

ARTIFICIAL INTELLIGENCE 2

Vision TUTORIAL 1

Out: Week of 2/2

Discuss: Week of 9/2

- For each of the following grey level representations, construct binary representations, using Roberts' cross operator.

The first step is to estimate the magnitude of the luminance change in local areas, determined by passing a 2x2 window across the digitised representation, and by applying the following operator to the values contained in the window. For window:

a	d
c	b

the operator is:

$$R = \sqrt{(a - b)^2 + (c - d)^2}$$

This operator produces a set of candidate edge points, from which the edge points are selected by comparing each value with a threshold value. This is the second step. The supra-threshold values are replaced by 1s to produce the binary representation.

Problem 1

8x8 255 max

0	1	2	1	0	2	0	1
0	7	7	0	2	7	7	1
2	6	5	1	0	7	7	0
1	7	6	1	1	6	7	1
1	5	4	3	2	5	6	2
0	7	5	3	2	4	4	0
1	7	6	5	6	5	5	0
0	1	3	3	3	2	1	0

3 bit picture. What letter?

Problem 2

2	4	9	6	8	3	4	6	4
6	15	15	7	3	2	15	14	7
4	15	14	15	2	15	14	15	4
4	15	13	13	15	14	15	14	5
3	14	12	2	2	3	15	13	2
5	15	12	1	3	6	13	12	3
3	11	12	0	4	5	11	12	4
0	1	4	3	5	4	7	3	1

4 bit picture. What letter?

2. Often the cross operator is simplified for computational efficiency by using absolute magnitudes. It becomes:

$$R = |(a - b)| + |(c - d)|$$

Apply the absolute magnitude operator to the picture functions given in Problems 1 and 2, and compare the resulting binary images with the images generated by the square root operator.