

Name :: Aziz Ullah

ID :: 14665

Class :: B.S Rad: 4th

Paper :: CR & DR

Instructor :- Mam - Maheen Gul

Module :- 4th Semester

Exam :: Final Term

Q1: Describe the features of PreProcessing and PostProcessing.

ANS :- ^{Pre} ~~Pre~~ Processing The Digital Radiographic images.

- Radiographic image is the ability to manipulate the image before and after display - Pre Processing and Post Processing respectively.
- appearance usually for the purpose of improving image contrast.
- it is largely automatic.

- It is designed to produce artifact free digital image.
- Provide electronic calibration to reduce pixel-to-pixel.
- offset images and gain images are automatic calibration image designed to make the response of the image receptor uniform.
- Averaging techniques also are used to reduce noise and improve contrast.
- Signal interpolation are the response of pixels surrounding the defective pixels is averaged, and that value is assigned to the defective pixel.
- Each type of digital IR generates an electronic latent image that may not be made visible completely. Which remain is image lag and this can be troublesome when one is switching from high to low dose technique such as switching from (DSA) to Fluorcopy.
- Some voltage variation may be seen along the buses that drive each pixel. This defect called Line noise.

Post Processing The Radiographic Digital images:

- Post Processing intervention by radiologist ^{which} requires the radiologist to do anything that can be done to a digital radiographic image after it is acquired by the imaging system.
- required for operator manipulation to perform to optimize the appearance of the image for the purpose of better detecting pathology.
- Annotation is the process of adding text to an image.
- By window level adjustment the radiological technologist can make all 65,536 shades of grey visible.
- the large matrix size have better spatial resolution because they have smaller pixels.
- at Time multiple Digital images must be Flipped horizontally or vertically. this process called image flip.

- The Purpose of image subtraction is to enhance Contrast.
- Misregistration of a subtraction image occurs when the Pat move during Serial image acquisition.
- Edge enhancement is effective for Fracture and small, high-contrast Tissues.
- Highlighting can be effective in identifying diffuse, non focal disease.

Q2: Distinguish b/w Spatial Resolution and Contrast Resolution.

| <u>Ans</u> | Spatial Resolution | Contrast Resolution |
|------------|--|---|
| | <ul style="list-style-type: none"> → Resolution in space. → ability of an image system to resolve and render on the image a small high-scale contrast object. → Usually described as the size of the object that can be viewed. → in medical medicine it is described by the quantity spatial frequency. | <ul style="list-style-type: none"> → describe the ability of distinguishing b/w similar tissues, e.g Gray-white matter in the brain → Plain film radiography tends to lack contrast resolution. |

Q4: Discuss the features of an active matrix liquid crystal display.

Ans: Active matrix Liquid Crystal Display:

- A liquid crystal is a material state betw that of a liquid and a solid.
- it have the property of a highly ordered molecular structure. a crystal.
- it is linear organic molecules that are electrically charged forming a natural molecular dipole.
- AMLCD's are superior to CRT displays.
- Display characteristic.
- Light-Polarizing filters and films
- different blue filters and films.
- three filters: Red, green, blue.

Q3: Discuss the characteristics of digital imaging that should result in lower patient radiation doses.

Ans. Dose Reduction with digital Radiography.

- Exposures should not be repeated in digital radiography (DR) because of brightness and contrast concerns.
- DR system can not compensate for excessive noise caused by quantum mottle.
- over exposed image do not have to be repeated and should not become a habit.
- by acceleration to all-digital imaging we have the opportunity to reduce patient dose by 20% to 50%.

Q 5: identify application of the Picture archiving and communication system?

Ans. PACS.

Picture archiving and communication system (PACS) is a medical imaging technology used primarily in health care organizations to securely store and digitally transmit electronic images and clinically relevant reports.

→ The use of PACS eliminates the need to manually file and store retrieve and send sensitive information films and reports. Instead medical documentation and images can be securely housed in off-site servers and safely accessed essentially from anywhere in the world using PACS software, workstation and mobile devices.

Q7: Discuss the ~~three types~~ basic for data compression and the difference b/w lossless and lossy compression.

Ans: Data Compression:

- The process of reducing the volume of data by applying a compression technique is called compression.
- the resulting data is called compressed data.
- NEEDED AS most of the REAL world Data is Redundant.

importance:

- Save disk Space
- Saves Connection Bandwidth
- Reduce Processing Time.
- Reduce Communication Time.
- Enables Fast Storage and Retrieval.

Loss Compression:

method eliminates some amount of data that is not noticeable.

- This technique does not allow a file to restore in its form but significantly reduce the size.
- the Loss Compression technique is benefit if the quality of the data is not your priority. It slightly degrades the quality of the file or data but is convenient when one wants to send or store the data.

Types Technique:

→ This method transforms the pixels which are lossy compression and lossless compression are the two terms widely categorised under data compression methods.

- Major difference is that lossy compression produced a close match of the data decompression whereas lossless creates exact original data.

Q.6. Discuss the three types of digital radiographic imaging artifact and how to avoid them?

Ans. Artifacts.

- feature on a medical image that simulate tissue or obscure tissue.
- artifacts interfere with diagnosis and must be avoided.
- artifact can be controlled when the cause of artifact can be understood.

→ Three classifications of artifacts occur -

1. IR artifacts.

- digital IR can suffer from rough handling scratches, and dust.
- it can be corrected easily with proper cleaning.
- the artifacts of image receptor is corrected by additional techniques.

2. Software artifacts.

- DR image are obtained as raw data sets.
- As such these images are ready for processing.

→ For processing images are manipulated into ~~for~~ image that the radiologic technologist can use for QA and for interpretation by the radiologist.

31. Pre Processing artifacts.

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

→ This artifact occurs alive to dead pixels, row, or column of pixel.

→ a single row or column will not interfere with diagnosis.

→ many of these must be corrected.

→ introduction of a digital radiographic image receptor by the x-ray beam may show variation over the image, producing an irregular pattern that could interfere with diagnosis.

→ Flatfielding is a software correction that is performed to equalize the response of each pixel to a uniform x-ray beam.

Q9. Explain how digital radiographic image artifacts occur because of improper collimation, Partition or alignment.

Ans. Improper Collimation. If the x-ray exposure field is not properly collimated, size, and positional exposure field recognition errors may occur.

- the result is very dark or very light or very noisy images.
- Automatic radiation field recognition is essential for artifact-free images.
- Collimation of the projected area x-ray beam is ~~important~~ important for patient radiation dose reduction and for improved image contrast in screen-film radiography.
- In DR, proper collimation has the added value of the defining the image histogram. If improperly collimated, the histogram can be improperly analyzed, resulting in an artifact.
- Proper collimation and centring prevent histogram errors that can lead to artifacts.

→ Alignment :-

→ Alignment of the exposure field on the IP is important in the same way and for the same reasons as collimation. → when an image field, ~~such as~~ ~~that shown in figure~~ is not oriented with the size and dimensions of the IP, image artifacts can appear.

Q8 :- Identify the difference between for-processing images and for-presentation images.

→ For-processing images :-

The images are manipulated into for-presentation ~~that~~ images that can then be used by the radiological ~~knowledges~~ Technologist for QC.

→ For-presentation Image :-→

→ These images are used for QC by the radio technician and are interpreted by the radiologist.