

가
 : (1) 가
 (convolution technique), (2)
 (erosion) (dilation)
 , (3) 가
 , (4)
 (sweeping).
 ,
 (heuristic tracking algorithm)

2.

가

[10]

[11] Figure 1a

가 2D

가

2D

가

가

[4, 5],

[6, 7],

3D

[8,9]

2D

Figure

[4,5]

1b

2D

가

가

가

3

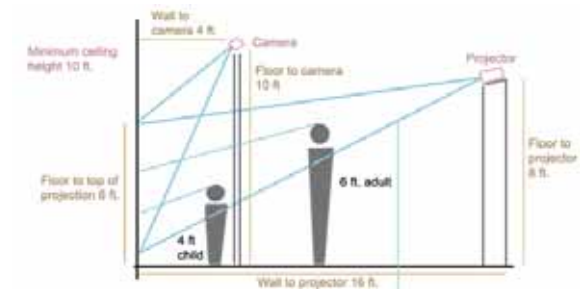


Figure 1a: A Cast Shadow Exhibition Space Size

가

2

가

3

4

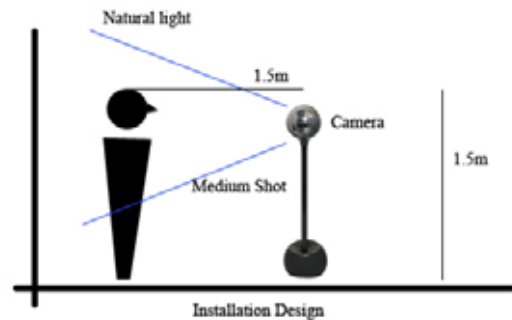


Figure 1b: Emotion-Shadow Playing Tool Exhibition Space

Size

5

(mapping)

6

Table 1: Comparison of a and b

	(a)	(b)
	4.9 x 3 m	1.5 x 2 m
		(.)
		,

3. 가

(background subtraction)

가

가

(background model)

가 . 가

level)

가

(grey

(approximation)

Yang

Levine[13]

(median value)

(background primal

(dilation)

(erosion)

sketch)

(1)

(gap)

B_{jk}

$$B_{jk} = \text{median}(I_{jk}^1, I_{jk}^2, \dots, I_{jk}^N) \quad (1)$$

$I_{jk}^1, I_{jk}^2, \dots, I_{jk}^N$

N

(j, k)

(difference

image)

(threshold)

가

가

[12]. 가

(uniform threshold)

가

(sweeping)

가

가

d_{jk} :

$$d_{jk} = 1, \text{ if } |I_{jk}^i - B_{jk}| > T$$

$$0, \text{ otherwise,} \quad (2)$$

I_{jk}^i

B_{jk}

T

. d_{jk}

1

가

,

가

가

, 가

(median mask)

(convolution)

$$O = \{ (x, y) \mid x = -\alpha, 0, \alpha \text{ and } y = -\alpha, 0, \alpha \}, I = \{ (x, y) \mid x = -\beta, 0, \beta \text{ and } y = -\beta, 0, \beta \}, \beta = k\alpha > 0, 0 < k < 1$$

(3)

Figure 2



Figure 2: An example of detected center of a upward convex shape.

4.

(model-based), (region-based) contour based, (active feature-based) [2].

(sub-feature)

color of $(x + o_x, y + o_y)$ is white, for $(o_x, o_y) \in O - \{(0, -\alpha), (0, 0)\}$ and color of $(x + o_x, y + o_y)$ is black, for $(o_x, o_y) \in I$,

(3) 5.

(Animation Mapping)

Table 2

Figure 3

Figure 4

Table 2: A mapping of hand gestures to emotions

Emotion	Right Arm	Left Arm
Anger	Up	Up
Sadness	Up	No gesture
Surprise	No gesture	Up
Joy	Rightward	Leftward
No emotion	No gesture	No gesture



Figure 3: Animation frames in case of angry and joyful emotion



Figure 4: Snapshots of the tool

6.

640×480

k=0.65

0.8 ~3.0m,

α 114~32

factor)

type1

type2

type1

s

type1

Type2

s

가

Table 3: Summary of the experimental result

Distance	room	s=0.2			s=0.3			s=0.4		
		type1	type2	success rate	type1	type2	success rate	type1	type2	success rate
0.8m	1	7	7	53.3	5	4	70.0	6	9	50.0
	2	13	2	50.0	11	3	53.3	15	1	53.3
1.5m	1	4	3	76.7	3	1	86.7	4	6	66.7
	2	8	2	66.7	6	3	70.0	3	6	70.0
3.0m	1	3	0	90.0	1	0	96.7	1	3	86.7
	2	4	1	83.3	2	1	90.0	1	2	90.0

가

가

가

가

가

room2

가

type1

가

3.0m

room1

room2

7.

가

가 가
가 가

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