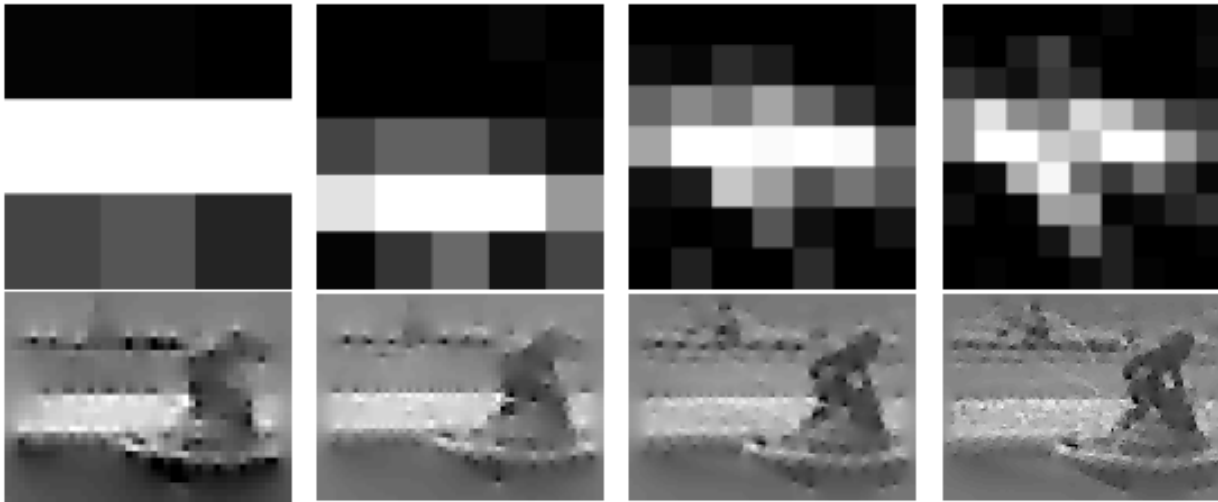


Gaussian

Blind deconvolutions

Fergus Alg.

Fergus iterations example



Fergus results



original



bluer



Comparing results



Lucy Richardson



sparse prior (levin et al.)

Comparing results



original



Blurred

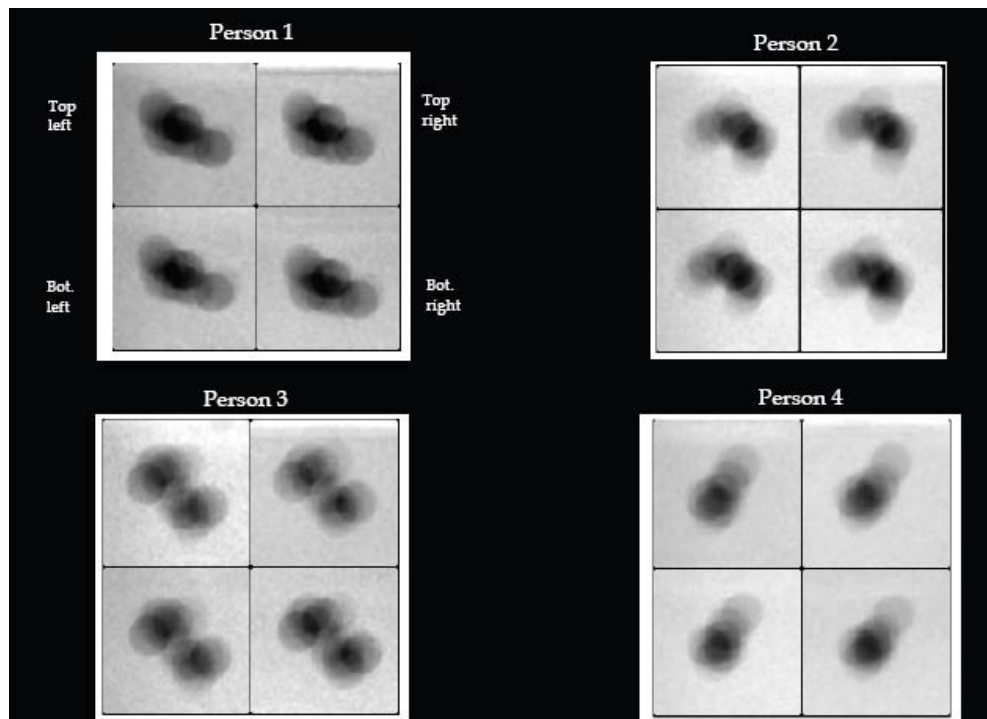
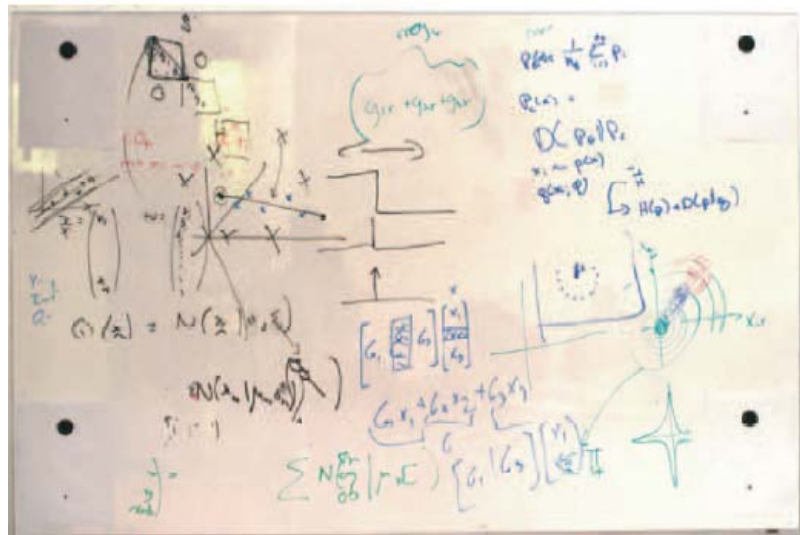


Richardson Lucy

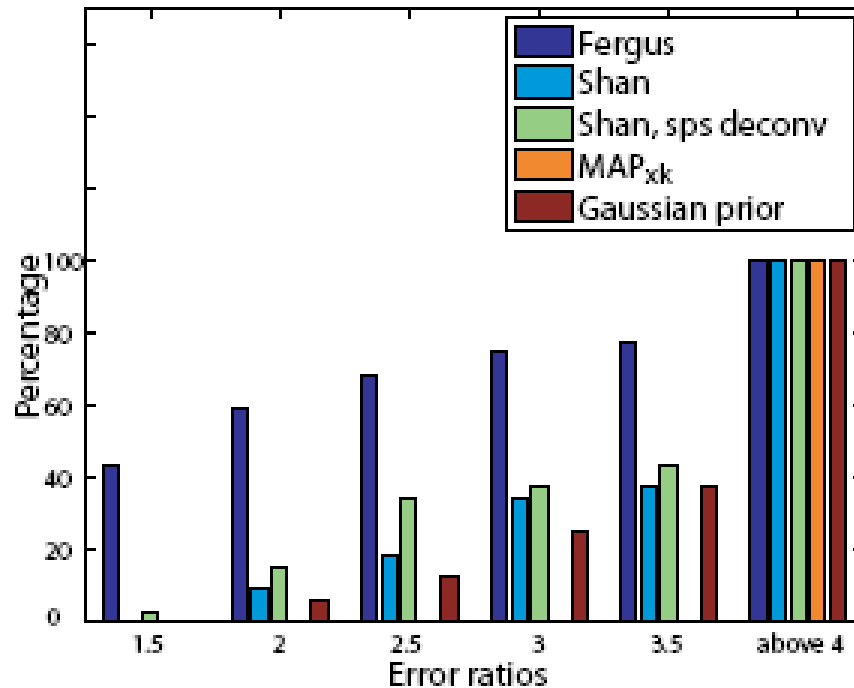


Fergus

Fergus cont.



Comparing between the blind algorithms



The percentage of test examples achieving error ratio below specific value