

# PDE-project (module B)

## Image restoration using PDEs



Peterson, Science  
vol 161, p. 299-300  
(2002)



# Basic version:

**Download** or create a grayscale **image** (matrix) or create a photo.

Create a **mask**, i.e. a matrix with values 1 or 0, where 0 corresponds to a missing pixel ("graffiti-sprayed" region) and 1 corresponds to a non-missing pixel.

Solve numerically the **Laplace equation** for the missing region using the intensities at the edges of the missing region as boundary values (harmonic inpainting).

To quantify how successful the image restoration was introduce a "**discrepancy score**" between the graffiti-sprayed regions from the original image and the restored images.

# Advanced version    Try to improve upon the basic method.

For instance:

Solve the diffusion equation (long times) also including a force term into Laplace equation (how to determine the force?)

Include an anisotropic or spatially-varying diffusion constant

Change the boundary condition.

Consult one of the alternative methods available in the literature (see references in hand-out)

Or, even better, come up with some method of your own!

# Presenting your results:

Oral presentations, see Canvas Schedule