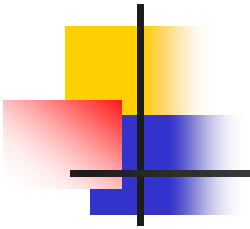

Math 3360: Mathematical Imaging

Lecture 19:
Anisotropic diffusion of image denoising & Energy minimization models

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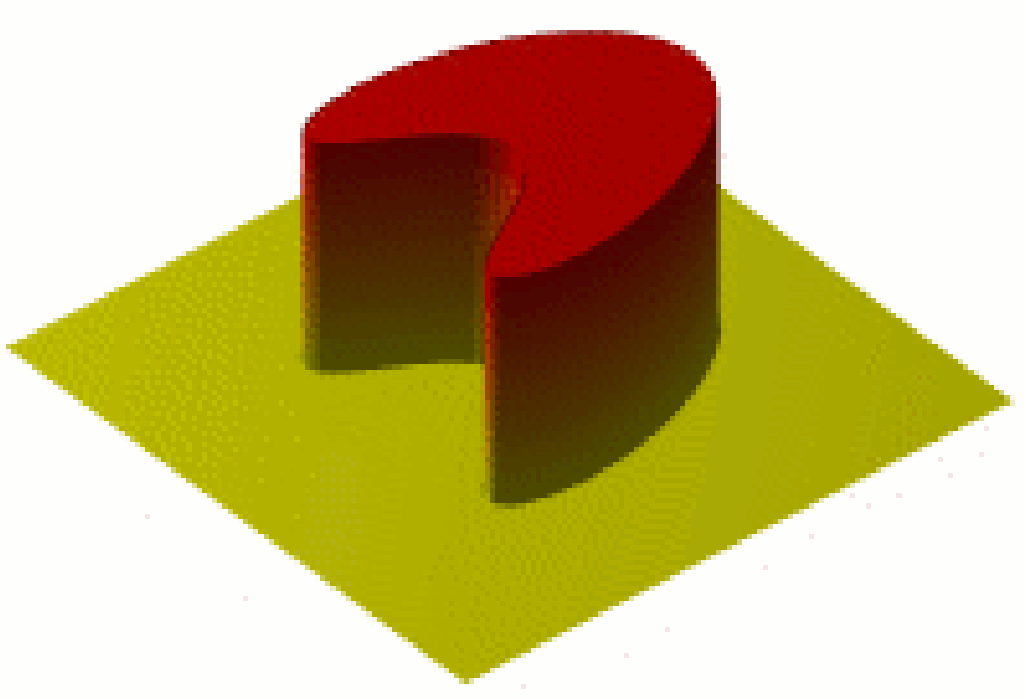
Isotropic diffusion



Isotropic diffusion

Original image

Sigma = 1.98

Sigma = 4.28

Sigma = 8.24

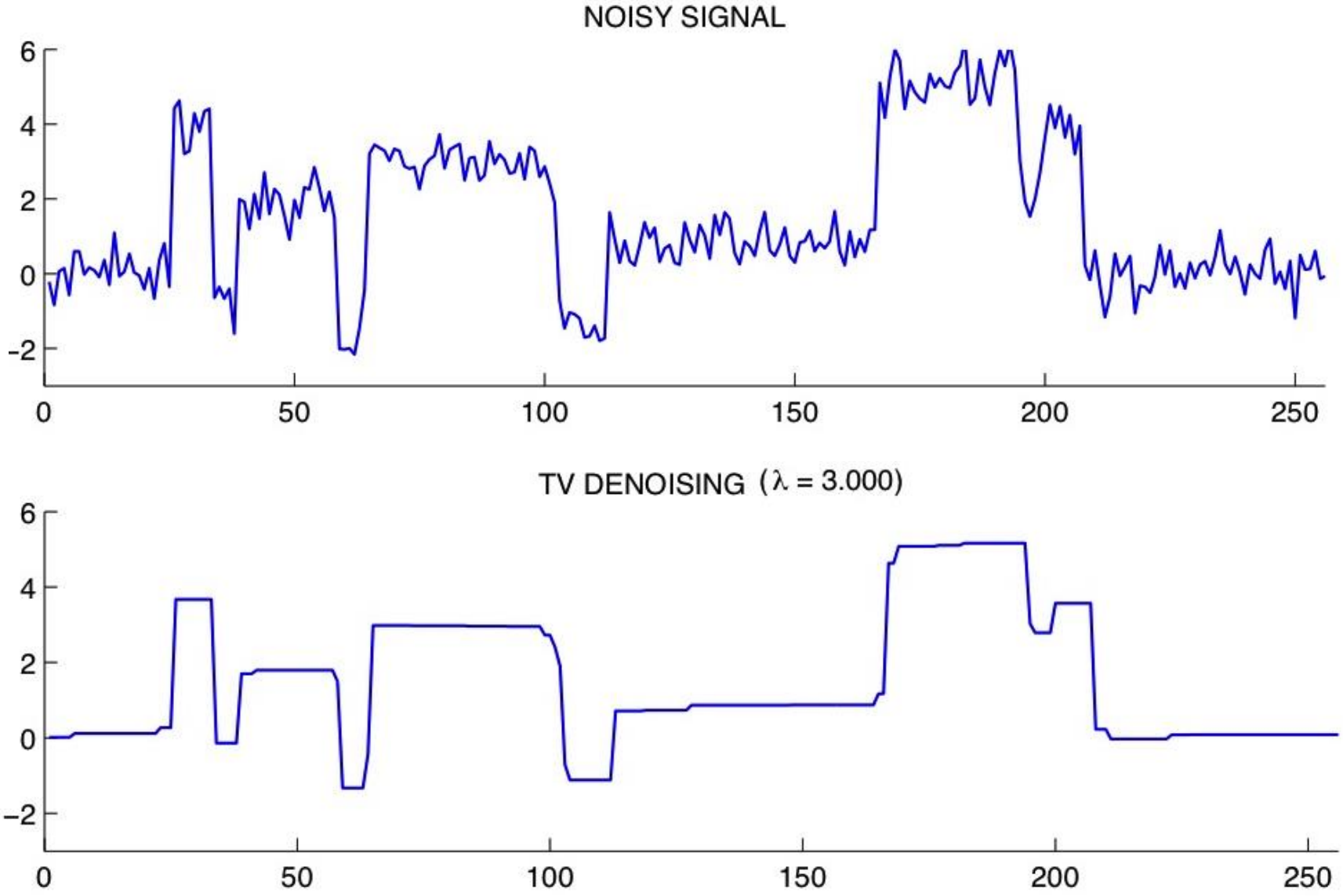
Anisotropic diffusion

Seven iterations

Fourteen iterations

Twenty iterations

TV denoising: 1D illustration



TV denoising favor piecewise constant functions

Gaussian filter

Noisy image

Gaussian filter/Isotropic diffusion

TV/ROF denoising

Noisy image

ROF

TV/ROF denoising

Original

Noisy image

Denoised image

TV/ROF denoising

Noisy

TV Denoised

TV/ROF denoising

(a)

(b)

Intermediate

(c)

final

TV/ROF denoising

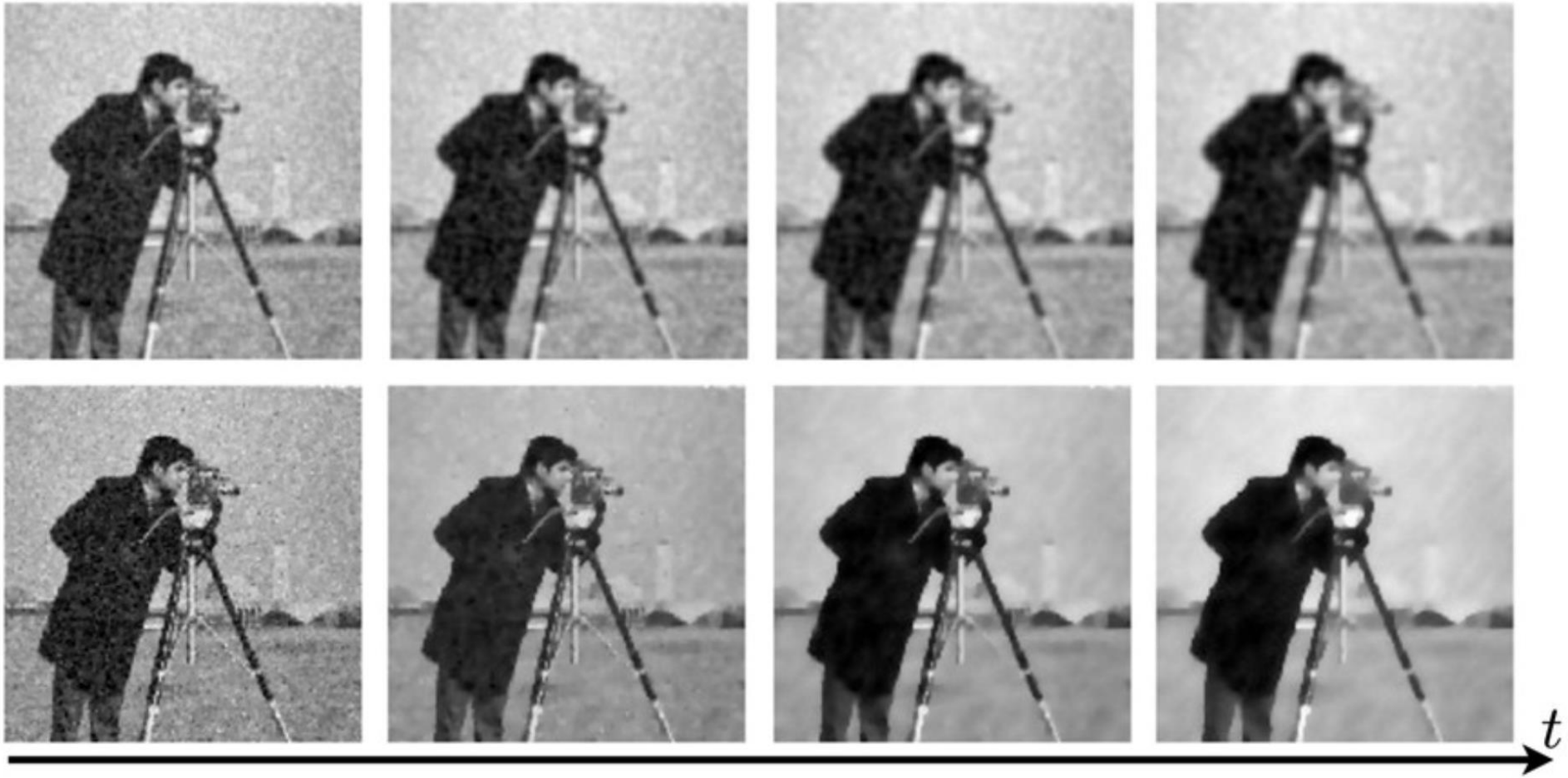
Original noisy image of Elaine and the one with 20% Guassian noise.

TV/ROF denoising

Steady state solutions to the ROF function with λ given by 0.005, 0.010, 0.020 and 0.050.

TV/ROF denoising

Top: Image denoising using L2 norm of gradient
Bottom: Image denoising using TV/ROF model



TV/ROF deblurring

Blurred + Noise

Basic

Total Variation (TV)