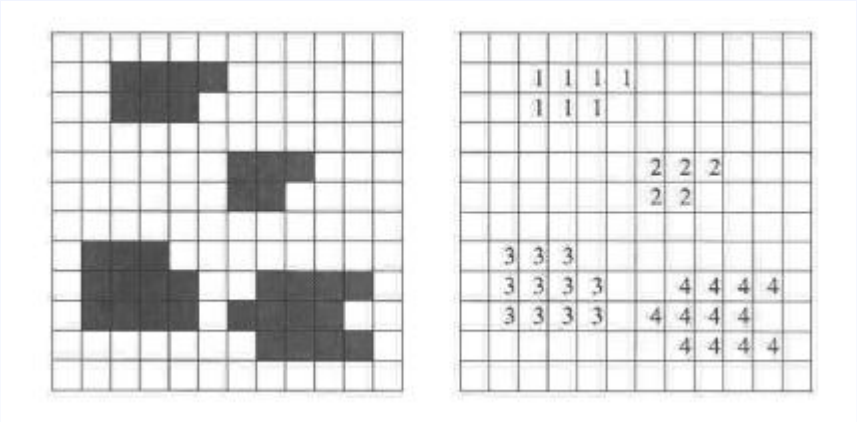
OpenCV4 图像处理与视频分析教程

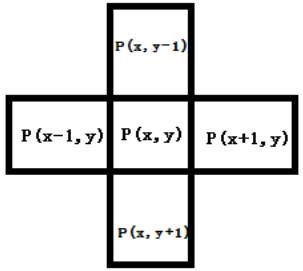
联通组件扫描

- 基本概念解释
- 常见算法
- 代码演示

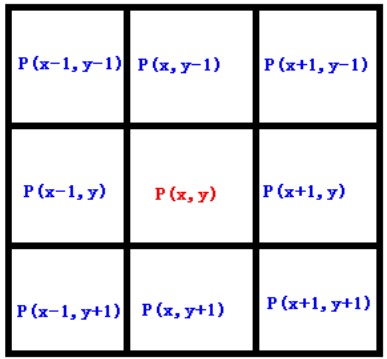
基本概念解释

- 图像连通组件
- 四邻域与八领域连通





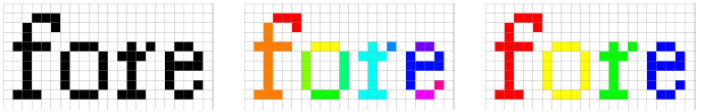
四邻域

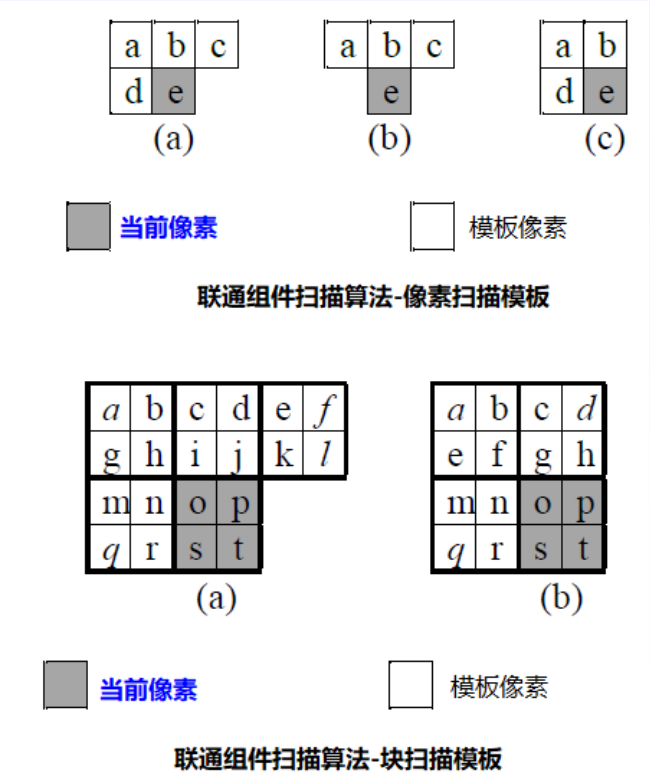


八邻域

常见算法

- 基于像素扫描的方法
- 基于块扫描的方法
- 两步法扫描





Connected Component Labeling
Two-Pass Algorithm Demo

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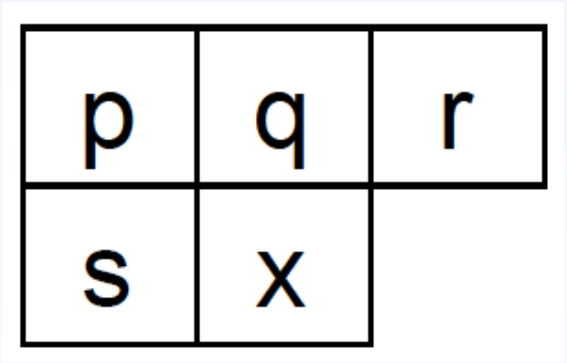
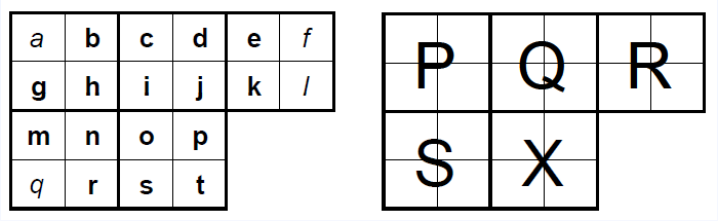
							assign				merge	
x	p	q	r	s	no action	new label	x = p	x = q	x = r	x = s	x = p+r	x = r+s
0	-	-	-	-	1							
1	0	0	0	0		1						
1	1	0	0	0			1					
1	0	1	0	0				1				
1	0	0	1	0					1			
1	0	0	0	1						1		
1	1	1	0	0			*1*	1				
1	1	0	1	0							1	
1	1	0	0	1			*1*			1		
1	0	1	1	0				1	*1*			
1	0	1	0	1				1		*1*		
1	0	0	1	1								1
1	1	1	1	0			*1*	1	*1*			
1	1	1	0	1			*1*	1		*1*		
1	1	0	1	1							*1*	1
1	0	1	1	1				1	*1*	*1*		
1	1	1	1	1			*1*	1	*1*	*1*		

决策表



模板

OpenCV中连通组件扫描算法-BBDT



$$
\begin{aligned}
c_1&: \; X \bowtie P \stackrel{\text{def}}{=} h \in \mathcal{F} \wedge o \in \mathcal{F} \\
c_2&: \; X \bowtie Q \stackrel{\text{def}}{=} (i \in \mathcal{F} \vee j \in \mathcal{F}) \wedge (o \in \mathcal{F} \vee p \in \mathcal{F}) \\
c_3&: \; X \bowtie R \stackrel{\text{def}}{=} k \in \mathcal{F} \wedge p \in \mathcal{F} \\
c_4&: \; X \bowtie S \stackrel{\text{def}}{=} (n \in \mathcal{F} \vee r \in \mathcal{F}) \wedge (o \in \mathcal{F} \vee s \in \mathcal{F}) \\
c_5&: \; P \bowtie Q \stackrel{\text{def}}{=} (b \in \mathcal{F} \vee h \in \mathcal{F}) \wedge (c \in \mathcal{F} \vee i \in \mathcal{F}) \\
c_6&: \; Q \bowtie R \stackrel{\text{def}}{=} (d \in \mathcal{F} \vee j \in \mathcal{F}) \wedge (e \in \mathcal{F} \vee k \in \mathcal{F}) \\
c_7&: \; S \bowtie P \stackrel{\text{def}}{=} (g \in \mathcal{F} \vee h \in \mathcal{F}) \wedge (m \in \mathcal{F} \vee n \in \mathcal{F}) \\
c_8&: \; S \bowtie Q \stackrel{\text{def}}{=} i \in \mathcal{F} \wedge n \in \mathcal{F} \\
c_9&: \; X \in \mathcal{F} \stackrel{\text{def}}{=} o \in \mathcal{F} \vee p \in \mathcal{F} \vee s \in \mathcal{F} \vee t \in \mathcal{F}
\end{aligned}
$$

API知识点

- connectedComponentsWithStats
- 黑色背景

输出	内容
1	连通组件数目
2	标签矩阵
3	状态矩阵
4	中心位置坐标

状态矩阵[label, COLUMN]

标签索引	列-1	列-1	列-1	列-1	列-1
1	CC_STAT_LEFT	CC_STAT_TOP	CC_STAT_WIDTH	CC_STAT_HEIGHT	CC_STAT_AREA

Thank You!