19EC351 – IMAGE PROCESSING AMD COMPUTER VISION

Guess Today's Topic????

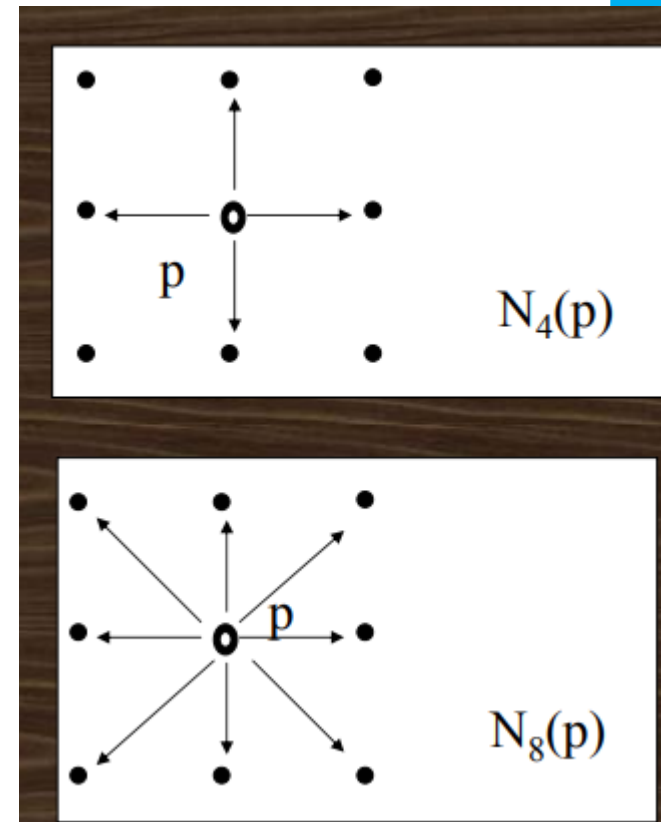# Neighbours of a pixels

A pixel p at (x,y) has 4-horizontal/vertical neighbours at (x+1,y), (x-1,y), (x,y+1) and (x,y-1). These are called the **4-neighbours of p : N4(p)**.

A pixel p at (x,y) has 4 diagonal neighbours at (x+1,y+1), (x+1,y-1), (x-1,y+1) and (x-1,y-1). These are called the **diagonal-neighbours of p : ND(p).**

The 4-neighbours and the diagonal neighbours of p are called **8-neighbours of p : N8(p).**

Adjacency between pixels

To determine whether the pixels are adjacent in some sense.

Let V be the set of gray-level values used to define connectivity;

then Two pixels p, q that have values from the set V

We consider three types of adjacency:

a) 4-adjacency: Two pixels p and q with values from V are 4-adjacent if q is in the set $N_4(p)$.

b) 8-adjacency: Two pixels p and q with values from V are 8-adjacent if q is in the set $N_8(p)$.

c) m-adjacency(mixed adjacency): Two pixels p and q with values from V are m-adjacent if

q is in $N_4(p)$, or

2) q is in $N_D(p)$ and the set $N_4(p) \cap N_4(q)$ has no pixels whose values are from V.
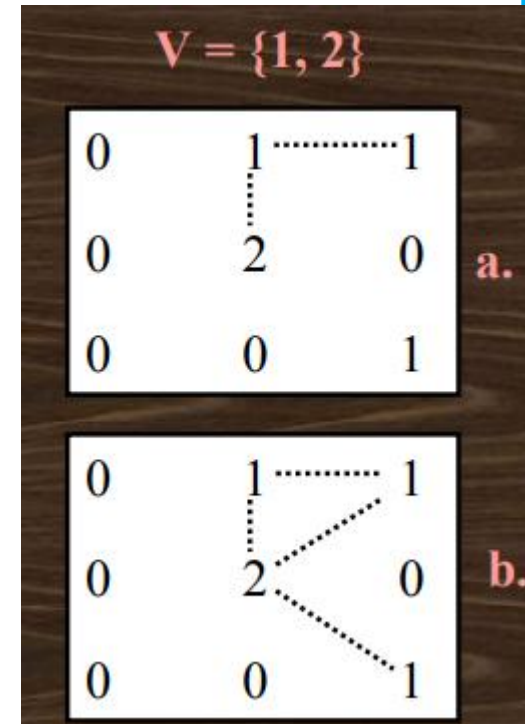
Connectivity between pixels

•It is an important concept in digital image processing.

•It is used for establishing boundaries of objects and components of regions in an image.

•Two pixels are said to be connected:

•if they are adjacent in some sense(neighbour pixels,4/8/m-adjacency)

•if their gray levels satisfy a specified criterion of similarity(equal intensity level)

Connectivity between pixels (cont.)

There are three types of connectivity on the basis of adjacency. They are:

a) 4-connectivity: Two or more pixels are said to be 4-connected if they are 4-adjacent with each others.

b) 8-connectivity: Two or more pixels are said to be 8-connected if they are 8-adjacent with each others.

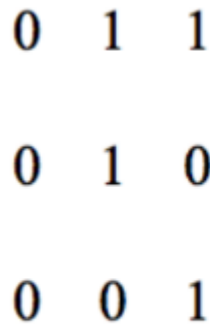**c) m-connectivity:** Two or more pixels are said to be m-connected if they are m-adjacent with each others
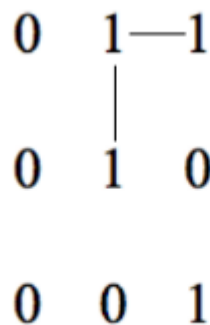

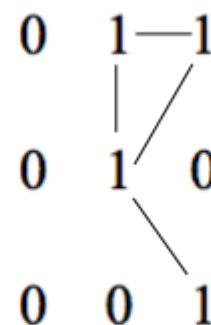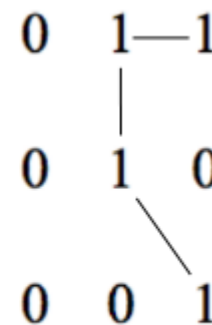| Fig: An arrangement of pixels | Fig: 4-connectivity of pixels | Fig: 8-connectivity of pixels | Fig: m-connectivity of pixels |

For pixels p, q, and z, with coordinates (x, y), (s, t), and (v, w), respectively, D is a *distance function* or *metric* if

(a) $D(p, q) \geq 0$ $(D(p, q) = 0$ iff $p = q)$,
(b) $D(p, q) = D(q, p)$, and
(c) $D(p, z) \leq D(p, q) + D(q, z)$.

- Euclidean distance
- D4 distance (city-block distance)
- D8 distance (chessboard distance)

THANK YOU

Bye
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19EC551/ Image Processing and Computer Vision/19EC351/K.SANGEETHA/UNIT 1

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