

KU LEUVEN

COMPUTER VISION

ERASMUS PROGRAM

Incisor Segmentation

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Radiographs are images inherently noisy. In order to locate the teeth precisely, the original radiographs should be converted in images as noiseless as possible, but sharpen enough to locate the edges of the teeth. For this purpose the following algorithms and transformations are used:

1. **Non-Local Means Denoising** - This algorithm performs denoising replacing the color of a pixel with an average of the colors of similar pixels. With the correct parameters, the result will have less noise than the original image, maintaining the image sharp.
2. **Top hat** - Is the difference between an input image and its opening. It extracts small elements and details from given images. The result of this transform is subtracted to the original image to remove objects that are brighter than the surroundings.
3. **Black hat** - Is the difference between an input image and its closing. It performs the opposite effect than top hat. The result of this transformation is subtracted to the original image to remove objects that are darker than the surroundings.
4. **CLAHE** - This name stands for Contrast Limited Adaptive Histogram Equalization. In this, image is divided into small blocks called "tiles". Then each of these blocks are histogram equalized as usual. If any histogram bin is above the specified contrast limit those pixels are clipped and distributed uniformly to other bins before applying histogram equalization.
5. **Edge detection with Sobel and Laplacian** - Sobel edge detector is a gradient based method based on the first order derivatives. It calculates the first derivatives of the image separately for the X and Y axes. The Laplacian of an image highlights regions of rapid intensity change.