MOTOWOTOFOS H/W□C/W□ Dated ____/____/20____

Syed Tufail Jan
I-d- 15371
4th Semester
CR . DR.

Q1 preprocessing :: preprocessing Image is The ability to manipulate Image before display it is used for improing Image Contrast prprocessing is automatic it produced electronic Calibration to reduce pixel to pixel and Column to Column response diffrance
automatic Calibration image Such is offset Image and gain I are designed to make The response of Image receptor uniformed
The offset Image are generated many time in a day but gain Image is genrated every few mouths. This preprocessing techniques are Called flatfielding

In preprocessing to reduce noise and improve Contrast Averaging Techniges is used.
Each type of digital Imsge generates an electronic Latant Image Tlat may not be made visible Complately what remaine Image lag and This Can be troublesome when one is Switching from high gose to low dose (such as Switching from (DSA) to fluoroscopy Tle Solution is application of an offset voltage bafore Tle next image is acquived.
Some voltage variations may be Seen along The buses Tlat drive each pixel. This Called Line noies Can couse Linear artifacts to appear on The final image Ole Solution is to apply a voltage Correction.

M T W T F S H/W C/W Dated:...../...../20.....

Postprocessing :-

Postprocessing is the ability to manipulate the image after display. by the image System postprocessing is the shines of digital Imaging and in Contrast which is largely automatic. post processing of digital image requires operator manipulation it is preformed to optimize the appearance of the Image for the purpose of better detecting pathology. e.g

Subtaction CDSA pixel shift =

Improve Image Contrast Reregister an image to Correct for patient motion

- adding text to an Image the process is called Annotation
- The Larger matrix Size digital disply devices have better Spatial resolutions because they have Small pixels. This allows among other properties

magnification of a region of an image to render the smallest detail. visible Magnification in digital imaging is similar to using a magnifing glass with a film image.

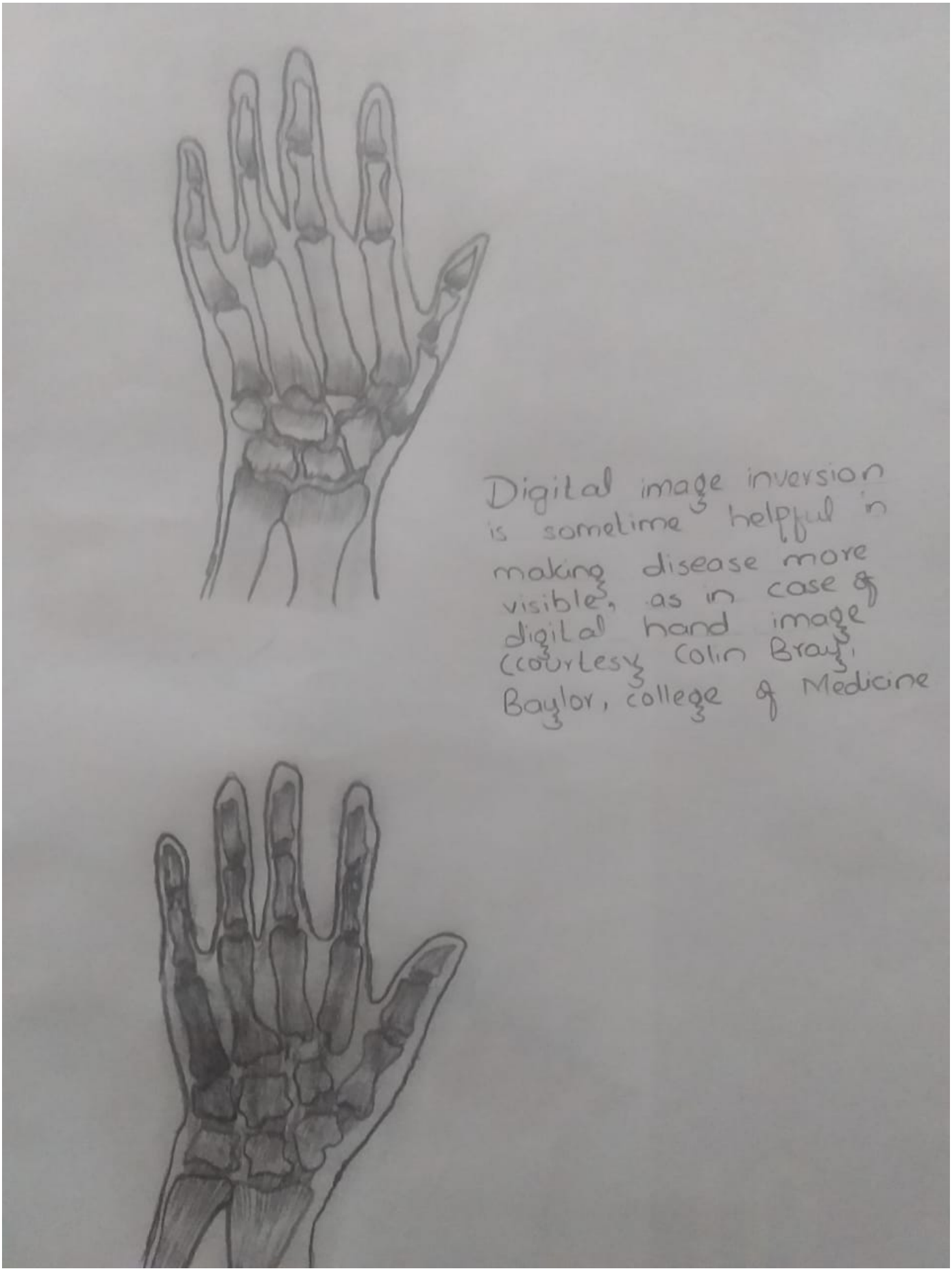
multiple digital image be flipped horizontally or vertically the process is called image flip. temporal subtraction is used to amplify changes in anatomy or disease. The purpose of Image subtraction is to enhance Contrast.

pixed shift is subtraction image when the patient moves during images.

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

Highlighting can be used to identify non focal disease.

and pan scroll and zoom allows for careful visualization.



Digital image inversion is sometime helpful in making disease more visible, as in case of digital hand image (courtesy Colin Brayi, Baylor, college of Medicine

M T W T F S H/W C/W Dated: / /20

Q2 Spatial resolution :-

it is the ability of an image system to resolve and render on the image a high contrast object.

Spatial resolution is described by spatial frequency.

frequency is expressed in (LP/mm)

high spatial frequency represents small objects

low spatial frequency represents large objects.

when frequency is larger objects are smaller

Higher spatial frequency indicates better spatial resolution

Liver kidney brain are large soft tissues therefore low spatal. frequency

bro trabeculae bvest and. Contrast filled vessels are High (F)

high (SF) has better S_resolution.

MCTCWCTCJFCS H/W C/W Dated: ...../...../20.....

Contrast Resolution :-

* it the ability to distinguish many shades of gray from black to white.
* All digital imaging system have better Contrast resolution than screen film Imaging.
* The principal descriptor for Contrast resolution is grayscale is called dynamic range.
* Dynamic range is Number of gray shader that an Image System Can reproduce.
* The dynamic range of digital image system is identified by the capacity of each pixel.
* CT and MRI have a 12-bit dynamic range.
* Digital have 14-bit. dynamic range
* Contrast resolution is so important in mammography digital mamography system have 16 bit. dynamic range.

M□T□W□T□F□S H/W□-C/W□ Dated:...../...../20.....

Q3 Ans:. Patient radiation dose with
acceleration to all digital image
to all Image we have the
opportunity to reduce patient
dose by 20 % to 50 %
depending on the examination
However quite the opposite
often has occured Sometime
may Call dose Creep
becoused digital Imaging Can
also yield a good image
it is possible for technolgit
to be unwillingly lured into
not adjustion exposures as a
free quently as a
Sreen film. by not Changing
factors between a lateral view
and an antarposterior view
when these are taken
Consecutively As a vesult
it is possible for the
over all patient dose increasc
patient radiation dose reduction
Should be possible becoused.

of the manner in which the digital image receptor responds to x ray and beeoused of a property of the digital image receptor known as DQE

* beeoused respones is linearly related to radiation dose image Cantrast does not Change with dose.

DQE is related to the absorption Coefficent and to the Spatial frequency of the image forming x ray beam

+ DQE is a measure of x ray obsorfaction efficiency patient dose in DR should be low due to high DQE.

Active Matrix Liquid Crystal Display.

it is material state between liquid and solid.

highly ordered molecular structors crystal and also the property of viscosity

There are linear organic molecules and electrically charged

AMLCD are better Then CRT displays.

These are pixel by pixel and has very intense backlight that illuminates each pixel.

every pixel have light polarizing Filtes and films. to control color of light transmitted Through pixel.

Medical flat panel digital display devices are @ monochome AMLCD

Spatial resolution improves with the use of higher mega pixel digital display devices.

M□T□W□T□F□S H/W□ C/W□ Dated: ...../...../20.....

* 1 megapixel display have a 1000 x 1000 pixel arrangement.
* 5 megapixel display have 2000 x 2500
* Active matrix have better grayscale definition then CRTs.
* The intrinsic noise of an AMLCD is less than that of a CRT this also results in better Contrast. resolution
* Amlcd are desinged to better & reduce the influence of ambient light on image Contrast.
*
* The principal disadvantage of an AMLCD is the angular dependance of viewing.

M T W T F S H/W C/W Dated: ...../...../20.....

Q5 Radiology is adopting digital Imaging very vapidly the present level of digitally acquired image vange up to 90%. The are Came from ever ea area of medical Image. Including diagnostic ultasonogvaphy vadiogvaphy flousocopy CT MRI A picture avching and Communication System when fully Implemented allows not only the acquisition but also The interpvetation and storage of each medical image in digital form without vesorting to film The projected efficiencies of time and cost are enormous.

- PACS improves Image interpvetation processing viewing storage and vecall
- The four principal Camponent of a PACS and The image acquisition system.

M□T□W□T□F□S H/W□-C/W□ Dated:...../...../20.....

A picture arching and Communition System (PACS) when fully implemented allows not only the acquisition but also the interpretation and strorage of each medical image in digital form without restoring to film the projection of time and cost are enormous.

M□T□W□T□F□S H/W□-C/W□ Dated:...../...../20.....

Q6 Types of Artifactus.

① Image Receptor-

* Digital image receptor can suffer from rough handling scratches and dust.
* Artifacts produced by dust can be converted easily with proper cleaning unless the dust is internal to the optics of a computed radiography image system.

② Scratches and substantial malfunction of pixels likely will require replacement of the image receptor

- Digital radiographic image receptors have unique artifacts associated with pixel failure
- Environmental radiation can contribute to ghost artifacts.
- usually such artifacts can be corrected by additional signal evasive techiques.

M□T□W□T□F□S H/W□-C/W□ Dated:...../...../20.....

(2) Software.

Digital radiographic image are obtained as raw data sets. These Image are ready for processing.

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

(3) object Artifacts.

object artifacts Can arise from technologist errors.

are.

- patient positioning
- positioning Histograms.
- Collimator. partition
- Back Scatter

M T W T F S H/W C/W Dated: ...../...../20.....

Q7 Ans: Data Compression

its takes advantage of redundancy of data and when all values are same occure with exposure to the raw x-ray beam.

Lossless mode.

+ its image is exactly same with original image.
- its reduces the data file to 10%. to 5%. (2:1) of the original file
- it is not satisfactory for large image.
- becoused transmissim time and data manipulatim time can still be unacceptable.

Lossy -

it can provid compressiom factors up to 100:1 or greater. Can be used on image in which exact measurement or fine detail is not required such as video recording its replayed on standrd domestic TV

M□T□W□T□F□S H/W□-C/W□ Dated:...../...../20.....

Q8 Before an Image is prepared for processing several manipulations of the output of an Image receptor may be necessary to correct for potential artifacts or dead rows or Columns of pixels A Single pixel or a Single row or Column normally will not Interfere with diagnosis However many of These defects must be Corrected Correction algorithms Specific to each type of digital Image receptor used.

Q9 Collimation and partition if the xray exposure field is not properly Collimated ~~sized~~ sized and positioned exposure field recognition erross may occur These Can had to histogram analysis errors.

M T W T F S S H/W -C/W Dated: ...../...../20.....

Digital Image receptors normally Can recognized ~~the x ray ip~~ x ray exposure fields That Centered and Cleanly Collimated Alignment of the exposure field on the ip is important. in the Same way and for the Same reason as Collimation when an image field Such as ~~the shown~~ in is not oriented with the Size and dimesions of and ip image artifacts can appear.