1) Discuss the significance of sampling and quantization in processing of digital images.

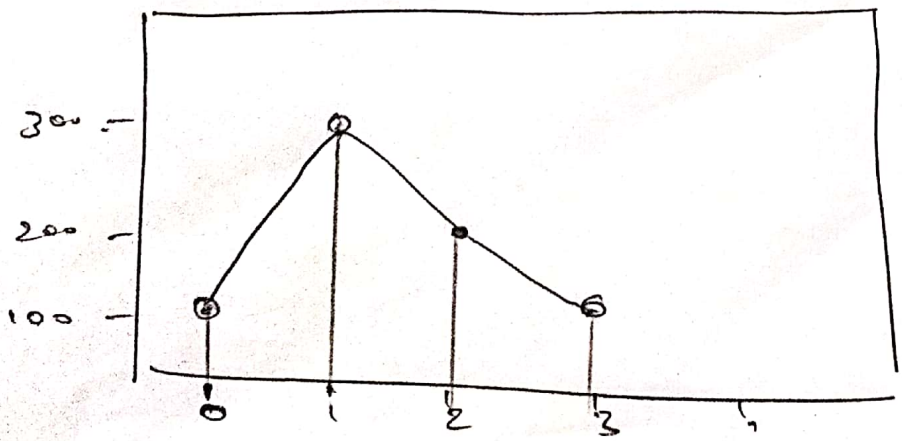
Sampling	Quantization.
* Spatial resolution of digitized image.	* fixes the number of gray level in digitized img.
* magnitude is expressed as digital value	* Change over between continous values of imag funtion & its digital equivalen.

Sampling : processes the analog signal of an image at regular discrete moments of time.

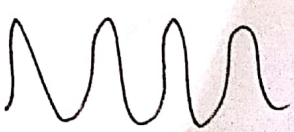
quantization : Each sample value (pixel) is mapped to a discrete level.

Sampling digitizing the coordinate values.

Ex : image :- $f(x,y)$ → where x & y are coordinate we have to sample the funtion in both cordinate & amplitud



Analog Signal will be



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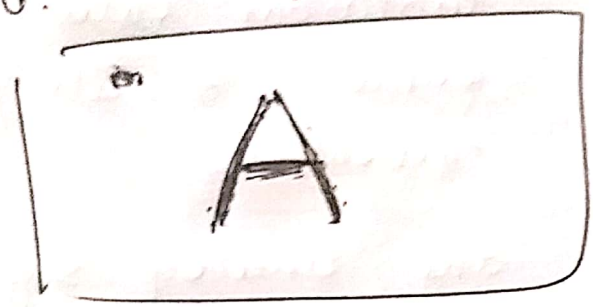
Sampling is done prior to quantization.

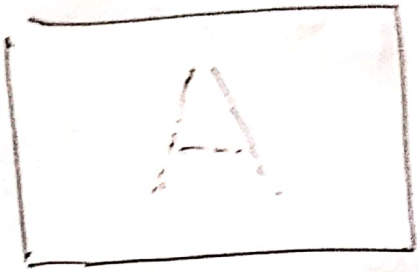
quantization is a mapping of direct signal

* usually finite set of value.
* Irreversible process.
* There may be loss of information.

Example. image.



gray scale.



here image quality is changed. (resolution).

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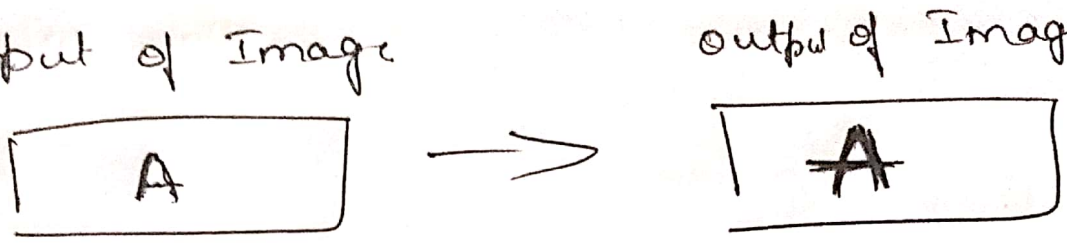
preprocessing involves manupabation of images or involves operation in an image at lowest level of abstraction.



* improvement of images.
* Removing of distortions, spaces etc
* This can be suitable for further procuring.
* changing brightness & contrast etc
* making image look clearly.
  include Equalization.

Drawing histogram → are one of the method to improve preprocuring.

Histogram procuring.

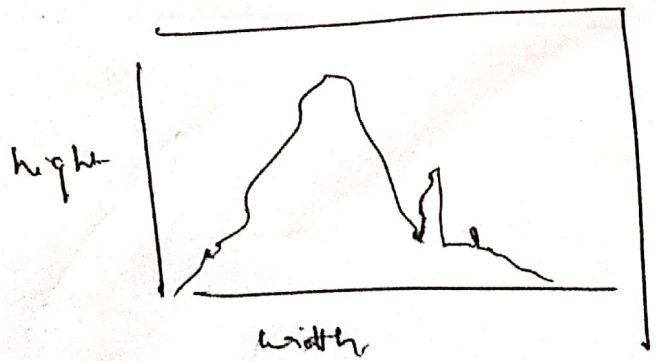


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Image Analysis & understanding is an useful task for better society building (4)

we can see a wide usefulness of digital image..

* Security & Surillence : captures | recording of particular area. if there is any, irregular function is area. it can be known.

* Robotics : Man works are reduced because of Robotics. monitor the behavior activities or changing data.
technology deals with automated machine. bulk task are made easy in production.

* Remote Sensing facilities :
we can know about Remote area. without visting. that place | without any physical contact.

* Agriculture : A farmer | a plant holder | can be know about quality of his products. (quality inspection).

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disease in farm etc.

Harvesting
Cleaning
quality checking
disease identification

* Banking Sectors : Here for transaction like signature identification checking the quality of checks. (which they are properly valid or not).

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* highways : Now a day there are huge traffic in highway so identify each vehicals & there fast (speed) or. hectic for individual. So everything are automatically know. to device using sensors do identify the no plate. ..

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4) Discuss the importance of biometric technology considering the current application

Now a day we can see biometric in Every sector (govt | privat).

people widely use this because of it's uniquly represents person identify.

Actually at present due to covid reason public avoid biometric facility.

Ex: Banking, voting (EVM machine).

↓

transaction to Complete

* It is used for authentication of a person.
* Security is guaranted here.

Varieties :→ face, & palm print.

Signature

Voice

Facial regnisation : In crime Sector.

Healthcare (hospital to maintain each patient information).

Replacing password (In baking field biometric authentication required)

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Fingure print recognation (Aadhaar Card)

Time & attendance (School procedure)

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5) Explain Image representation.

Image is a non-textual information, which can be display in monitor Sum or it can be printed in paper | oth.

Digital images are represented using 2Dimentional image which has finite Set of values

Each finite value are called **pixels**

Array of ~~pixels~~ pixels are called **bitmap**

There may be real images

Ex: photos captured in mobile | camera

There will be virtual images

Ex: cartoons, imaginary figures

Image contains spatial array, of values.

Image function

$f(x, y)$ → 2 variables.

↳ coordinate points.

x & y representing horizontal, Vertical } coordinates

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images must be digitized using frame grabber | digitizer.

So Sampling & quatize methods are used.

inorder to Convert Continous (Analog) imag. to descrete (digital) imag. So that it can be stored in computer

Storing of Analog is complex. it requires high memory storag.

So now digital stored are used. & Operations are used in digital imag.

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