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Q1

Ans :- Preprocessing The Digital Radiographic image

A principle advantage of digital radiographic imaging over screen film radiographic imaging is the ability to manipulate The image before and After display preprocessing and postprocessing Respectively. preimage processing and postimage processing alter image appearance usually for the purpose of improving image contrast preprossing of idigtial images is largely automtic.

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Preprossing is designed to produce artifact free digital images In this regard, preprocessing provides electronic calibration to reduce pixel to pixel row to row and ~~to~~ column response differences The process of Pixel interpolation lag correction, and noise correction are automatically applied with most system offset images and gain images are automatic calibration images designed to make the response of the image receptor uniform

Grain images are generated every few months and offset image are generted many times each day.

Postprocessing the digital Radiographic image

postprocessing is where digital image shines. In contrast to preprocessing which is largely automatic, postprocessing requires intervation by the radiologic technologist and the radiologist ~~Pre~~ postprocessing refers to anything that can be done to digital radiographic

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image after is required by imaging system.

Postprocessing of digital image requires operator mainpulation.

Postprocessing of the digital radiographic image performed to optimize the appearance of the image for the purpose of better detecting pathalogy.

Annotation is process of adding text to an image in addition to patient identification annotation is often helpful in informing

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the clinician about anatomy and dignosis.
By window and Level adjustment the radiologic technologist can make all 65,536 shade of gray visible.

Edge enhancement is effective for fractures and small high contrast tissues.

High Lighting can be effective in identifying diffuse non fical disease. Pan, ~~small~~ scroll, and zoom allows for careful visculization of precise region of an image.

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Q2

Ans Spatial Resolution

=) The Spatial Resolution is the ability of an imaging system to reslove and render on the image a small high contrast object.

=) In medical imaging spatial resolution is described by the quantity Spatial frequency

Spatial frequency

Spatial

frequency is expressed in line pair per millimeter (lp/mm)
A low spatial frequency represents large objects and high spatial frequency represents small object

An imaging system with higher spiatial frequncy has batter spatial Resolution.
Mamography is best because of small focal spot 0.1 mm for magnification.

Modulation Transfer function (MTF)

MTF is the ability of imaging System to render objects

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or different size onto an image

The ideal imaging system is one the products an image that appears exactly as the object such as system would have an MTF equal to 1

Contrast Resolution

contrast Resolution is the ability to distinguish may shades for gay from black to white. All digital imaging system have batter contrast Resolution than screen film imaging.

The principle desciptor for contrast Resolution is grayscale also called dynamic range.

Dynamic Range

The dynamic range is the number of gray shades that an imaging system can reproduce.

The dynamic range of digtial imaging system is identified by bit capcity of each pixel. CT and MRI system generally have 12 bit dynamic Range.

Q4

Ans Active matrix Liquid crystal Display

A Liquid crystal has the property of a highly ordered molecular structure a crystal and the property of viscosity - a fluid we all know that matter takes the form of gas Liquid or solid. A Liquid crystal is materal state between that of a Liquid and a Solid

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AMLCDS are superior to CRT displays.

AMICD

— Display characteristics

Active matix liquid crystal displays are fashioned pixel to pixel.

The AMLCD has a very intense white backlight that illuminates each pixel

color AMICD have red green blue fiters within each pixel fashioned into subpixels each with one of these three fiters.

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AMICD
Display characteristic

① medical flat panal digital display devices as monochrome AMICDs

2) Spatial Resolution improves with use of higher megnapixel display devices.

AMICD
Image Luminance

Aperture ratios of 50% to 80% are characteristic of medical AMICDs the portion of the pixel face that is available to tansmit

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Light is the aperture ratio Aperture ratio to display device as fill factor is to a digtial radiographic detector.

Aperture ratio is measure of image luminance of AMICDs AMICDs are rapidly replacing CRTs in digtial radiography (DR) because most of these characteristics favor the AMICD.

AMICD

Ambient Light

The principal disadvantage of AMICD is the

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angular dependence of viewing

Q 6

Ans The three type of digital radiographic imaging artifacts are Following three type of digital radiographic imaging ~~artifacts~~ artifacts

There are three digital imaging artifact classes and the following

1) image Receptor

Dust dirt-
Scratches, pixel
malification Gost

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images

2) Software Artifacts

Histograms Range/Scaling
image
compression.

3) object Arifiaets

patient positoning
collimator paritition
Back scatter.

Image Receptor atifaets

1) Digital image receptor
can suffer from rough
handling scratches
and dust.

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Dust on any section of the CR optical path mirror and lense cannot be corrected the radiologic technologist and will require professional service.

Image Receptor artifacts

If a CR IP has been used 24 hours. It should be evased agin before use.

Software Artifacts

Digital radiographic images are obtained as raw data sets.

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3) object Artifacts

object artifacts can arise from the technologist errors in the patient positioning X ray beam collimator and histogram selection.

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

proper collimator and centering prevent histogram errors that can be lead to artifacts.

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Q9

Ans collimation and partition :-

IF the x ray exposure field is not properly collimated, size and positioned exposure field recognition errors may occur.

Result is very darke or very light or very noisy images

Automic radiation field recognition is essential for artifact free images

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proper collimation and centering prevent histogrm errors that can lead to orificats.

illustrates the opposite situation

partitioning of multiple digital images on a single IP results is proper sepration and collimator of each image.

collimator of projected area x ray beam is improtance for patient radiation dost reduction and for improved image

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image contrast is screen film radiography.

Aligment :-

Aligment of the exposure field on the IP is important is the same way and for the same reason as collimator.

a) when as image field such as that ⊗ is not oriented with the size and dimensions of the IP image artifacts can appear.

Q 5

Ans Application of picture archiving and communication system :-

(PACS) is modalify of imaging techology which help in image transmission from the site of image acquisition to multiple physically disparate locations but also convenient to acess multiple modalities nospital or across th globe

A patient may undergo battery of radiological

- invesition at seprate location which need to be acressed by multiple radiologists and multiple treating physician different location
- PACS improve image interpertation processing viewing storage and recall
- the four princple of PACS are the image acquistion system.
- the display system
- network
- storage system
- PACS Network → to be truly

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effective, each of these image processing modes must be quick and easy to use. To provide for such interaction a network is required. each of these devices is called client of the network

In some countries national networks are used for medical data All patients have a unique identifier a number that is exclusively for life. PACS workstation for processing

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PACS storage system

Just the cost of the hospital space to accommodate a film file room may be sufficient to justify.

Backup image storage is accomoted offsate a digtial data storage vendor in the case that the main file is corrupted because of the dyamic rage of DR and digital mamography the storage is stretched.

Q3

Ans Patient Radiation dose

patient Radiation dose with accelration to all imaging we have oportunity to reduce patient dose 30% to 50% depending on their examination.

How ever Quit the opposite often has occured same thing that many does deep. By at changing factor between and lateral view when taken consectively As a result

Possible in increas patient dose.
Patient Radiation dose reduction should be possible of DOE
Reduction of close by exposure not to repeated.

characteristics of Digital imaging

They are four characteristics of Digital imaging which are the following below.

(1) parameters
2) matrix
3) pixles
4) voxels

A digital imaging is made up 2D array called matrix.

The individual matrix boxes are also called pixels

voxel information in converted into number value and expressed in the pixel.

The number bit or binary digits per pixel called bit depth.

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Q7

Ans basis data compession

In signal processing data compression source cording or bit rate reduction is the process of encoding information using fewer bits than the original representation. Any particular compression reduces bits by indentifying and eliminating statistical redundancy. compression is useful because it reduces resource required to store

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and transmitb data computational resources are consumed in the compression and decompression process.

An image file that compressed in a lossless made is one that can be reconstructed to be exacity the same as the original image lossless compressed reduces the data file to 10% of the original.

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difference between lossless and lossy compression

lossy compression	lossless compression
1) lossy compression presion is the method which elimination the data which is not noticeable	lossless compression does not eliminate the data which is not noticeable
2) In lossy compression A file does not restore or rebuilt its original form	while in lossless compression A file can be restored in its original form

3) Data quality is compromised	Data quality can not compromised
4) The Reduces the size of data	But can not Reduces the size of data.
5) Algorithms used in lossy compression are transform conding Discrete Cosine transform fractal compression etc.	Algorithmus used in lossless compression are Run length Encoding lempel ziv Lempel Huff man coding, Arithmetic endcothing etc.

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6) lossy compression has more data holding capacity	lossless compression has less data holding capacity.
⑦ lossy compression is also termed as irreversible compression	lossless compression is also term reversible compression
8) lossy compresion is that which is something greter than an order to magntude compression loss than 10.1	(8) lossless compression up to 3:1 generally is considered acceptable and helpful digital radiographic image managment

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Q8 Ans

Processing image : Before an image prepard for processing servel manipulation of the output of an image receptor may be necessary to correct the potential artifacts A single pixel or a single row and column normally will not interfare with diagnosis correction algorithm specific to each type of digital image receptor use.

Processing image is a method to perform Some Operation on a image in order to get an enhanced image or the extract some useful information from it.
The type of single processing in which input is an image and ouput may be image
The processing im age can be include Three step are The following.

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1) Importing the image via image acquistion tools

2) Analysing and main manipulating the image

3) output in which result can be altered image or report that is based on image analysis.

There are two type of Methods using for processing image

Image processing is the use of digital computer to process

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digit image though
in algorithum - Digital
radiographit image are
2) ~~presentation~~ image

obtined a raw data
sets As such these
image are redly
for processing.

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Ans 8 Digital radiographic image are obtained as raw data sets As such these image are readly for processing - for processing manipulated for presentation image. image Qc and for interpretation by the Radiologist

The End