BIL 717 - Image Processing

HACETTEPE UNIVERSITY
Department of Computer Engineering

Problem Set 2
Spring '2011-2012
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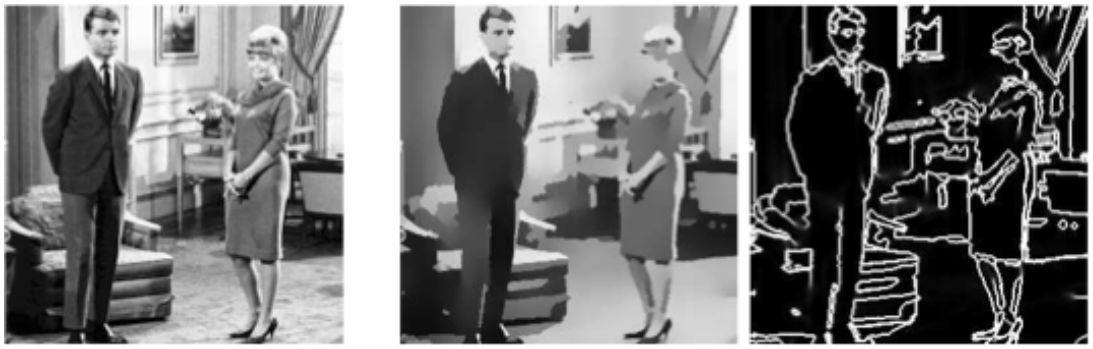
Filtering in Spatial Domain

Due Date: 01:30pm on Tuesday, April 10th, 2012



Overview

The goal of this assignment is to segment images using Ambrosio-Tortorelli formulation.

Details

You will implement the Ambrosio-Tortorelli (AT) formulation [1]. Your program will take a grayscale image as input and produce a smoothed version of it and the corresponding segmenting contour as the main outputs. It should have the following structure:

1. Read the input image.
2. Set the parameters of the model.
    - scale-space parameters: α and β
    - smoothing radius: ρ
3. Perform segmentation.

You have previously provided a linear diffusion code. You can use that code together with the skeleton given in the webpage to implement the AT model.

In your reports and the related experiments, you should address the following issues:

- Relation between the Perona-Malik [2] diffusion model and the AT formulation (try to obtain nearly equivalent results using the relation discussed in your lecture notes)
- Effects of the parameters on the segmentation results (considering the discussions held in the class)

What to Hand In

You are required to submit all your code along with a short report in *HTML*. For that purpose, prepare a folder containing

- `README.txt` *(text file containing details about your project)*
- `code/` *(directory containing all your code)*
- `html/` *(directory containing all your html report, including your images)*
- `html/index.html` *(html report)*

Archive this folder as `pset2.zip` and email to my email address (`erkut@cs.hacettepe.edu.tr`).

Your HMTL report should contain a brief overview of the problem, and your comments about the experimental analysis on the aforementioned issues. Please do not include any code in your reports.

References

[1] L. Ambrosio and V. Tortorelli, On the approximation of functionals depending on jumps by elliptic functionals via Γ-convergence. Commun. Pure Appl. Math., 43(8):999-1036, 1990.

[2] P. Perona and J. Malik. Scale-space and edge detection using anisotropic diffusion. IEEE Trans. Pattern Anal. Mach. Intell., 12:629639, 1990.