Hacettepe University Computer Engineering Department

CMP717 – Image Processing

Homework 2

Image Segmentation

In this experiment, you will analyze and discuss the effectiveness of image segmentation filters in some not-so-special conditions.

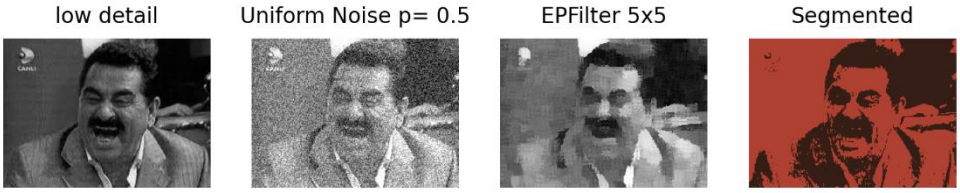
Preparation

In the first experiment, you analyzed some edge-preserving filters in noisy image conditions. You are going to use the experience you obtained from this experiment.

First, choose **four** segmentation methods - Clustering based / Split-Merge / Graph-based / Auto-Thresholding (e.g. Otsu) (**three** if you are a single-person group). You can use two classes for parametric methods. Use intensity values as features. You may implement or find the implementation of these methods. You can use any environment (python, OpenCV, Matlab, etc.)

I'll provide one image set containing low, medium and high details (medical images).

You'll add uniform noise to these images. Then you'll experiment effect of edge-preserving filters on segmentation.



(Quote: *Look, I'm a son of a scumbag, I'm trying hard not to cry.*)

Experiment

You have an edge-preserving filter of your choice (EPF).

- You have two filter sizes 5x5 and 15x15. If filter sizes do not apply to your choices, change and state the situation in your report.

You have Uniform Noise to apply (U).

- Uniform noise should be distributed between 0 and 255
- Apply the noise in 0.1, 0.5, and 0.8 probability. (0.1 prob means %10 of the pixels will be distorted)

You have a set of images (S – medical).

- Change images to grayscale.

Experiment Flow

Image set S

- Apply U noise
  - None
    - Apply filter
      - None
      - For 5x5
      - For 15x15
  - 0.1 probability
    - Apply filter
      - None
      - For 5x5
      - For 15x15
  - 0.5 probability
    - Apply filter
      - None
      - For 5x5
      - For 15x15
  - 0.8 probability
    - Apply filter
      - None
      - For 5x5
      - For 15x15
- Apply all segmentation methods separately and present the results in your report.

Submission

Codes

Submit the codes for your experiment.

Report

Introduction:

- Briefly (in one or two paragraphs) describe why you chose the EP filter in your HW.
- Briefly (in one or two paragraphs) describe the segmentation methods you choose.

Tools:

- Which environment and preparations need to run your experiment?

Results:

- Necessary code samples to create the images and the outcomes(images) with proper description.

Discussion:

- What are your observations about different filter sizes?

- Which segmentation method is better in different noise and detail cases? Provide your opinions and observations. This is a highly subjective point of view; just stick with your observations.

References:

- List all references you've used in the experiment.