Medical Image Processing

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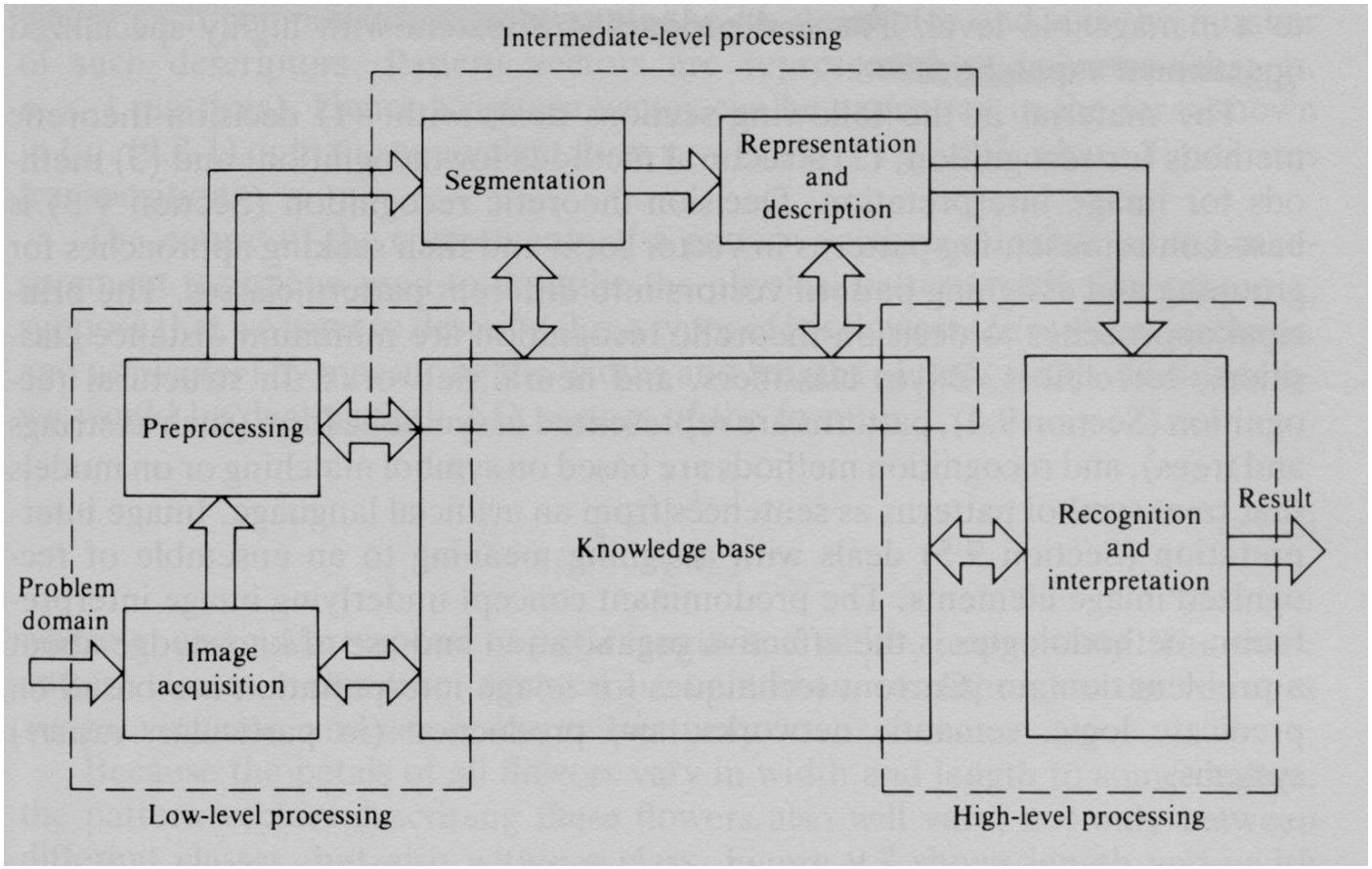
Levels of Processing



Levels of Processing

Low-level processing
- Prosedur standar diterapkan untuk meningkatkan kualitas gambar
- Prosedur tidak memerlukan kemampuan cerdas.

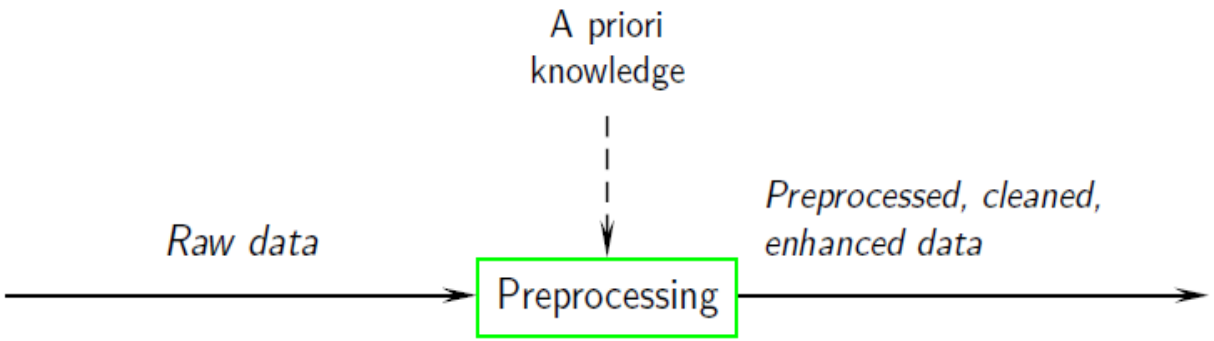
Intermediate-level processing
- Mengekstrak dan menganalisis komponen dalam gambar
- Beberapa kemampuan cerdas diperlukan.

High-level processing
- Pengenalan dan interpretasi.
- Prosedur memerlukan kemampuan cerdas yang tinggi.

Preprocessing

Examples:

Noise suppression, contract enhancement, intensity equalization, outlier elimination, bias compensation, time/space filtering, . . .



Preprocessing

- Enhancement
- Filtering
- Registration
- Calibration
- Transformation

Enhancement

The objectives of image enhancement techniques is to process an image so that the result is more suitable than the original image for a specific application .

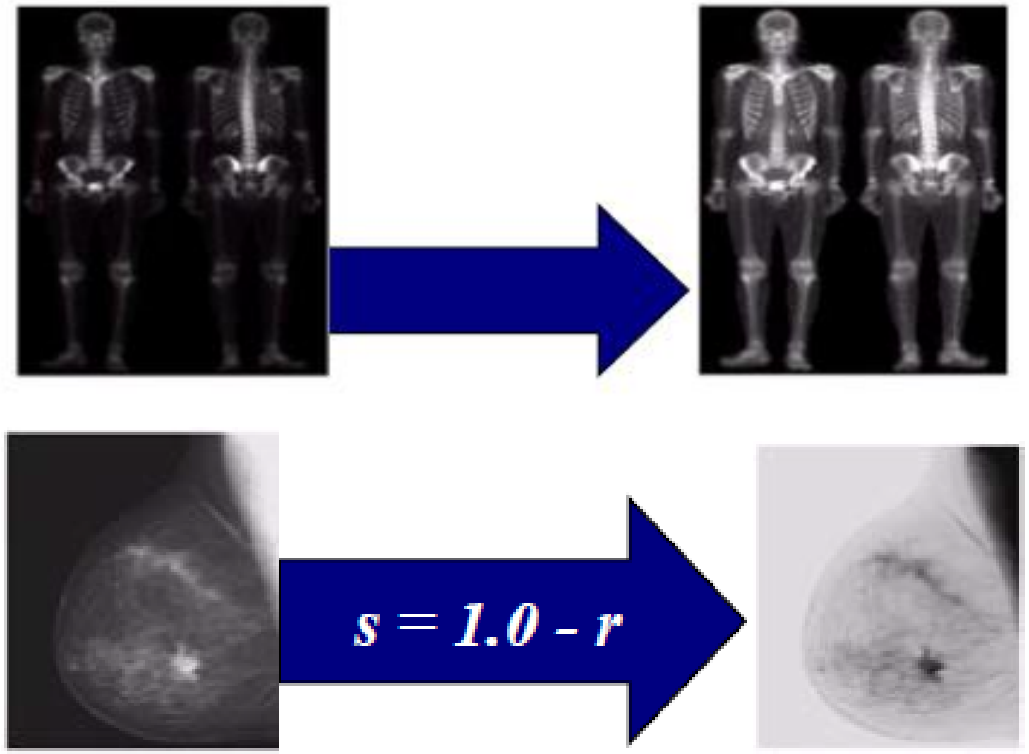
Image enhancement techniques can be divided into two broad categories:

1.Spatial domain methods .
- Point Processing
- Histogram Equalization
- Image Subtraction

2 Frequency domain methods.
- Fourier transform

Enhancement

Example

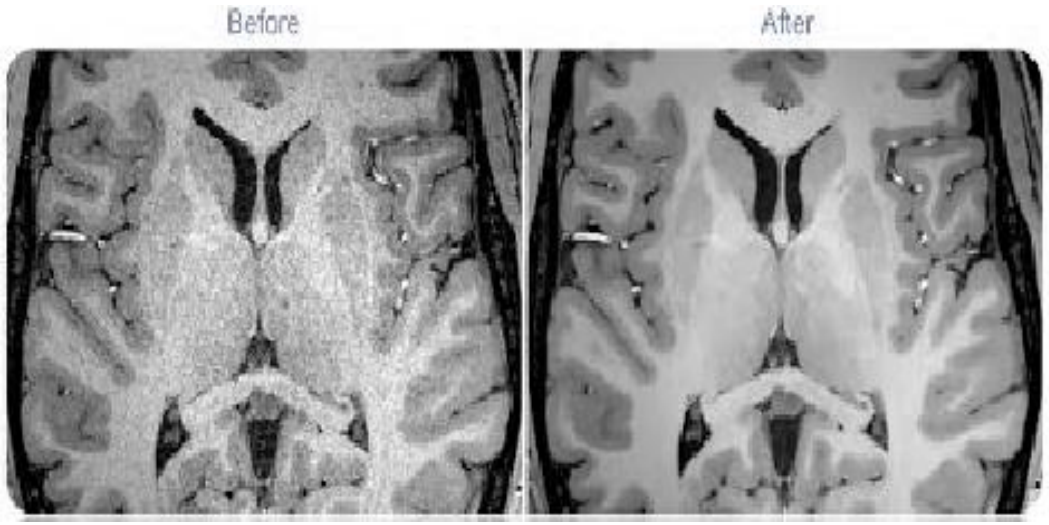


Filtering

The objective of filtering is to remove noise.

Techniques

- Averaging Filter
- Median Filter
- Max/Min Filter

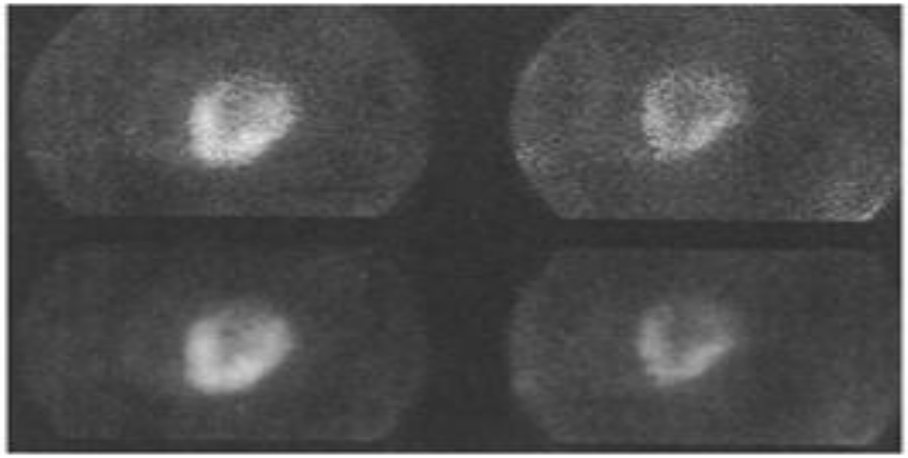


Smoothing

The aim of image smoothing is to diminish the effects of camera noise, spurious pixel values, missing pixel values etc.

Two methods used for image smoothing.

- Neighborhood averaging and
- Edge-preserving smoothing.

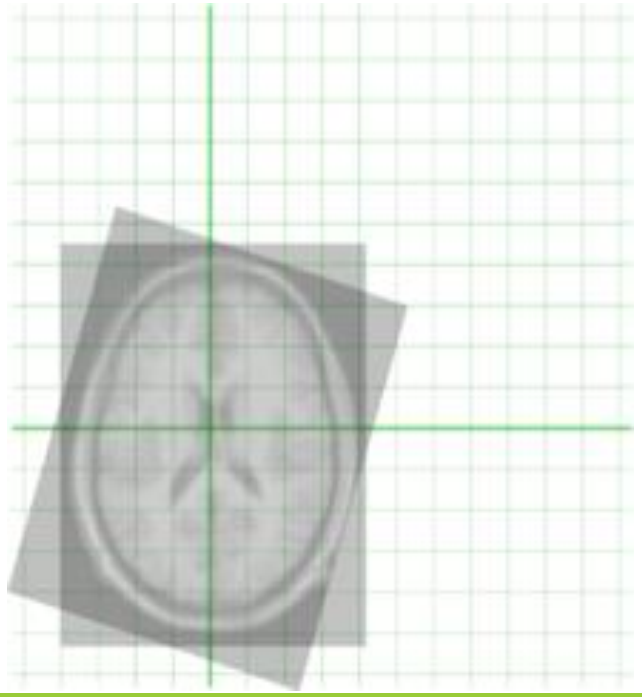


Registration

Medical image registration, for data of the same patient taken at different points in time such as change detection or tumor monitoring.

Unimodal Registration

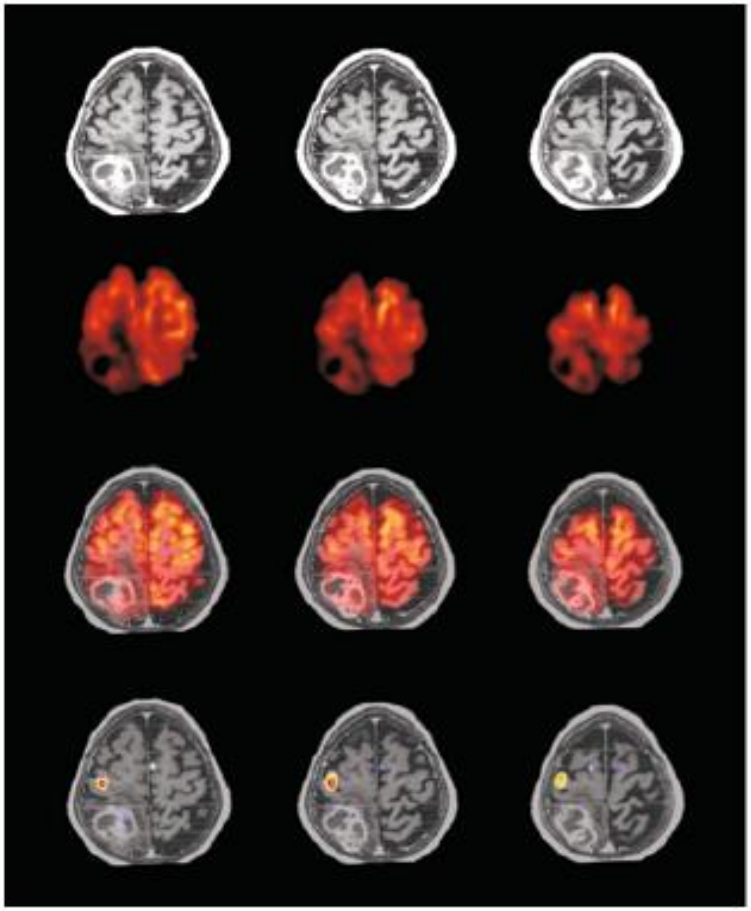
This term refers to the relative calibration of images that have been acquired with the same modality.



Registration

Multi-Modal Registration

The images to be compared are captured with different modalities.



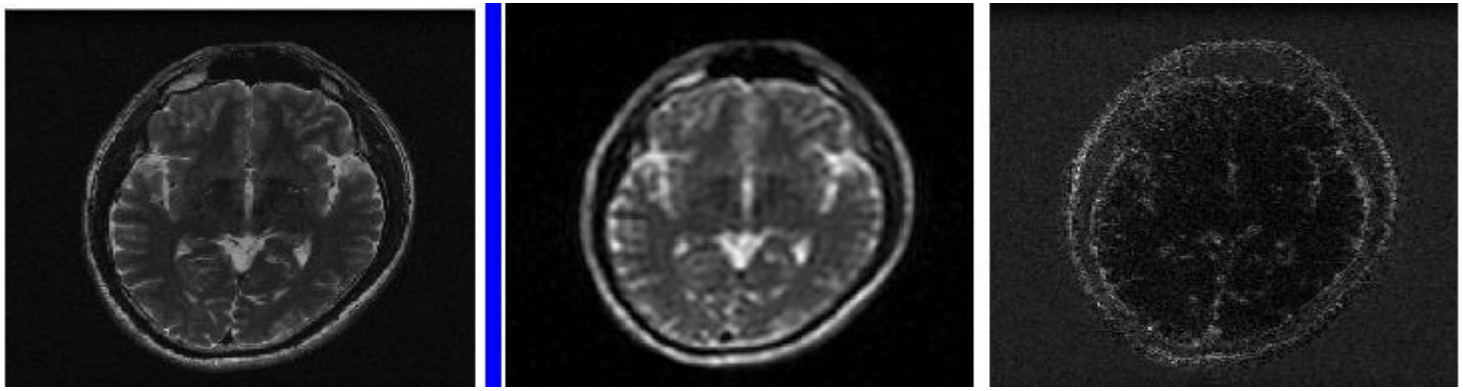
Transformation

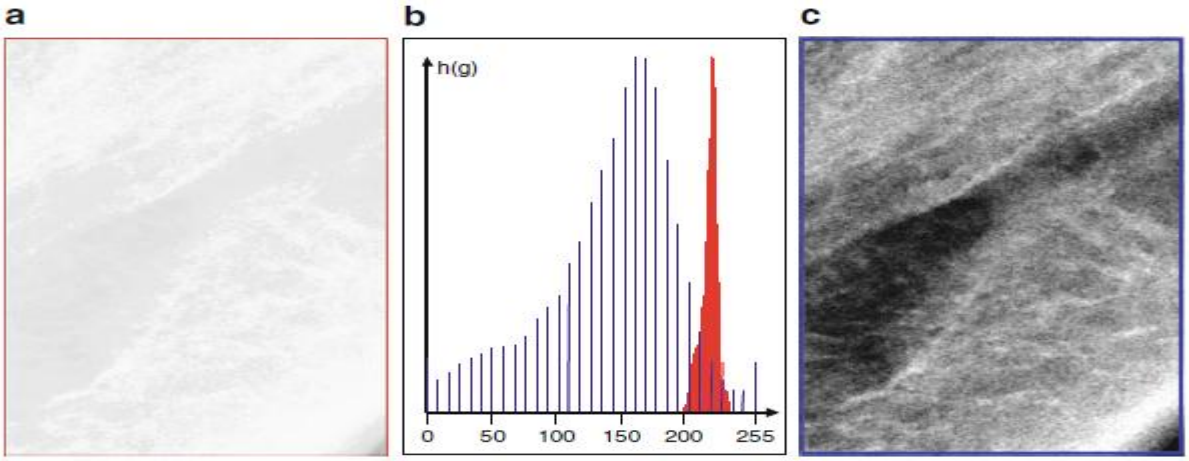
Image transforms can be simple arithmetic operations on images or complex mathematical operations which convert images from one representation to another.

The transformation is intended to select the most prominent or relevant features.

- Discrete Fourier Transform DFT
- Discrete Cosine transform DCT
- Discrete Wavelet transform DWT

Example





Thank You!!