TADI - Scale space - practical work

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This practical work is dedicated to the implementation and the study of various diffusion numerical schemes seen during the lecture. Possible languages are : C, C++, Python/Numpy and Matlab. If you prefer C/C++ you can use the library `imlib2` to read images (see `c/imlib.c` for an example).

The directory `tmp/` contains some images illustrated in the lecture, but we can use your own images.

We have to produce a PDF report, provide source code, demonstrator for each experiment and submit your work on Moodle by January 25, 2023, 23 :00.

Exercise 1

Write a code implementing the 2-D forward and centered numerical scheme of the heat equation (see lecture, Eq. (19) slide 89, for a 1-D scheme). Space step is set to 1, time step is chosen by the user. Experiment the CFL condition.

Exercise 2

Write a code implementing the Perona-Malik scheme, such that given in lecture slides 111. You can use a linear interpolation and/or the simplification given in slide 112, and compare the results.

Exercise 3

Write a code implementing the "Edge Enhancing" scheme such that described in slides 130 and 131.

Exercise 4

Write the 2-D heat equation using an implicit scheme. Experiment the absence of CFL condition.