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あらまし

キーワード

A study on people density estimation using multiple cameras

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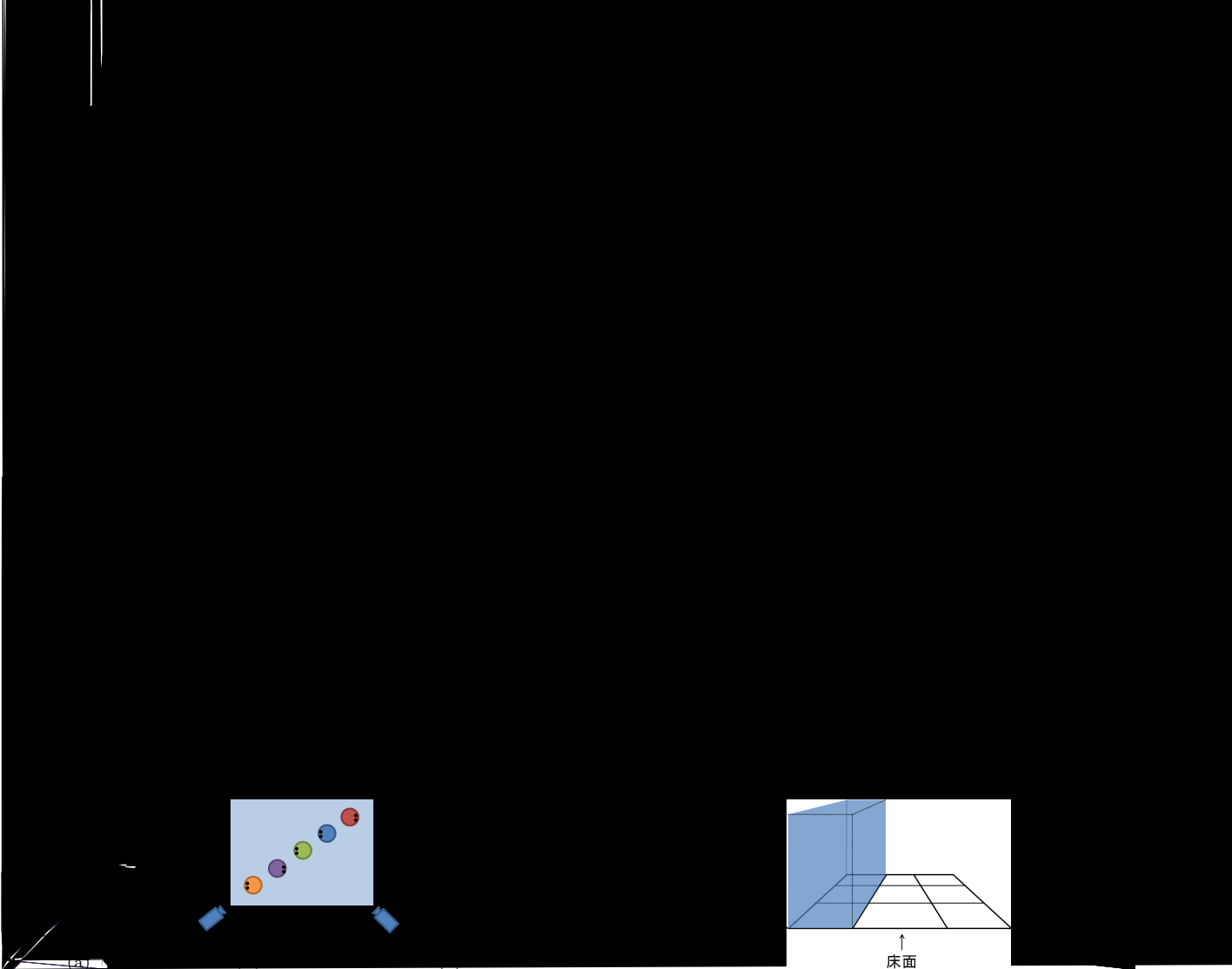
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Abstract Crowd analysis is focused on for public safety and marketing. Also, in recent years, it has become necessary to analyze a large volume of video data recording the activity of a crowd according to the widespread of surveillance cameras due to the increase of security awareness. Automatic analysis of such crowd videos is in demand because manual analysis takes time and effort. Among the crowd analysis, there is a demand for people density estimation. Therefore, we aim to estimate the density of people in a situation where many people exist, using multiple cameras to deal with occlusion. In this report, we study a method which estimates the people density by counting people based on regression in small areas. In an experiment, we examined the accuracy of the proposed people density estimation method.

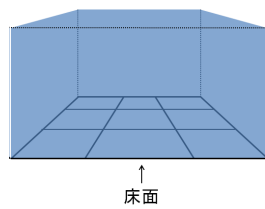
Key words People density estimation, crowd analysis, multiple cameras

1. ま え が き



1

4



2

1

1(b)

1

1(a)

2

1(c)

[1]

[6]

[2]

[3]

2

3

4

2. 回帰による小領域毎の人数分布推定手法

2

3×3 9

[4]

[5]

2.1 学習段階

1 2

2

3

2.2 推定段階

1

2

3

3. 人数分布推定実験

3.1 実験条件

300×300 cm² 3×3 9

4 6 2

90

6

1

2

3

3

7

3.2 学習用画像の生成

9

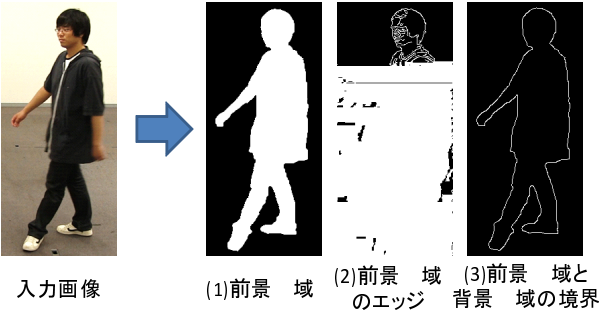
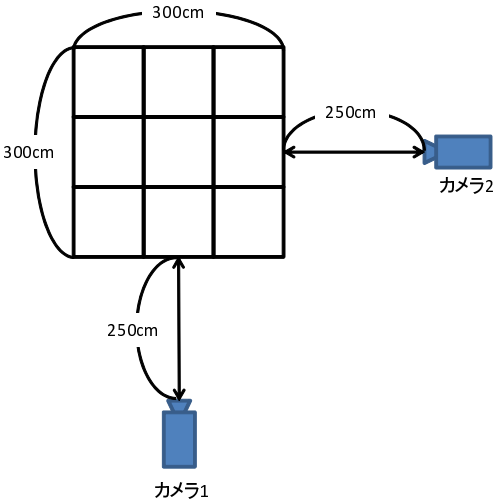
3×3

0 4

2

10

10(a)

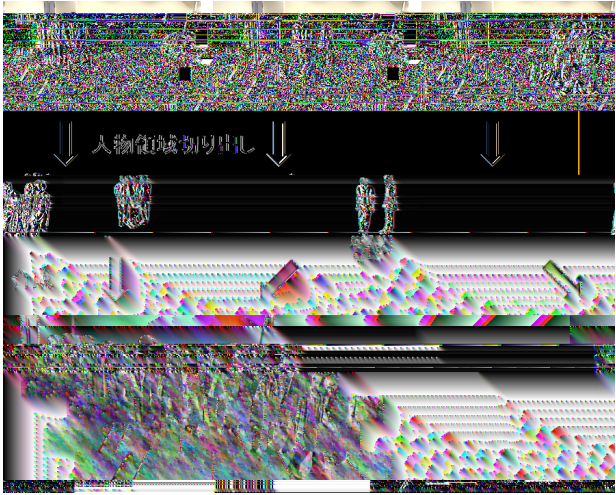


Canny

[7]
[8]

1 1 12 230
4,500

8



9



(a)

(b)

10

1 1

10(b)

5 0 4 1

3.3 実験結果と考察

11

0.21

$$(x,y) = (1,1)$$

11

$$(x,y) = (1,3) \qquad 0.55$$

$$(x,y) = (1,3)$$

12

$$(x,y) = (1,3)$$

$$(x,y) = (1,3) \qquad 2$$

1 3

13

3

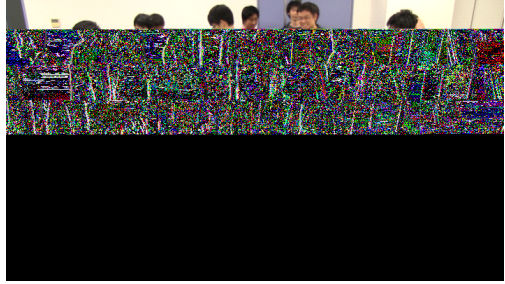
$$14 \quad (x,y) = (2,2) \quad (x,y) = (3,1)$$

1

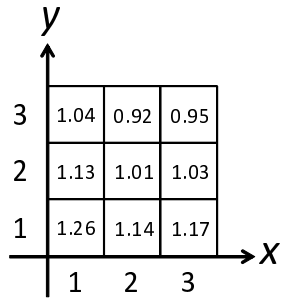
4. ま と め



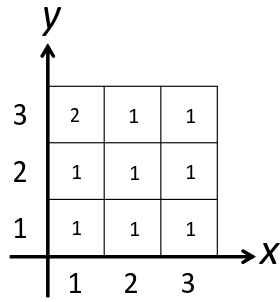
(a) 1



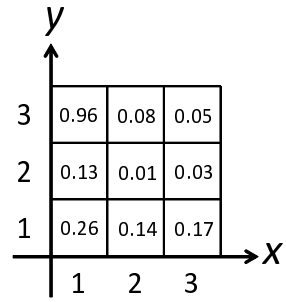
(b) 2



(c)



(d)



()

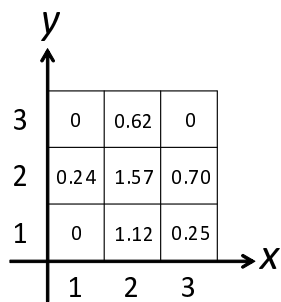
12 $(x, y) = (1, 3)$



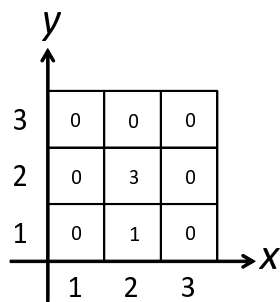
(a) 1



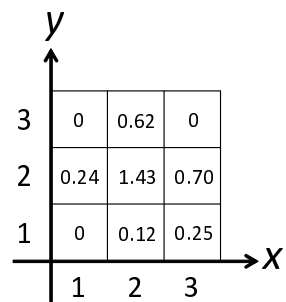
(b) 2



(c)



(d)



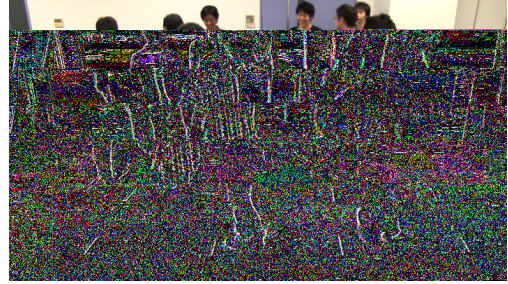
()

13 1

3



(a) 1



(b) 2

	y			
3		0.55	1.35	1.35
2		0.74	1.54	1.53
1		0.77	1.57	1.57
		1	2	3
		x		

(c)

	y			
3		2	1	1
2		1	0	1
1		0	2	0
		1	2	3
		x		

(d)

	y			
3		1.45	0.35	0.35
2		0.26	1.54	0.53
1		0.77	0.43	1.57
		1	2	3
		x		

()

14 0

1

謝 辞

MIST

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