SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECE351 – IMAGE PROCESSING AND COMPUTER VISION

III B.E. ECE / V SEMESTER

UNIT 4 – MORPHOLOGICAL IMAGE PROCESSING

TOPIC – BASIC CONCEPT

Morphology

- “*Morphology* “ – a branch in biology that deals with the form and structure of animals and plants.
- “*Mathematical Morphology*” – as a tool for extracting image components, that are useful in the representation and description of region shape.
- The language of mathematical morphology is – **Set theory**.
- Unified and powerful approach to numerous image processing problems.
- In binary images , the set elements are members of the 2-D integer space – Z^2. where each element (x,y) is a coordinate of a black (or white) pixel in the image.

Basic Concepts in set theory

- Subset

  $A \subseteq B$
- Union

  $A \cup B$
- Intersection

  $A \cap B$

  disjoint / mutually exclusive $A \cap B = \emptyset$
- Complement $A^c \equiv \{ w \mid w \notin A \}$
- Difference $A - B \equiv \{ w \mid w \in A, w \notin B \} = A \cap B^c$
- Reflection $\hat{B} \equiv \{ w \mid w = -b, \quad \forall b \in B \}$
- Translation $(A)_z \equiv \{ c \mid c = a + z, \quad \forall a \in A \}$

Logical operations

- The logic operations used in image processing are: **AND, OR, NOT** (**COMPLEMENT**).
- Logic operations are preformed on a pixel by pixel basis between corresponding pixels (bitwise).
- Other important logic operations :

  XOR (exclusive OR), NAND (NOT-AND)
- Logic operations are just a private case for a **binary set operations**, such : AND – Intersection , OR – Union,

  NOT-Complement.

- **Reflection**

The reflection of a set B, denoted B, is defined as

$$B = \{w \mid w = -b, \text{for } b \in B\}$$

- **Translation**

The translation of a set B by point $z = (z_1, z_2)$, denoted $(B)_Z$, is defined as

$$(B)_Z = \{c \mid c = b + z, \text{for } b \in B\}$$

Thank you!