

AbstractID: 9846 Title: Radiographic Image Processing

Digital radiographs are processed for display presentation using methods that are optimized for the commonly obtained views of different body parts. Exposure recognition processes identify the image value range for regions of anatomic importance. Large region spatial processing equalizes image values in regions of high or low exposures and provides increased detail contrast. Small region spatial processing is used to both restore the sharpness edges and reduce quantum mottle. Finally, the grayscale characteristics of the presented image are defined by image value transformations. The generic methods used for these processes will be explained and illustrated in this session.

Digital radiography detector data is commonly corrected for non-uniformities and expressed as image values that are proportional to the logarithm of the recorded signal. The image values of interest (VOI) depend on the body part size and x-ray spectrum. Radiographic factors should be determined first by considering subject contrast and noise for important anatomic features. The appropriate processing for a specific radiographic varies depending on the body part and size, the view, and the radiographic factors. The guidelines for processing chest, urologic, skeletal, and mammographic images will be described and illustrated.

For processing radiographs, different companies use different numerical approaches. Equalization is done using large kernel convolutions, Fourier filters, or multi-scale processing. Particularly notable are the multitude of methods available for achieving noise reduction without causing edge blur. Representatives from several companies will explain the numerical methods used and how they are optimized for different body parts. For each, the factors that are available to the radiography to adjust image processing and their effect will be explained.

Currently, most digital radiographs are sent and stored in electronic archives as fully processed data for display presentation. New DICOM standard elements allow the grayscale transformation to be sent as a VOI lookup table. This allows adjustments in display values and contrast to be made during presentation. For some modalities, DICOM now formally defines how data can be specifically stored for processing by another computer. The methods now commonly used for electronic storage and display and the future direction will be explained.

Educational Objectives:

1. Learn how 4 generic methods for image processing are used to prepare digital radiographs for presentation.
2. Understand the guidelines used to process images of different body parts.
3. Learn how different products implement radiographic image processing.
4. Understand how processing operations are incorporated within DICOM standards.