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Q9

Ans: Preprocessing of digital Radiographic image.

A principal advantage of digital radiographic imaging over screen film radiographic imaging is the ability to pre or manipulate the image before and after display preprocessing and postprocessing respectively. Preimage processing and post-image processing alter image appearance usually for the

purpose of improving image contrast.

preprocessing of digital image is largely automatic.

pre processing is designed to produce artifact free digital image. In this regard

preprocessing provide electronic calibration to reduce pixel to pixel row to row and column to column response differences.

offset image and gain images are automatic calibration image designed to make the response of the image receptor uniform. Gain

image are generated every few ~~not~~ months and offset image are generated many times each days.

The preprocessing calibration technique are identified as flatfielding and are shown



averaging technique also ave  
reduce noise and improve  
contrast.

Digital imaging processing  
problem solution

Detect pixel interpolate adjacent  
pixel signal  
image lag offset contrast

Line noise correct from dark  
reference zone.

postprocessing the Digital  
Radiographic image.

postprocessing is where  
digital imaging shine. In  
contrast to pre processing  
which are largely automatic  
postprocessing require intervention  
by the radiologic technologist.  
postprocessing refers to anything  
that can be done to a  
digital radiographic image after  
it is acquired by the  
imaging system.

Postprocessing of digital images requires operator manipulations. Postprocessing of the digital radiographic image is performed to optimize the appearance of the image after it is acquired by the imaging system for the purpose of better detecting pathology. Annotation is the process of adding text to an image. In addition to patient identification annotation is often helpful in informing clinicians about anatomy and diagnosis. The larger matrix size digital display devices have better spatial resolution because they have smaller pixel. They allow among other properties magnification of region of an image to render the smallest detail visible.



Digital image post-processing.

process

Results

Annotation:

Label the image  
Expand the digitized

Window and level:- expand the digitized  
gray scale to visible.

Magnification:- improve visualization  
and spatial resolution.

Image flip:- Reorient image  
presentation.

Image inversion:- Make white-black  
and black white.

Subtraction:- Improve image  
contrast. Register an  
image to correct for  
patient motion.

Region of interest:- Determine average  
pixel value for use  
in quantitative imaging.

Q2

Ans Spatial resolution:

Spatial resolution is the ability of an imaging system to resolve and render on the image a small high contrast object.

Black on white 1:8

high contrast but rather low contrast. The dots

arranged in size scaled from 10mm down to

50µm. Most people can see object as small as

200µm. Therefore the spatial resolution of the eye is

described as 200µm. If

the dots were not high contrast the spatial resolution of the eye would require larger dots.



## Contrast Resolution:-

One hundred percent contrast is black and white. The lettering on this page show every high contrast. Contrast resolution is the ability to distinguish many shades of grey from black to white. All digital imaging systems have better contrast resolution than screen film imaging. The principle descriptor for contrast resolution is Gray scale also called dynamic range. Dynamic range is the number of grey shades that an imaging system can reproduce.

Q4

Ans Liquid crystal display:

Active matrix liquid crystal display are fashioned pixel by pixel the AMOLED is a very intense white backlight that illuminates each pixel.

- Each pixel contains light-polarizing filters and film to control the intensity and color of light transmitted through the pixel.
- The difference b/w color and monochrome AMOLEDs involve the design of the filter and film.

Color AMOLEDs have red, green blue filter within each pixel fashioned into sub pixel each with one of these three filters.

→ Spatial resolution improves with the use of high megapixel digital display device.



~~Ans~~  
Ans

picture archiving and communication system.

A picture archiving and communication system.

When fully implemented allows not only acquisition but also interoperation in storage of each medical image in digital form without resorting to the film. (hard copy)

The projected efficiencies of time and cost are enormous.

→ PACS improves image input, preselection, processing, viewing, storage and recall.

→ The four principal components of a PACS are the image acquisition system, the network and display system and storage system.

Q3

Ans Dose Reduction with DR.

- Exposure should not be required repeated in DR because of brightness or contrast concerns.
- DR system cannot compensate for excessive noise caused by quantum mottle.
- Over exposed image do not have to be repeated and should not become a habit.

with acceleration to all digitized imaging we have the opportunity to reduce patient dose by 20% to 50% depending on the examination.

However quite the opposite often has occurred something that many call dose creep.

Because digital imaging can always yield a good image.



Q6

Ans DR Imaging Artifacts.

Three types

- Image Receptor Artifacts.
- Software artifacts.
- preprocessing artifacts.

Imaging Receptor Artifacts.

- Digital image receptor can suffer from rough handling scratches and dust.
- Artifacts produced by dust can be corrected easily with proper cleaning unless the dust is internal to crystals of a computed radiology imaging system.
- Digital Radiographic image receptor have unique artifacts associated with panel failure.
- Dust on any section of the CR optical path mirrors and lenses cannot be

corrected by the radiologic technologist and will require professional unit

### Software Artifacts:

Digital radiographic images are obtained as raw data sets.

- As such these images are ready for processing.
- For processing image are manipulated into "for presentation" image the radiologic technologist can use for QC and for interpretation by radiologist.

### Preprocessing artifacts:-

Before an image is prepared for processing several manipulations of the output of the image receptor may be necessary to correct



for potential artifacts.  
such artifacts can occur  
because of dead pixel  
row or column of  
pixel.

7

ns **Data Compression:**

The process of reducing  
the volume of data applying  
a compression technique is  
called compression.

→ The resulting data is  
called compression data.

**Difference b/w Lossy compression  
and Lossless compression.**

Lossy compression removes  
non-useful part of the  
data that is undetectable  
while lossless compression  
reconstructs the exact data.

Lossless compression can  
reduce the size of data.

- at low extent.
- 3 The quality of data degrades in case of lossy compression whereas lossless compression maintains the quality of data.
- 4 In the lossy technique the channel accommodates more data. Conversely channel holds a smaller amount of data in case of lossless technique.

Def:-

The lossless compression method is capable of reconstituting the original form of a data. The quality of data is not compromised. This technique allows a file to restore its original form. Lossless compression can be applied to any file format and can improve the performance of compression.



### Def Lossy Compression.

The lossy compression method eliminate some amount of data that is not noticeable. This technique does not allow a file to restore in its original form but significantly reduce the ~~file~~ size.

Q9

Ans

### Artifacts:

object artifacts can arise from the technologist error in patient positioning x-ray beam collimation and histogram selection.

- Backscatter radiation also can be troublesome b/c of sensitivity of the DR image receptor
- if a lots of scattering material is present behind the image receptor backscatter radiation can cause a

phenomenon image. If this type of artifacts is discovered the back side of the image receptor should be shielded to reduce back-scatter x-rays.

### Collimation and penetration.

- If the x-ray exposure field is not properly collimated sized and position exposure field recognition errors may occur.
- The result is very dark or very light or very noisy image.
- Automatic radiation field recognition is essential for artifact free image.
- Collimation of the projected x-ray beam is important for patient radiation dose reduction and for improve image contrast in screen film radiography.



partitioning of multiple digital image on a single IP result improper separation and collimation of each image.

### Alignment:-

Alignment of the exposure field on the (IP) is important in the same way and for same reason as collimation.

- When an image field such as that shown in figure is not oriented with the size and dimension of the IP image artifact can appear.

Q8

Ans Difference b/w for-processing image and for-presentation image.

Digital radiographic image are obtained as raw data set. A such these image are ready "for processing". "For processing" images are manipulated into "for presentation" image that the radiologic technologist can use for QC and for interpretation by the radiologist.