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Question No 1

Answer:-1,

Preprocessing:-

Preprocessing take place in the computer where the algorithms determine the image histogram.

• Post processing is done by the technologist through various user function.

• Digital processing method are vendor specific.

• A principle advantage of digital radiographic imaging over screen film radiographic imaging is the ability to manipulate the image before and after display processing and postprocessing.

Processing of digital images is largely automatic.

The preprocessing calibration techniques are identified. At flatfielding and aperturing techniques are used to reduce noise and improve contrast.

Digital image receptor and display devices have million of pixels.

Each type of digital image receptor generates an electronic latent image that may not be made visible completely.

Digital image processing.

Problem Solution.

Detective pixel	interpolate adjacent pixel
image lag	signal offset correction.
line noise	correct from dark reference zone

post processing.

post processing is where digital imaging shines. in contrast to pre-processing, which is largely automatic, postprocessing require intervention by the radiological technologist and the radiologist.

post processing refer to anything that can be done to a digital radiographic image after it is acquired by the imaging system.

post processing of digital radiographic image is performed to optimize the appearance of the image for the purpose of better detecting pathology.

Annotation is the process of adding text to an image.

In addition to patient identification, annotation is also helpful in performing the clinical about anatomy and diagnosis.

Digital image have a dynamic range upto 16bit $65-536$ Gray

level. However the human

human visual system can visualize

only ~~app~~ approximately 30

shades of Gray. by window

and level adjust, the

radiological technologist can

make all $65-536$ shades of

gray visible.

this amplification of image contrast maybe the most important features of digital radiographic imaging.

most digital radiographic images are viewed through the contrast rendition of screen film image. Bone is white, and soft tissue is black. However sometimes pathology can be made more visible with image inversion which result in a black appearance of soft tissue.

Digital image post processing.

Process

Result.

Annotation

label the image

window and level

Expand the digital grayscale 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

Pixel Shift

Register an image to correct for patient motion.

Region of

Determine average

interest

pixel value for

use in quantitative

imaging.

Question No = 2

Answer

Spatial Resolution.

Spatial resolution in radiology

refer to the ability of the imaging modalities to differentiate two object.

low spatial resolution technique will be unable

to differentiate b/w two

objects that are relatively

close together.

Spatial resolution (resolution in space) is the ability

an imaging system to resolve

and render on the image.

high contrast Object.

in medical imaging, spatial resolution is described by the quantity (spatial frequency)

spatial frequency was

introduced further because

it is an important characteristic

that is used to describe

medical image and

medical imaging system.

- spatial frequency is expressed in line pair per millimeter.

Contrast resolution.

- Contrast resolution is the ability to distinguish many shades of gray 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.

One hundred percent contrast is black and white. The lettering on this page.

Show very high contrast.

contrast resolution is the ability to distinguish many shades of gray from black to white.

Question No = 3

Answer

Patient Radiation dose.

With acceleration to all digital 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 it is possible for the radiologic technologist to be

Unwittingly turned into not adjusting exposure as frequently as with screen film, for example by not changing factor for a lateral view and an anteroposterior view when these are taken consecutively.

As a result it is possible for the overall patient dose to increase. patient radiation dose reduction should be possible because of the manner in which the digital image receptor responds to x-ray and because

of a property of the
digital image receptor

known as DQE.

Question No-4

Answer.

Liquid Crystal display.

We all know that matter take the form of gas, liquid or solid.

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

LCDs are superior to CRT displays.

A liquid crystal has the property of a highly ordered molecular structure - a crystal and

the property of viscosity. a fluid liquid crystal material are linear organic molecule. that are electrically charged, forming a natural molecular dipole, consequently a liquid crystal can be aligned through the action of an external electric field.

Display Characteristic.

liquid crystal display are fashioned pixel by pixel. the LCD has a very intense white back lite that illuminates each pixel.

Each pixel contains light polarized filter and films to control the intensity and colour of the light transmitted through the pixel. The difference between colour and monochrome LCDs involve the design of the filter and films, colour LCDs have red green blue filter within each pixel fashioned into sub pixel each with one of these three filters.

Question No = 9

Answer

Artifacts.

"An artifact is any false visual ~~fig~~ features on a medical image that stimulates tissues or obscures tissue.

Artifact interfere with diagnose and must be avoided.

The three digital imaging artifact classes are shown along with the subset of each.

image Receptor artifact.

- Dust, Dirt, Scratches.
- pixel malfunction
- Ghost images.

Software artifact.

- Histograms
- Range scaling
- image Compression.

Object @ Artifact.

- Patient positioning
- Collimator partition.
- Back Scatter.

Collimation and Partition.

if the xray exposure field is not properly collimated, size and positioned, exposure field recognition error may occur. This can lead to histogram analysis error. For the image

histogram to be properly analyzed, collimated field should consist of four distinct collimated margins. usually works, but when fewer than three are used.

Artifact may result.

if image are not collimated

and Centred, image receptor exposure will not be accurate and cannot be used for image quality evaluation.

- if multiple fields are projected onto a single IP, each must have clear, collimated apes and margins between each field. the process called partitioning allow two or more image to be projected on a single IP.

- partitioning of multiple digital images on a single IP result in proper separation and collimation of each image.

Question No = 5

Answers.

Picture Archiving and Communicating System.

Radiology has adopted digital imaging very rapidly. Estimates of the present level digitally acquired image range upto 95%, these digital images come from every area of medical imaging, including nuclear medicine, diagnostic ultrasonography, radiography fluoroscopy, CT and MRI.

Screen film can be digitized with the use of a device such as that shown in. Such film digitizers are based on laser beam technology.

Network.

To be truly effective each of these image processing modes must be quick and easy to use. These require that each workstation must be micro-processor control and must interact with each imaging system and the

central computer. To provide
for such interaction a
network is required.

Question No = 6

Answer.

Three type of digital radiographic artifacts.

1) Image Receptor Artifacts

If a CR IP has not been used for 24 hours, it should be erased again before used.

When a completely erased IP is processed, the resultant image should be uniform and artifact free.

Software Artifacts.

Digital radiographic images are obtained raw data sets.

As such these images are ready for 'processing'.

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

Object Artifacts.

- Object artifact can arise from the technologist error in patient positioning x-ray beam collimator and histogram selection.
- Back scatter radiation also

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

Question NO=7

Answer

Data Compression.

• Need as most of the real world Data is Redundant.

importance.

• Save disk space

• Save Connection Bandwidth

• Reduce processing time

• Reduce communication time

• Enable fast storage and Retrieval.

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

is called compression.

The ~~set~~ resulting data is called compressed data.

• Lossy compression and lossless compression are two

terms widely categorized under data compression

method. The major difference between lossy compression and lossless compression

is that lossy compression produce a close match

of the data after

decompression whereas lossless

create exact original data.

Difference between lossy Compression and lossless Compression.

① lossy Compression removes non-useful part of the data, what is undetectable while lossless Compression reconstruct the exact data.

② lossless Compression can reduce the size of data at low extent, on the other hand, lossy Compression can decrease the size of the file to a greater extent.

③ the quality of the data degrades in case of lossy

Compression whereas lossless does not degrade the quality of the data.

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

of a property of the
digital image receptor

known as DQE.

Question No - 8

Answer.

Difference between for-processing images and for-presentation images.

For-processing images.

for processing images are manipulated into "for" presentation' images that the radiologic technologist can use for QC and for interpretation by the radiologist.

For-presentation images.

these images are used for QC by the sed tech and are interpreted by the radiologist.