



SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



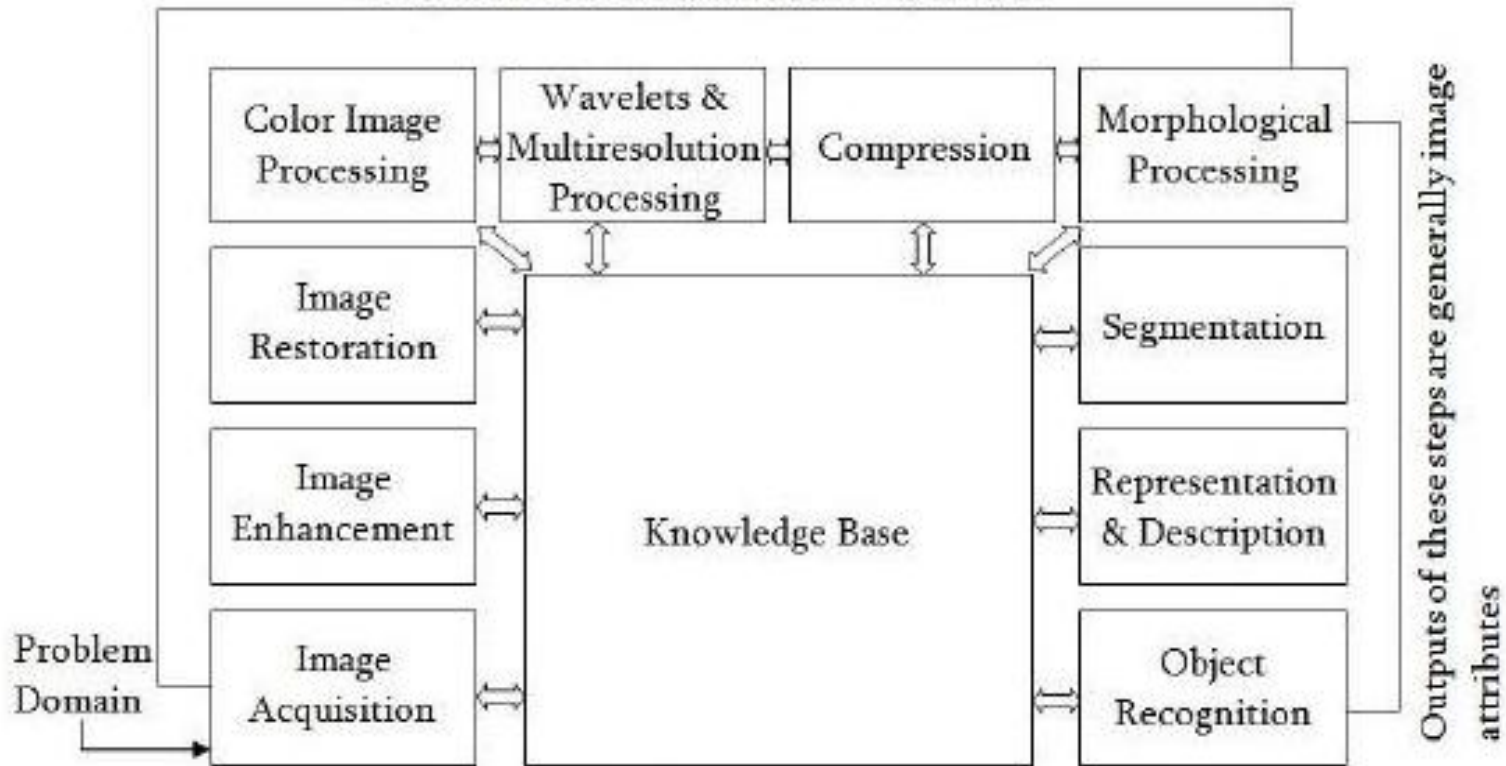
19EC351 – IMAGE PROCESSING AND COMPUTER VISION



Guess Today's Topic???



Outputs of these steps are generally images



Fundamental Steps in Digital Image Processing

❖ Image Acquisition. Image acquisition is the first step of the fundamental steps of DIP. ...

❖ Image Enhancement. ...

❖ Image Restoration. ...

❖ Color Image Processing

❖ Wavelets and Multi-Res

❖ Compression. ...

❖ Morphological Processing. ...

❖ Segmentation.



Image Acquisition



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Image Enhancement



(a)



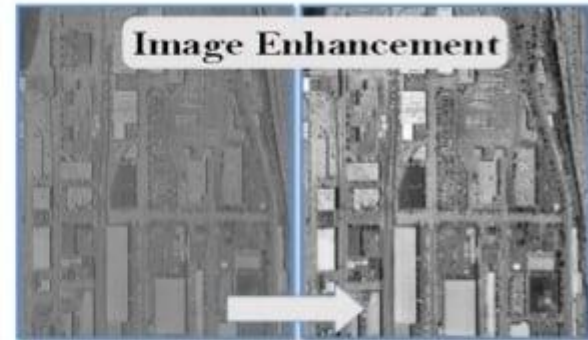
(b)



(c)



(d)



27-08-2018

5



What is Image Restoration?

- Image restoration attempts to restore images that have been degraded
 - ✓ Identify the degradation process and attempt to reverse it.
 - ✓ Almost Similar to image enhancement, but more objective.



Fig: Degraded image



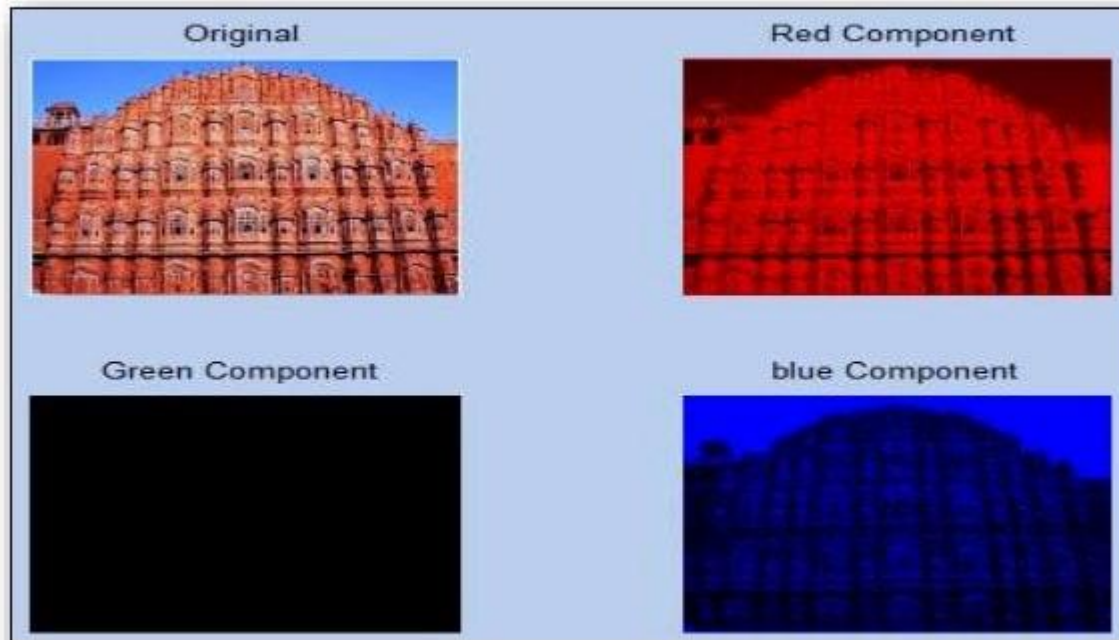
Fig: Restored image

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6



RGB Components of an Image



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8



Image Compression?

- How we stored the image: Reduce the size for storage .
- How analog image world is relate to digital processing world.
- Compression-Remove redundancies.
- Transmission with minimum bandwidth.
- Lossy Compression=redundancy +some information, but still acceptable.



Original Image
Size-116 KB



Compressed Image
Size-12.9 KB, 11 %



Compressed Image
Size-1.95 KB, 1.6 %

27-08-2018

11



Morphological Image Processing

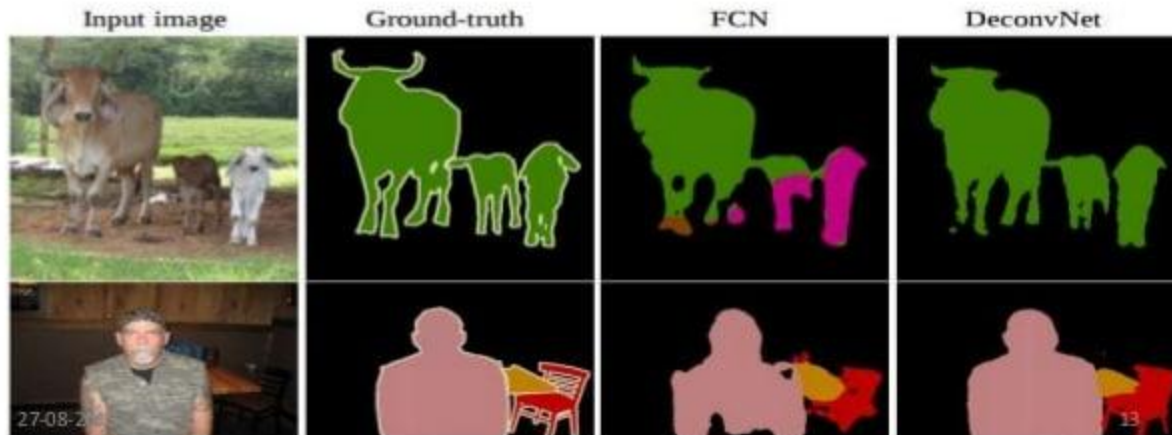
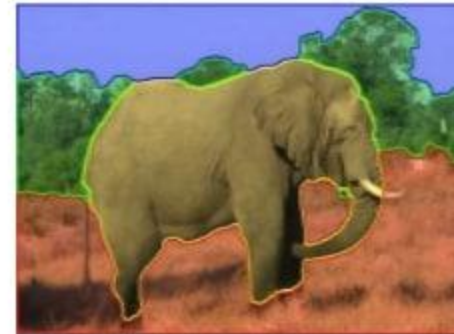
Extract image components that are useful in the representation and description of region shape, such as-

- Boundaries extraction
- Skeletons
- Convex hull
- Morphological filtering
- Thinning
- Pruning...many More



Image Segmentation

In computer vision, **Image Segmentation** is the process of partitioning a digital image into multiple segments. The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze





Fundamental Steps in Digital Image Processing



Image Representation & Description

- Image representation & description: After an image is segmented into regions; the resulting aggregate of segmented pixels is represented & described for further computer processing.
- **Representation and Description**
 - Representing regions in 2 ways:
 - Based on their external characteristics (its boundary):
 - Shape characteristics
 - Based on their internal characteristics (its region):
 - Regional properties: color, texture, and ...
 - Both

27-08-2018

14



Fundamental Steps in Digital Image Processing

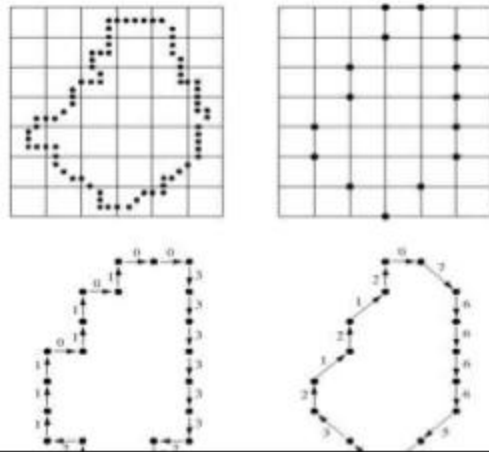
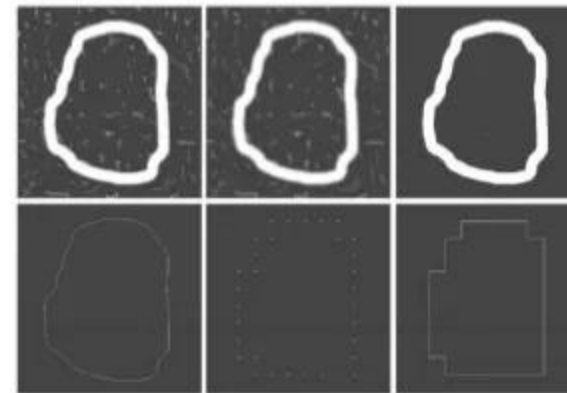


Image Representation & Description



a b c
d e f

FIGURE 11.5 (a) Noisy image, (b) Image smoothed with a 9×9 averaging mask, (c) Smoothed image, thresholded using Otsu's method, (d) Longest outer boundary of (c), (e) Subsampled boundary (the points are shown enlarged for clarity), (f) Connected points from (e).

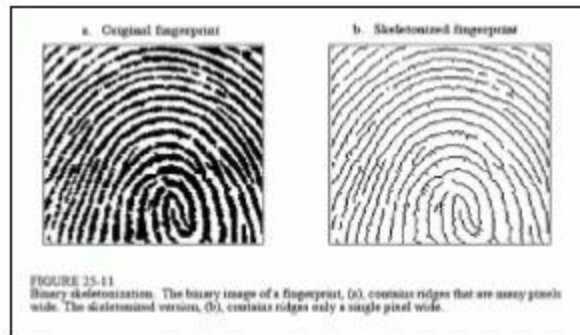
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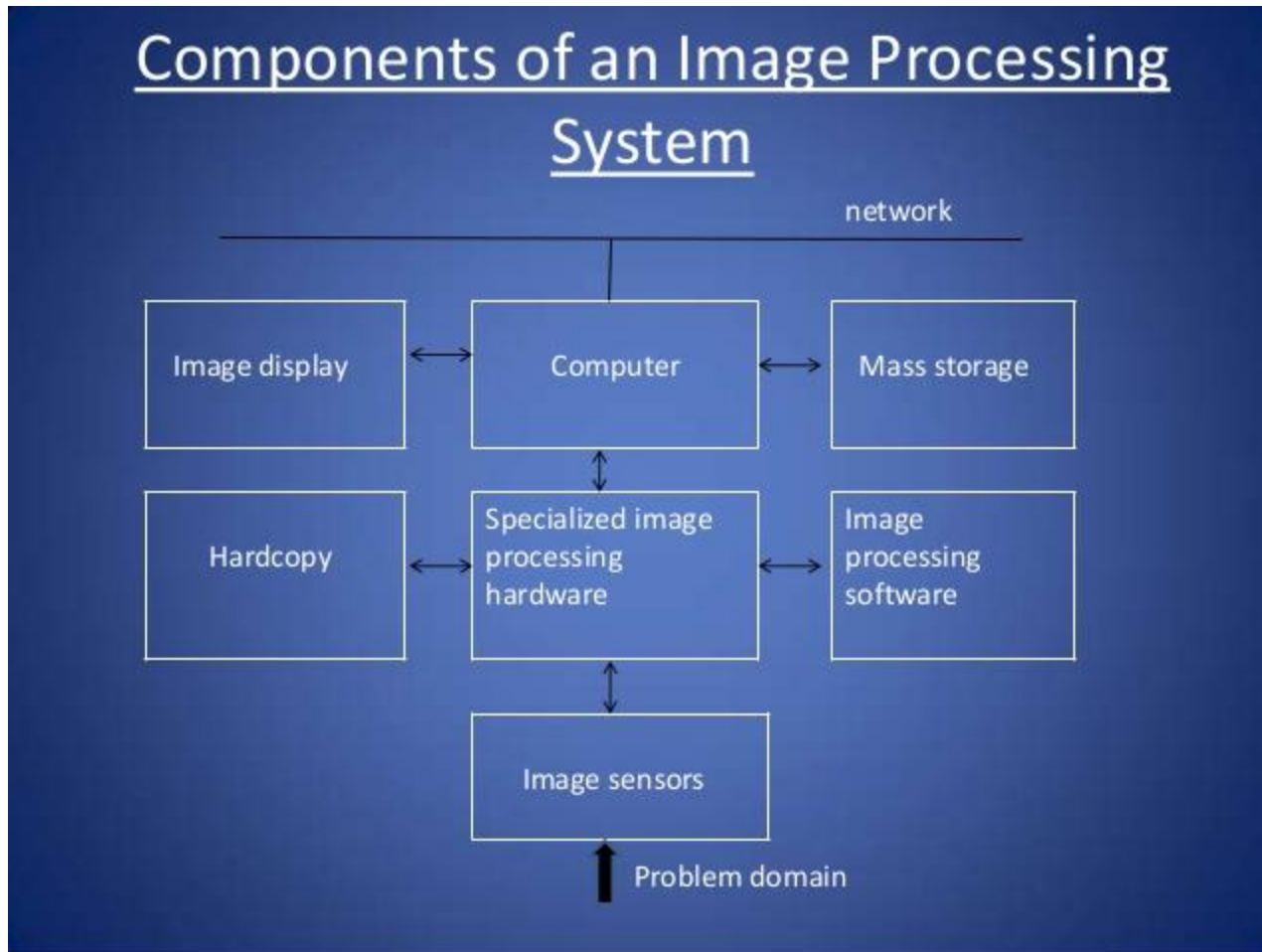


Morphological Image Processing

Extract image components that are useful in the representation and description of region shape, such as-

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Popular Image Processing Software

- CVIP tools
(Computer Vision and Image Processing tools)
- **Intel Open Computer Vision Library**
- Microsoft Vision SDL Library
- **MATLAB**
- KHOROS
- **ImageJ**



27-08-2018

18





THANK YOU

