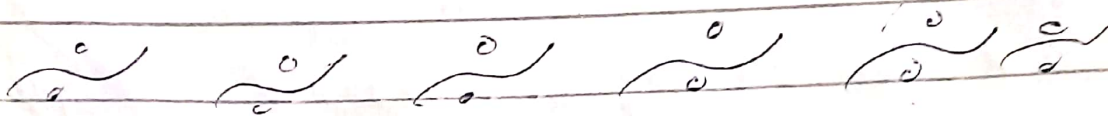


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Q # 1

Pre processing the Digital Radiographic
image.

* A principal advantage of digital radiographic imaging over screen & film radiographic imaging is the ability to manipulate the image before display - pre-processing and after display pre-processing.

* Primary process and post image processing after image appearance. usually of the purpose improving image contrast.

* pre-processing of digital image is largely automatic.

* pre processing actions are out line in table 18-5.

* pre processing is designed to produce artifact free digital images.

* the process of pixel interpolation, leg correction and noise correction automatically applied with most system.

* pre processing provide electronic calibration to produce pixel to pixel, row to row and column to column response difference.

Digital problems.	Image processing Solution
* Defective pixel	* interpolate adjacent pixel
''	single.
* Image leg	object correction.
* Line noise	Correct dark reference zone.

Preprocessing :

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

* gain image and generated every few months and offset image are generated many time each day. these preprocessing calibration technique are identified as flatfielding.

* Averaging technique also are used to reduce noise and improve contrast.

* Digital image receptor and display device and million of pixels. it is responsible to expect some individual pixels to be defective and respond different or not all. Such defects are corrected by single interpolation.

* Each type of digital image receptor generate an electronic latent image that may not be made visible completely. what remain image leg.

Low dose technique such as
switching from digital subtraction
angiography (DSA) to fluoroscopy
to solution is application of
offset ~~solution~~ voltage before the
next image is recorded.

* Some voltage variation may be seen
along the buses the drive each pixel
this defects called line noise.

can cause linear artifacts to
appear to the final image to solution
to apply voltage correction from
a row or column of pixels is a
dark, ~~unirradiated~~ unirradiated are
of the image receptor.

Post processing the Radiographic Digital image

a post processing is where
digital imaging shine
and contrast to

to ~~post~~ preprocessing, which is largely automatic act. post processing requires intervention by the radiologic technologist and the radiologist.

* Post processing refers to any thing that can be done a digital radiographic image after it is scanned by imaging systems

* post processing of digital images requires operators manipulation.

* post processing of digital radiographic images performed to optimized the appearance of image purpose of better detecting pathology.

* Annotations is the process of adding text to an image.

an addition to patient identification annotation is often helpful in informing the clinician about anatomy and diagnosis.

* by window and level adjustment
 the radiologic technologist can
 make all 65 536 shades of
 gray visible. optimization of
 image contrast may be the
 most important feature of
 digital radiographic imaging.



O H R

SPATIAL RESOLUTION : ^{sp} spital

resolution refers to the ability
 of imaging instrument to provide
 the sharpness or detail of
 images.

* factors affecting spatial resolution
 include collimator resolution the
 main factor in nuclear medicine
 system sensitivity. resolution
 constant diameter of the

Collimator holes etc.

CONTRAST RESOLUTION :-

* Contrast resolution is the ability to distinguish structures with the similar subject contrast such as liver, spleen, fat - muscle.

* CT (computed tomography) and MRI have excellent contrast resolution, conventional radiology is fair to poor.

2
O H 3

Dose Reduction with Digital Radiography.

- * Exposure should not be repeated in digital radiography (DR) (DR) because of brightness of contrast once more.
- * DR systems cannot for excessive noise caused by quantum mottle.
- * over exposed images do not have to be repeated and should not become a habit.
- * Digital imaging technologist must be approached differently instead of (dose creep) Technician creep should be used with each of the various digital imaging systems.

Because digital image contrast is unrelated to dose, kVp becomes less important when digital examination of specific anatomy is conducted. The kVp should stand to be increased and an accompanying reduction in mAs should be noted with successive examination.

* The result will be enhanced contrast resolution, spatial resolution and reduced patient radiation dose.

* Patient radiation dose reduction that is possible is limited.

* The problem with very low techniques for digital imaging is low SNR. Noise can predominate and compromise with interpretation of soft tissue anatomy.

Q # 4

ACTIVE MATRIX LIQUID
CRYSTAL DISPLAY

The most common type of Active matrix liquid crystal display (AMLCD) contains, besides the polarizing sheets and cells of liquid crystal, matrix of thin film transistors to make a thin-film transistor liquid crystal display. This device store electric state of each pixel on the display while all the other pixels are being ~~er~~ updated. This method provide a much brighter, sharper, display than a passive matrix of the same size. In important specification of for these displays is their viewing angle.

Thin film transistors are usually used for constructing an active

matrix so that the two terms
often interchanged, even though
a thin transistor just component
an active matrix and active matrix
designs have used other components
such as diodes.

Voltage to the liquid crystal the
greater area an active matrix display
used a grid of transistors and
capacitors with the ability to
hold a charge for a limited
period of time. Because of the switching
actions of transistor, only the desired
pixel receives charge, and the pixel
act capacitor to hold the charge until
the next refresh cycle, improving
image quality over passive
matrix. This is special ~~quality~~
~~over~~ ~~passive~~ version of a
simple and hold circuit.

Q # 5

(PACS) PICTURE ARCHIVING AND COMMUNICATION SYSTEM

* Radiology is adopting digital imaging very rapidly. Estimates of the present level of digitally acquired images vary up to 90%. These digital images come from every area medical imaging include nuclear medicine, diagnostic ultrasonography, radiography, fluoroscopy CT and MRI.

* An (PACS) when fully implemented allow not only the acquisition but also the interpretation and storage of each medical image from without resorting to film (hard copy) the projected efficiency of time and cost are enormous.

* PACS improves image interpretation processing viewing, storage and

Recall.

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

PACS NETWORK

- * To be truly effective each of these image processing modes must result be quick and easy to use resources that can workstations must be microprocessor controlled and must interact with imaging system the provide of such interaction a network is required.

- * Computer Scientists use the term network describe a manner in which many computers can be connected to interact with one another, business, offices for instance. which is interfaced with a central office computer.

* In some countries, national networks are used for medical data. All patients have a unique identifier, a number that accompanies them for life.

* Any hospital can at any time enter a unique identifier and access the medical records of that patient.

* Each of these devices is called a client of the network.

PACS STORAGE SYSTEM

* One motivation for PACS is archiving. How often are films checked out from the film room? Never returned. How many films disappear from jackets? How many jackets disappear?

* Just the cost of the hospital space of accommodate film file room may be sufficient to

justify PACS.

* Image storage requirement are determined by the number of images and the image detail file size.

* The PACS film file room is replaced by a magnetic optical memory device the future PACS.

* optical ~~discs~~ discs can accommodate ten of gigabytes (10 GB) of data and image and when stored in jukebox, can accommodate terabytes (T.B).

Q # 6

~~Three~~ There are Three types of artifact.

- (2) image Receptors Artifacts
- (2) Software artifacts.
- (3) object artifacts.

(1) image Receptors Artifact : IP

* has not been used for 24 hours it should be erased again before use when a completely erased.

* Digital images receptors can suffer from rough handling scratches & dust.

* Artifacts produced by dust can be corrected easily with proper cleaning.

unless the duct is internal to the optic on the Computed radiography imaging System.

② Software Artifacts :-

★ Digital radiographic image are obtained as raw data sets.

★ At such these images are ready for processing.

★ For processing image are manipulated into for presentation images that the radiologic technologist can use for CR and for interpretation by the radiologist.

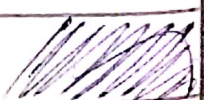
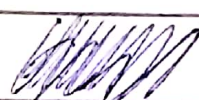
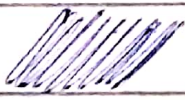
③ Object artifact :-

Object artifacts can arise from the technologist in patient positioning, X-ray beam collimation and histogram selectors.

* Back scatter radiation also ~~can~~
can be trouble damage b/c
of the sensitivity of the
digital radiographic image
receptors.

* If a lot of scattering material
is present behind the image
receptors back scatter radiation
~~can~~ can cause a phantom
image.

* If this type of artifacts
discovered the back side
of the image receptors
should be shielded to
reduce back X-ray.



Q # 7

DEFINITION OF LOOSY COMPRESSION

Loosy Compression :-

Loosy Compression ~~and~~ is irreversible compression. It is the class of data encoding method that uses inexact

Approximation and partial data discarding to represent the content. These techniques are used to reduce data size for storing, handling and transmitting content.

Lossless Compression & Lossless Compression

is a class of data compression algorithms that allow the original data to be

perfect reconstructed from the compressed data. By contrast from the compressed data, by contrast lossy compression permits reconstruction only of an approximation of the original data through, usually with greatly improved compression ratio.

Difference Between Lossy 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 on the other hand, lossy compression can decrease the size of file to a greater extent.

(21)

* The quality of the data degrades in case of lossy compression whereas the quality does not degrade the quality of the data.

* In the lossy technique the channel accommodates more data. Conversely, channel holds a smaller amount of data in case of lossless technique.

Q # 9

OBJECT ARTIFACTS

* object artifact can arise from
 Technologist errors a patient
 positioning x-ray beam collimation
 and histogram selection.

* Backscatter radiation also can
 be troublesome because of
 the sensitivity of the digital
 radiographic image receptor.

* If a lot of scattering material
 is present behind the image
 receptor, backscatter ~~rad~~ radiation
 can cause a Phantom image
~~recep~~ If this type of
 artifact is discovered, the
 back side of the image
 receptor should be shielded
 to reduce backscatter x-rays.

Collimation and position

* The x-ray exposure field is not properly collimated sized and positioned, exposure field recognition error may occur.

* The result is very light noise images.

* Automatic radiation field recognition is essential for artifact free images.

* Collimation of the projected area x-ray beam important of patient radiation dose reduction and for improved images contrast.

* In DR proper collimation the added value of detecting image histogram collimated.

* Proper collimation and centering prevent histogram error that can lead to artifact.

* If multiple fields are projected on to single ip each must have clear, collimated edge and margin between each field.

* Partitioning of multiple digital images on a single ip result in proper separation and collimation of each image.

ALIGNMENT

* Alignment of the exposure field on the ip is important in the same way and the same ~~and~~ for the same reasons as collimation.

(25)

* When an image field
such as that show ~~region~~
is not orientated with the
size and diameter of
the ip, image artifacts
can appear.

O # 8

"For processing" means in relation of a software artifact.

These images are manipulated into for presentation images that can then be used the ~~out~~ teach bad teach for OC.

What does "For Presentation" mean in relation to software artifact.

These image are used for OC by the bad tech and are interpreted by the Radiologist.

(27)

Interpolation

The process of
assignment a value to
a dead pixel based
on the recorded
value of adjacent
pixels.

