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Q1:→ Describe the features of preprocessing and postprocessing?

Ans: preprocessing the digital radiographic Image:→

↳ The preprocessing of the digital images are largly automatic.

↳ For to produce the artifact free images the process preprocessing is designed.

↳ To reduce pixel-to-pixel, row to row and column to column differences, the preprocessing provides electronic Caliboration.

↳ The ability to manipulates the image before display (preprocessing) is the basic advantage of digital radiographic imaging over the Screen film radiography.

↳ To make the response of the image receptor uniform, an automatic Caliboration images are designed, which are offset images and gain images.

↳ The offset images are generated many times each day while the Gain image are generated in a very few months.

↳ To reduce nosise and improve the contrast, an averaging techniques should also be used.

↳ Digital display devices and the imaging receptor having millions of pixel that's why it is reasonable to expect Some individual pixel to be defective.

↳ An electronic latent image that may not be visible Completly is generated by each type of digital image receptor.

↳ Along the buses that drive each pixel, there will be some voltage variation may be seen, this defect as Known by line noise and can lead to linear artifacts to appear on the final

image.

2) Postprocessing the radiographic Digital Images →

↳ An operator manipulation is required for postprocessing of digital images.

↳ The postprocessing requires intervention by the the radiologic technologist and the radiologist.

↳ The postprocessing is the digital imaging shines.

↳ The process postprocessing means anything that can be done to a digital radiographic image after it is acquired by the imaging system.

↳ The main purpose of the postprocessing is to optimize the appearence of the images for the better detecting of diseases/pathology.

↳ The annotation is often helful in informing the clinican about the anatomy and diagnosis, the annotation means that adding text to an image.

↳ The radiologic technologist can make all shades of gray visible by the adjusement of window and level. The amplification of image contrast is too much important feature of digital radiographic imaging.

↳ Magnification of a region of an image to render the smallest detail visible is spatial resulotion, the larger matrix size digital display devices have better spatial resolution because they have smaller pixel.

↳ The purpose of image subtraction is to enhance contrast. The subtraction of digital

radiographic images obtained months apart - temporal Subtraction is used to amplify changes in anatomy or disease.

↳ When the patient moves during serial image acquisition, then misregistration of a Subtraction image occurs, and can be corrected by re-registering the image by technique called pixel shift.

Q2: Distinguish between the Spatial resolution and the Contrast resolution?

Ans

Spatial Resolution:→

↳ The spatial resolution in the radiology refers to the ability of the imaging modility to defferentitate two objects.

↳ Low spatial resolution techniques will be unable to defferentiate b/w two objects that are relatively close togather.

↳ In digital imaging it depend on the size of the pixel used.

↳ A large pixel size will be unable to resolve two near-by structures as Compared to small pixel size.

↳ Spatial resolution is measured in line pairs per millimeter.

Contrast Resolution:→

↳ The Contrast resolution in radiology refers to the ability to distinguish many shades of gray from black to white.

↳ All digital imaging Systems have better Contrast resolution than the Screen film radiography.

↳ In the Case of digital imaging it depends on the bit-depth of the system.

↳ The 8-bit system shows less gray values and high contrast system then the 12 bit system that show more gray value and is low contrast System.

↳ Imaging modalites have an inherent contrast resolution intrinsic to the modality itself.

Q3:→ Discuss the Characteristics of digital imaging that Should results in lower patient radiation doses?

Ans We reduce the patient radiation by accelerationing all the digital imaging upto 20 or 50% depending on the type of examination.

Digital radiography and Dose Reduction:→

Don't repeat any over exposed image, if Someone repeat will give high dose to the patient.

Optimization of a procedure is one of way to reduce the patient dose.

Using a lower current tube Can also lower the patient dose.

x-ray tube current & voltage balance can also help in patient radiation dose reduction.

Exposures should not be repeated in digital radiography because of brightness or contrast concerns.

Do not have to be repeated overexposed images and should not become a habit.

Noise caused by quantum mottle cannot be compensate by DR system.

With acceleration to all digital imaging we have the opportunity reduce the patient radiation dose.

Q4:→ Discuss the features of an active matrix liquid Crystal display?

Ans **Active Matrix Liquid Crystal Disply:→**

The active matrix liquid display is a type of flat pannel display that uses cathode ray tubes typically less than four inches thick. The active matrix crystal display is commonly used in mobile devices and televisions.

↳ A liquid crystal is a material state between that of liquid and Solid.

↳ The liquid crystal can be aligned through the action of external electric field.

↳ Liquid Crystal material are linear organic molecules that are electrically charged.

↳ The active matrix crystal displays are fashioned by pixel by pixel.

↳ Medical flat fannel digital display devices are monochrome "AMLCDs".

↳ With the use of higher megapixel digital display devices the spatial resolution will be improves.

↳ By the number of pixel in "AMLCD", the medical flat panel digital display devices are identified.

↳ The principal disadvantages of an AMLCD are the angular dependence of viewing.

↳ Better Contrast resolution is attained because the AMLCD are not limited by veilling glare or reflection in the glass faceplate.

↳ The AMLCD results in better Contrast resolution and also the image noise of AMLCD is less than that of CRT.

Q5:→ Identify application of the picture archiving and communication system?

Ans "PACS" system means picture archiving and Communication System.

↳ This is a medical imaging technology which provides economical Storage, retrieval, management, distribution and presentation of medical images. The electronic images and reports are transmitted digitally via PACS system.

↳ The PACS system allows the health care orginization to capture, store, view and share all types of images both internally and externally.

↳ The universal format for PACS image storage and tranfer is DICOM (Digital Imaging & Communication medicine)

↳ DICOM permits radiology information System and more medical imaging System to connect with and pass data at other health Care facilites.

Hard Copy replacement by PACS based mean of manging medical images Such as film archieves.

Improves the acess to past and Current, file integrity and speed retrieval, and Better diagnosis is done through "PACS".

Q6:→ Dicuss the three types of digital radiographic imaging artifacts and how to aviod them?

Ans:- The three types of digital radiographic imaging artifacts are given below below.

i) Image Receptor artifacts;
ii) Software artifacts.
iii) object artifacts.

① Image Receptor artifacts:-
From the dust, scartches, and from rough handling, the digital image receptor can be suffered. The dust on any part of the CR optical path cannot be corrected by radiologic technolgist and will required professional service.

The enviromental radiation can also contribute to ghost

artifacts, and this ghost artifact may also occurs because of incomplete erasure of previous image on a CR IP.

Avoiding of IR artifacts:→

↳ Using additional signal erasure techniques.

↳ Can be corrected easily by proper cleaning unless the dust is internal to the optics CR imaging system.

↳ To avoid scratches and also maintain proper handling.

② Software Artifacts:→

The digital radiographic images are obtained as a raw data set, as such these images are ready for processing.

The for processing images are manipulated into for presentation imges that the

radiologic technologist can use for QC and for interpretation by the radiologist.

Avoiding of Software artifacts:-

Flatfielding is a Software Correction that is used to equilize the response of each pixel to a uniform x-ray beam. Correction algorithms specific to each type of digital receptor use interpolation technique to assign the digital value of each dead pixel, row, or column.

(3) Object artifacts:-

Due to the technologist error in the patient positionnig, x-ray beam collimation and histogram selection such type (object artifacts) of artifact can be developed.

The Backscatter radiation can also be troublesome

because of the sensitivity of the digital radiographic image receptor.

Avoiding Object artifacts:→

To avoid the object artifact the technologist need for proper Collimation, partation and alignment.

↳ Automatic radiation field recognition is useful for artifact free images.

↳

Q7:- Describe the basis for data Compression and diffrence b/w lossless and lossy Compression?

Ans:- Basis for Data Compression:-
The Data compression takes advantage of redundancy of data, as occur with exposure to the raw x-ray beam when all value are the same.

The Difference b/w lossless & lossy Compression is given below

① Lossless:→

Lossless Compression reduces the data file to 10% of the original file. An image file that is Compressed in a lossless mode is one that can be reconstructed to be exactly the same as the original.

The lossless is not Satisfactory for large image files because transmission process and data manipulation can still be unacceptable.
lossless Compresion up to 3:1 generally is considered acceptable and helful in dagital imaging mangement.

(2) Lossy Compression:→
The lossy Compression Can provides Compression factors upto ~~1000~~ 100:1 or greater Can be used on images in which exact measurement or detail is not required.
The lossy Compression is that which Something greater than an order of magnitude Compression less than 10:1.

Q8:→ Identify the difference b/w the for processing images and For presentation images?

Ans The difference b/w the For processing and For presentation is given below.

"For Processing":→

These images are manipulated into "For presentation" images that can then be used by the radiologic technician for QC.

"For Presentation":→

These images are used for QC by the radiologic technicians and are interpreted by the radiologist, the For processing images are manipulated into For presentation.

Q9: Explain how digital radiographic image artifacts occur because of improper Collimation, partition or Alignment?

Ans: Artifict:→ The most of artifict in radiology refer to Something seen on an image that are not present in reality but appear due to quirk of the modility itself.

The structure or an appearence that is not normally present on the radiograph and is produced by artifical mean, this may occur due to technical error or processing error.

↳ The artifacts Cause due to improper Collimation, partition or alignment is objective artifcts.

(1) Improper Collimation Artifacts:→

An Exposure field recognation error may occur due to the x-ray exposure field is not properly collimated, sized and positioned.

The improper collimation are results in a very nosiy, or very light or very dark image.

For an atrifact free images there should be an automatic radiation field recognition is essential.

For an improved image contrast in screen film radiography and for patient radiation dose, collimation of the projected area x-ray beam is important.

Due to improper collimation the histogram can be

imporperly analyzed which resulting in an artifact.

Improper Collimation and Centring prevent histogram errors may lead to artifacts.

2) Partition Artifacts:

The partioning of the multiple digital images on a a single IP results in a proper Seperation and Collimation of each image.

Partition is a process which allows two or more images to be projected on a Single IP.

Partition is the process in which multiple fields are projected onto a single IP, each having clear, collimated edges and margins between each field.

3) Alignment Artifacts:→

An image artifacts can be appear, when an image field is not oriented with the size and dimension of the Ip.

In the same way and for the same reason like the collimation, the alignment of the exposure field on the IP is also important for reducing the artifacts.