

Name Hamid Ullah
 Discipline BS Radiology
 ID 14603



Question ①

preprocessing :-

- offset images and gain images are automatic calibration images designed to make the response of the image receptor uniform.
- ⇒ Gain images are generated every few months, and offset images are generated many times each day. This preprocessing calibration technique is identified as flatfielding.
 - ⇒ Averaging technique also used to reduce noise and improve contrast.
 - ⇒ Digital image receptors and display devices have million of pixels. It is reasonable to expect some the individual pixels to be defective and to respond differentially or not at all.

⇒ The digital image receptor generates an electronic latent image that may not be made visible completely. This can be troublesome when one is switching image high dose to low dose technique.

post processing ⇒

- post processing is where digital image shines.
- ⇒ In contrast to processing in which largely automatic, post processing require intervention by the radiologic technologist and the radiologist.
- ⇒ post processing refers to anything that can be done to a digital radiograph image after it is acquired by the imaging system.
- ⇒ post-processing of digital images requires operator manipulation.
- ⇒ Annotation is the process of adding text to an image in addition to patient identification, Annotation is often helpful in informing the clinical about anatomy and diagnosis.
- ⇒ By window and level adjustment, the radiologist technologist make all 65, 536 shades gray level. In addition of gray visible. The amplification image contrast may be the most important feature of digital imaging.

Question (8)

Spatial Resolution

⇒ spatial resolution the ability of an imaging system to allow two adjacent structures to be visualized as being separate or the distinctness of an edge in the image.

⇒ The image of a small high contrast object.

⇒ The spatial resolution of the eye would require larger dots.

⇒ When all the facts are correct conventional radiography has excellent spatial resolution.

⇒ In medical medicine, it is described by the quantity "spatial frequency"

⇒ usually described as the size of the object that can be viewed.

⇒ Resolution in space.

⇒ KVP set for the technique.

Contrast Resolution :-

- => Contrast resolution is the ability to distinguish many shade of gray from black to white.
- => Computed tomography and MRI have excellent contrast resolution. Conventional radiology is fair to poor.
- => Sensitivity of the System.
- => low contrast resolution
- => low contrast detectability.
- => The principal descriptor for contrast resolution is gray scale.
- => The measure is used in medical in medical imaging to quantify the quality of acquired images.

Question (3)

Answer :-

- => With the acceleration to all digital imaging we have the opportunity to reduce patient doses 50% to 60%.
- => Exposure should not be repeated in digital radiography (DR) because of brightness or contrast concerns.
- => The patient radiation dose reduction that is possible is limited.

- ⇒ DR System cannot compensate for excessive noise caused by quantum mottle.
- ⇒ Over exposed images do not have to be repeated and should not become a habit.
- ⇒ The result will be contrast resolution, constant spatial resolution, and reduced patient radiation dose.
- ⇒ However quite the opposite often has occurred - something that many call "dose creep".



Question ④

Features of an active matrix liquid crystal display.

- ⇒ It allows the electrical signal for each sub-pixel to avoid influencing adjacent elements.
- ⇒ The TFT is patterned into the glass layer.
- ⇒ Allow very high resolution.
- ⇒ A liquid crystal is a material state between that of a liquid and a solid.

- => A liquid crystal has a property of a highly ordered molecular structure a crystal and the property of viscosity a fluid.
- => The liquid crystal can be aligned through the action of an external electric field.
- => liquid crystal display are fashioned pixel by pixel.
- => The LCD has a very intense white backlight that illuminates each pixel.
- => The pixel contain light-polarizing filters and film to control the intensity and color of light transmitted through the pixel.
- => A black light illuminates the pixel and is blocked or transmitted by the orientation of the liquid crystals.
- => Each sub-pixel is individually control by an isolated thin film transistor. (TFT).



Question 5

Picture Archiving And
Communication System

A picture archiving and communication system (PACS) is a medical imaging technology which provides economical storage, retrieval, management and presentation of medical images.

Application ::

- Hard copy replacement: PACS replace hard copy based means of managing medical images.
 - ⇒ with the decreasing price of digital storage.
 - ⇒ They provide a growing cost and space advantages over the film archives in addition to the instant access to prior image at the same institution.
- Remote access :- It extend on the possibilities of conventional system by providing capabilities of off-site viewing and reporting.

- Electronic Image integration platform.
 - => It provide the electronic platform for radiology image interfacing with other medical automation system.
- Radiology workflow management:
 - => PACS is used by radiology personnel to manage the work flow of patient exams.



Question ⑥

Image Receptor Artifacts

With Screen film image receptors, digital can suffer from the rough handling, scratches and dust. Artifacts produced by dust can be corrected easily with proper cleaning unless the dust is internal to the optics of a computed radiography imaging system.

- => Dust. dust scratches.
- => pixel ~~can~~ malfunction
- => Ghost images.

Software Artifacts:-

Digital radiograph image are obtained as raw data set.

These image are ready "for processing" images are manipulated into "for presentation" images that the radiologic technologist used for QC and for interpretation by the radiologist.

- ⇒ Histograms
- ⇒ Range / scaling
- ⇒ Image Compression.

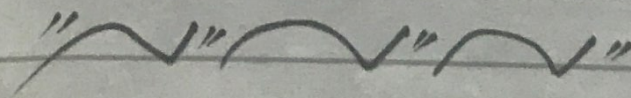
Object Artifacts:-

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

The sensitivity of the digital radiograph image receptor.

The back side of the image receptor should be shielded to reduce backscatter x-rays.

- ⇒ patient positioning.
- ⇒ collimator position.
- ⇒ Backscatter.



Question (7)

Data Compression :-

In signal processing, data compression, source coding or bit-rate reduction is the process of encoding information using fewer bits than original representation.

- => Any particular compression is either lossy or lossless
- => It is useful because it reduces resources required to store and transmit data.
- => Basis for compression is provided by information theory. and more specific compression and rate distortion.
- => Theory for lossy compression these are the study were essentially by Claude in 1940.

differentiate btw lossless and lossy.

Lossless

Lossy

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>⇒ It represent data with out lossing any information</p> <p>⇒ It is reversible process</p> <p>⇒ Lossless Compression is possible because most real world data exhibits statistically redundancy</p> <p>⇒ It can be slow</p> <p>⇒ It reduced the data file 10% to 50% of the original file.</p> | <p>Data with lossing any information</p> <p>⇒ It is not reversible process.</p> <p>⇒ Lossy Compression is possible.</p> <p>⇒ It can be fast</p> <p>⇒ It not reduced the data</p> <p>⇒ large image file.</p> <p>⇒ It is not acceptable for mammography</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Question (4)

For processing and
for presentation of
An Image :-

⇒ For processing image are manipulated for presentation images that the radiologic technologist can use for the interpretation by the radiologic.

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

⇒ Such artifact can occur because of dead pixels / dead rows / columns.

Question 9

Answer:

if exposure field is not properly collimated size and positioned exposure field recognition error may occur. These can lead to histogram analysis error because signal outside to analysis field is included in the histogram.

The result is very dark or very light or very noisy image. Automatic radiation recognition is essential of artificial image.

Collimation of the project area x-ray beam is important for patient radiation dose reduction and for improved image contrast screen-film radiography.

In DR proper collimation has been added value of the defining image histogram. If improperly collimated, the histogram can be improperly analyzed, resulting in an artifact such as show that.

proper collimation and centering prevent histogram error that can lead to histogram.

Digital image receptors normally can recognize even numbered (i.e. two 7008)

x-ray exposure fields that are centered and evenly collimated. Those on one and four on one are not recommended unless the unexposed portion is shielded.

The uses of three collimated margins usually works, but when fewer than three are used artifacts may result.

If image are not collimated and centered. Image receptor exposure will not be accurate and cannot be used for image quality evaluation.