Shapes and Boundaries

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Introduction

- Question we might ask about shapes include the following:
  - How to we tell if two objects have the same shape?
  - How can we classify shape?
  - How can we describe the shape of an object?
- Formal means of describing shapes are called **shape descriptors**. (size, symmetry, and length of perimeter)
- A precise definition of the exact shape in some efficient manner is a **shape representation**.
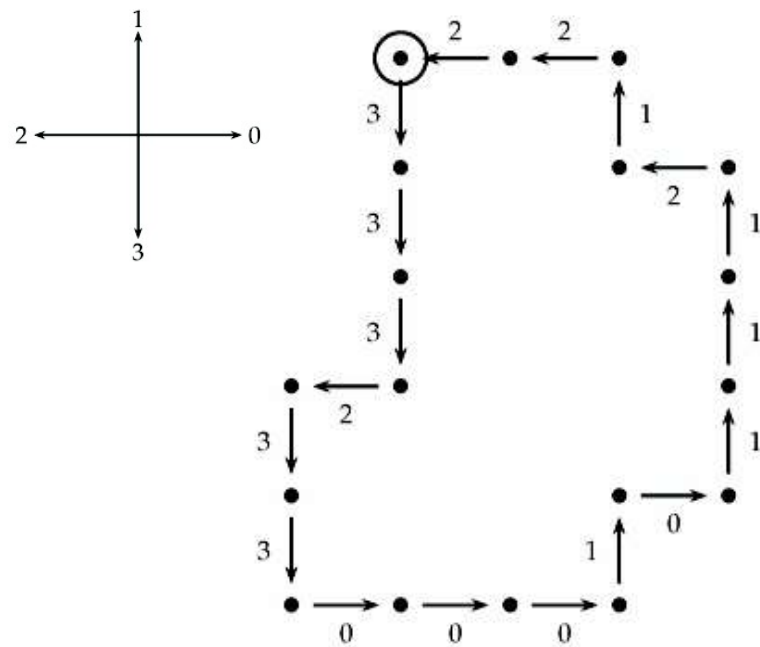
Chain codes and Shape Numbers
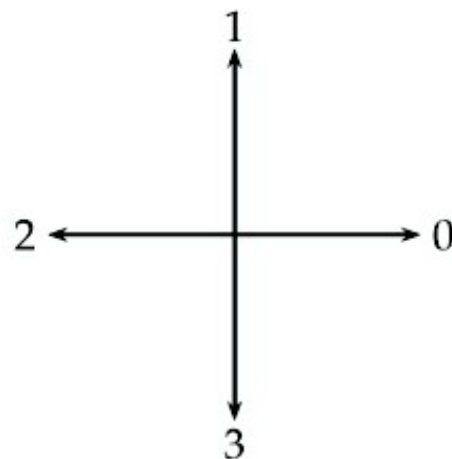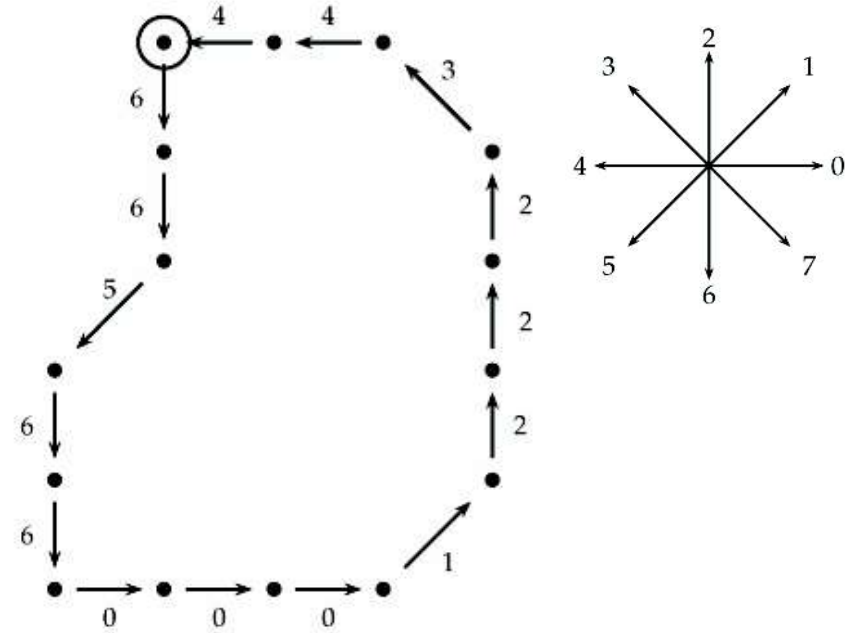

Direction for 4-connectedness
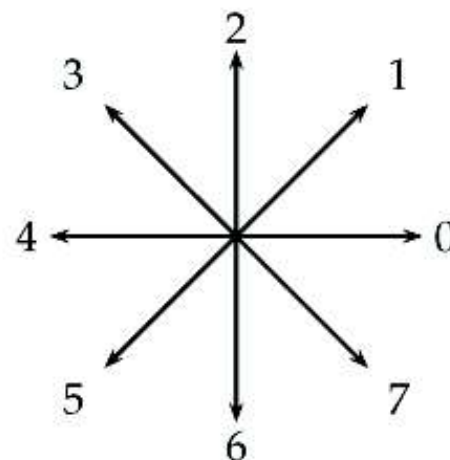
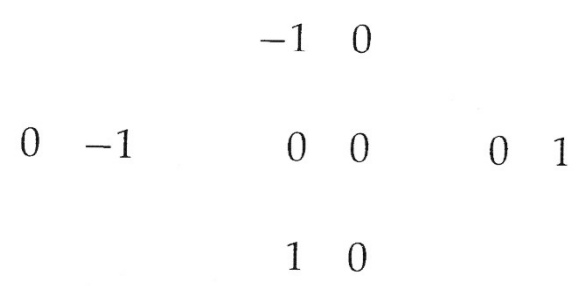**Direction for 8-connectedness**

Chain codes and Shape Numbers

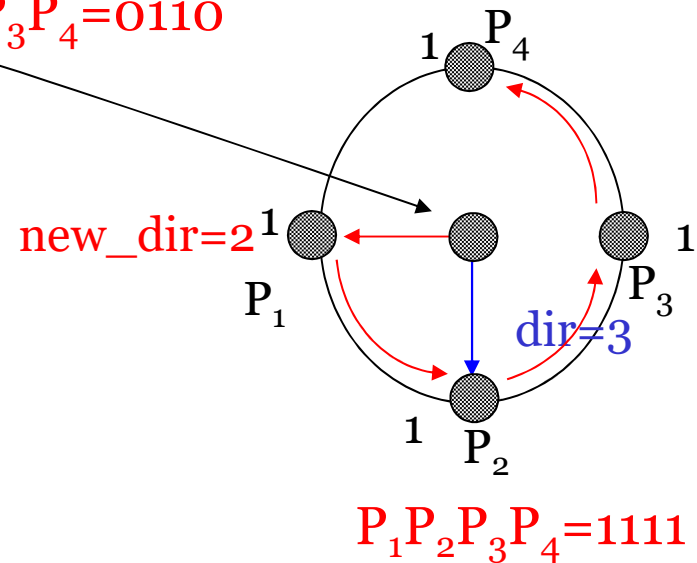3 3 3 2 3 3 0 0 0 1 0 1 1 1 2 1 2 2   6 6 5 6 6 0 0 0 1 2 2 2 3 4 4

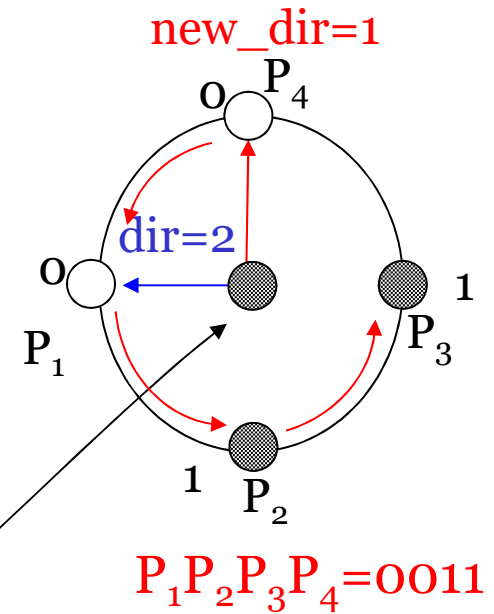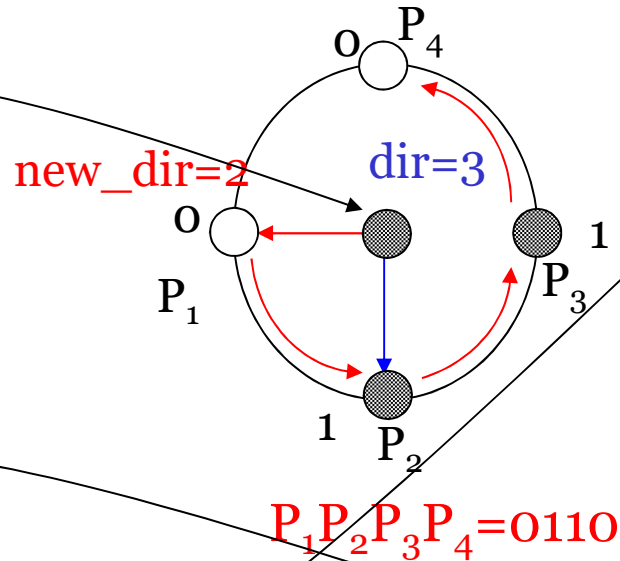# Chain codes and Shape Numbers

P_{k+1}

$$1 \quad\quad 1 \longleftarrow \cdots\cdots 0$$

$$1 \xrightarrow{\;0\;} \boxed{P_k \atop 1} \quad 0$$

$$3$$

$$0 \quad\quad 0 \cdots\cdots\longrightarrow 0$$

$$-1 \quad 0$$

$$0 \quad -1 \qquad 0 \quad 0 \qquad 0 \quad 1$$

$$1 \quad 0$$

dir	0	1	2	3
dir+3 (mod 4)	3	0	1	2

dir	0	1	2	3	4	5	6	7
dir+5 (mod 8)	5	6	7	0	1	2	3	4

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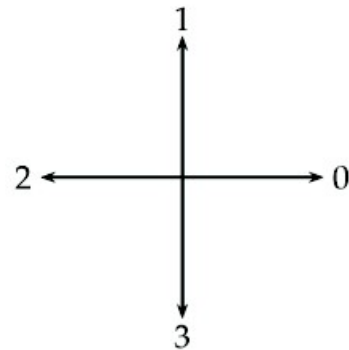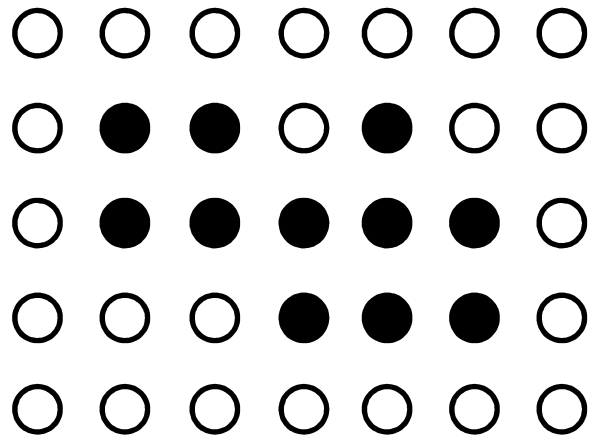
test = [

0 0 0 0 0 0 0;

0 0 1 1 1 0 0;

0 0 1 1 1 1 0;

0 0 1 1 1 1 0;

0 1 1 1 1 1 0;

0 1 1 1 1 1 0;

0 1 1 1 1 0 0;

0 0 0 0 0 0 0];

C1 = chaincode4(test)

3 3 **3** **2** 3 3 0 0 0 1 0 1 1 2 1 2 2

new_dir=2

dir=3

$P_1P_2P_3P_4$=0110

new_dir=1

dir=2

$P_1P_2P_3P_4$=0011

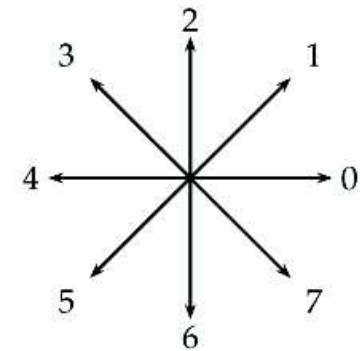new_dir=2

dir=3

$P_1P_2P_3P_4$=1111

Exercise

Direction for 4-connectedness

Direction for 8-connectedness

Applications