

(19)
(12)

(KR)
(B1)

(51) 。 Int. Cl. ⁷
H04N 13/00

(45)
(11)
(24)

2003 03 04
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2003 02 20

(21) 10 - 2000 - 0041424
(22) 2000 07 19

(65) 2002 - 0007894
(43) 2002 01 29

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(72) 8 1501

9 1801

(74)

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(54)

1 2 /

, Bayesian Sense

가

가

1

1

2 1 SMC

3 2

4 3

5 3

6 3

(Stereo Matching) 2 3 (Stereo vision) [Uemsh R. Dhond and J. K. Aggarwal. Structure from stereo - a review. IEEE Transactions on Systems, Man, and Cybernetics, 19(6):553 - 572, nov/dec 1989]

가 가 (similar) (pixel) 3

(Depth)

(Occlusion)

가

Virtual Reality, Medicine Mapping, Geology, Testing, Inspection, Navigation, Vi 가 (Autonomous Vehicles) (Robotics)

[Stuart Geman and Donald Geman. Stochastic relaxation, Gibbs distributions, and the Bayesian restoration of images. IEEE Transactions on Pattern Analysis and Machine Intelligence, PAMI - 6(6):721 - 7

41, November 1984] Kirkpatric et al Simulated Annealing St
 ochastic Optimization Markov Random Fields Mean Field
 Geiger Girosi

[H. H. Baker and T. O. Binford. Depth from edge and intensity based stereo. In Proceedings of the International Joint Conference on Artificial Intelligence, page 631 - 636, Vancouver, Canada, 1981]
 [Y. Ohta and T. Kanade. Stereo by intra - and inter - scanline search. IEEE Transactions on Pattern Analysis and Machine Intelligence, PAMI - 7(2):139 - 154, March 1985] (D
 ynamic Programming:DP) Dual - level DP
 (Heuristic) Post - processing [Ingemar J. Cox, Sunita L. Hingorani, S
 atish B. Rao, and Bruce M. Maggs. A maximum likelihood stereo algorithm. Computer Vision and Image Understanding, 63(3):542 - 567, May 1996]
 [Stan Birchfield and Carlo Tomasi. Depth discontinuities by pixel - to - pixel stereo. In Proceedings of the IEEE International Conference on Computer Vision, pages 1073 - 1080m, Bombay, India, 1998] Post - processing
 Single - level DP [Peter N. Belhumeur. A Bayesian approach to binocular stereopsis. International Journal of Computer Vision, 19(3):237 - 260, 1996] Sub - pixel Resolution
 DP Markov Random Field
 (Scale)

Bayesian Sense

가

1 2

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(11),

(10,11)

(10),

(12),

SMC(Stereo Matching Chip)(13),

(14)

2

1

SMC

2 SMC N/2 (12) (21), N (20), N/2 (12) (22), (20), (21) (23) . (N 2 .)

3 2

3 (20) (21) (Foward Processor) (30), (30) (Decision Stack) (31), / (Backward Processor) (32)

4 3

4 (20) (21) 가 1 가 (41), (41) (42), 1 가 (42) (22) 가 (43), (43) 가 (Cost Register) (44), (44) 가 (22) 2 가 (45)

5 3

5 (43) 2 (53) 1 MUX(50) (Multiplexer, MUX) (50), 1 MUX(50) (32) 1 (51), 1 (51) 1 MUX(50) 2 MUX(52), 2 MUX(52) 2 (53)

6 3

6 (60), OR (60) (61), OR (61) (62), OR (63) (60) (61) (Demultiplexer, DEMUX) (62), (63) (31) 3 (6)

1 6

axes) (Focal plane) (Disparity) (Optical (10,11)

(10,11) SMC(13) 가 . SMC(13) (12) , 가 .

2 SMC(13) N (22) N/2
(20) (20,21) 2 가 . N 2 .
(10) (11) , (21)

(22) , (22) (22)
(22) , (22) 가

(23) 2 (20,21), (2
(23) 0 CIKE (22) (20) (22)
(23) CIKO , (22)
(21)

(22) (20) (21) (20)
F/B R/W, R/W) R/W 가 / (.
가 .

(20) (21) (23) CIKE (22) N/2
, CIKO . (20,21) N/2 - 1 .
N/2 - 1 가 .

CIKO 가 (22) ,
가 . (22) 0 0 , 가
(CIKE , CIKO)

(22) , SMC(13)
CIKE (20) N/2 - 1 .

(22) , R/W 가 ,

(22) (Activation bit)가 0(22) 가
 (1 N)(22) .
 (22) , 가
 가 (22) 가
 (22) 가

(- 1, 0, +1) 가 0
 (22) 가 .
 (22) 3 (30), (31), (32)

(30) 가 4 .
 (41) (20) Rin (21) Lin $|Rin-Lin|$
 1 가 (42) 가
 (22) 가 , (43) 가 .

(43) (22) Uout (Uin1 U
 in2). (43) 3 가 가
 (44) () Uin - 1, Uin2 +1,
 0 , Dfout .

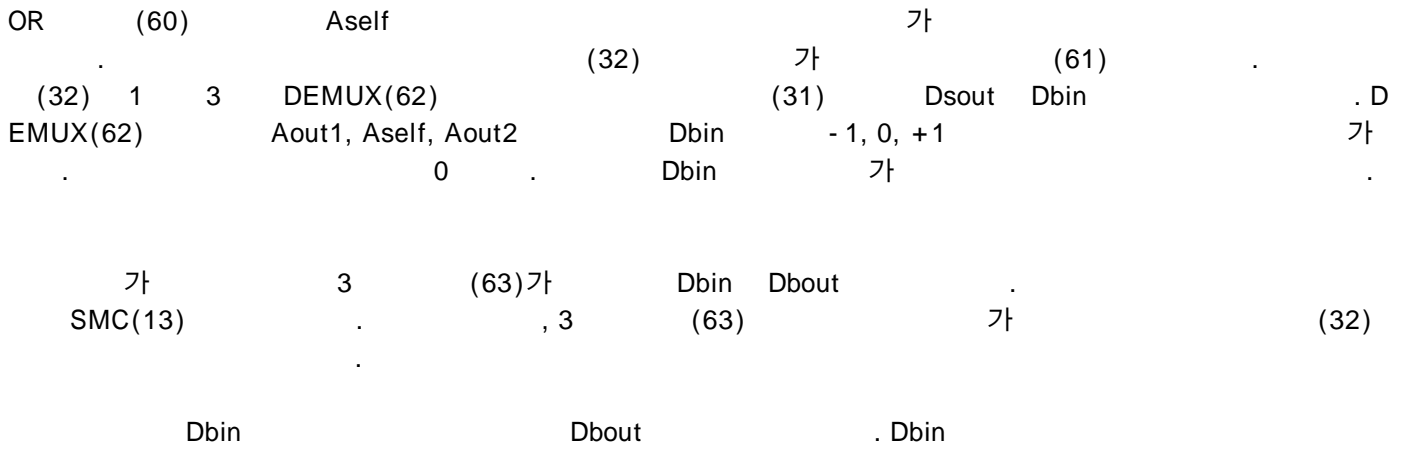
2 가 (44) Co 가 Uout
 (22) Co ,
 (22) .

(31) 가 가 2
 (31) 가 5 .

(31) R/W (30) Dfout D
 sin 가 (31) . 1 MUX(50) (43) 2 (53)
 . 1 (51) 1 MUX(50) ,
 (32) Dsout , 2 MUX(52) 1 (51)
 , 2 (53) 2 MUX(52) 2 M

UX(52) .

(32) (32) 가 6 .
 (32) (61) 가
 (32) . OR (60) (22) (Ain1, Ain
 2) (Aself) . Ain1 (22) Aout2
 , Ain2 , Aout1 OR (60) 가
 가 , 가



1. : 0

$$U[0,0]=0$$

$$U[0,j] = \dots, j \in \{1, \dots, N-1\}$$

2. : i 가

For i=1 to 2N do:

For each j {0, ..., N - 1}:

if i+j is even

$$U[i,j] = \min_{k \in \{-1, 0, 1\}} U[i-1, j+k] + C_o k^2$$

$$P[i,j] = \arg \min_{k \in \{-1, 0, 1\}} U[i-1, j+k] + C_o k^2$$

if i+j is odd

$$U[i,j] = U[i-1, j] + \left| g' \left[\frac{(i-j+1)}{2} \right] - g' \left[\frac{(i+j+1)}{2} \right] \right|$$

$$P[i, j] = 0$$

3. :

$$d[2N] = P[2N, 0]$$

4. :

For $i=2N - 1$ to 0 do:

$$d[i] = d[i+1] + P[i+1, d(i+1)]$$

$$P[i,j] \quad (31)$$

$$(31) \quad (32)$$

(22) 가
(22) 가

1.

$$(30) \quad 4 \quad i \quad (30) \quad j \quad U[i,j]$$

$$U[i,j] = \min_{k \in \{-1,0,1\}} U[i-1,j+k] + rk^2 + (1-k^2) \left| g' \left[\frac{(i-j+1)}{2} \right] - g' \left[\frac{(i+j+1)}{2} \right] \right|$$

$$P[i,j] = \arg \min_{k \in \{-1,0,1\}} U[i-1,j+k] + C_0 k^2 + (1-k^2) \left| g' \left[\frac{(i-j+1)}{2} \right] - g' \left[\frac{(i+j+1)}{2} \right] \right|$$

(31)

2.

$$(31) \quad N \quad \text{LIFO (Last - In First - Out)} \quad (30) \quad 2$$

$$P[i,j] \quad (22) \quad (31) \quad (32) \quad (30)$$

3.

$$\text{가 } 6 \quad (31)$$

$P[i,j]$ for $i = 2N - 1$ to 0

$$i = 2N - 1 \quad (61) \quad a[0,j] \quad a[0,0] = 0 \quad (32)$$

- (Aself) : a[i+1,j] (P[i+1,j]),
- (Aout2) : a[i+1,j+1] (1 - P[i+1,j+1]),
- (Aout1) : a[i+1,j - 1] (-1 - P[i+1,j - 1])

(61)

$$a[i,j] = \sum_{k \in \{-1,0,1\}} a[i+1,j+k] \delta(-k-P[i+1,j+k])$$

(32)

$$P^* [i,j] = a[i,j]P[i,j]$$

$$P[i] = \sum_{j=0}^{N-1} P^* [i,j]$$

가 가 i P[i,j] P[i] |

가 .

가 .

, Bayesian Sense

가 가 .

(57)

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1 2 /

2.

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3.

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1 1 ;

2 2 ;

1 2 ;

1 2

5.

4 ,

(N 2 N , 1 2 N/2)

6.

5 ,

7.

5 , N

8.

4 , 1 2

9.

4 , 1

N/2 - 1

10.

4 ,

2 2 1 1

11.

4 ,

1 2 1

; 1 ;

2

12.

11 ,

가 가 1 가 , 가 2
가

13.

11 ,

1 가 2 가

14.

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1 2 ;

가 1 가 ;

1 가 가

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가 2 가

15.

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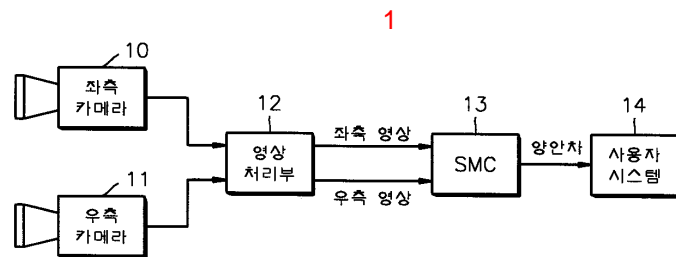
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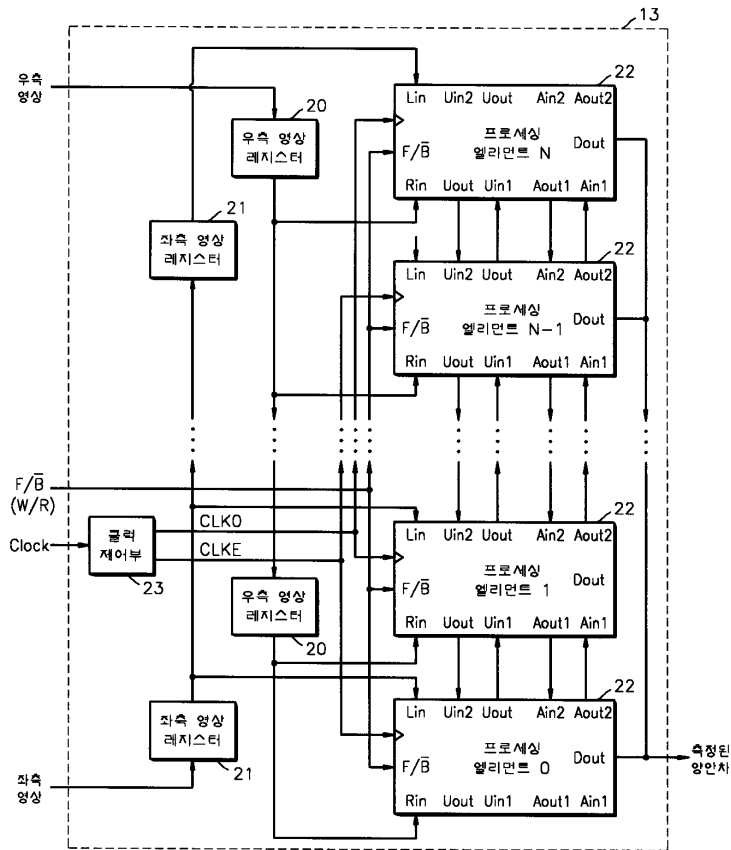
18.

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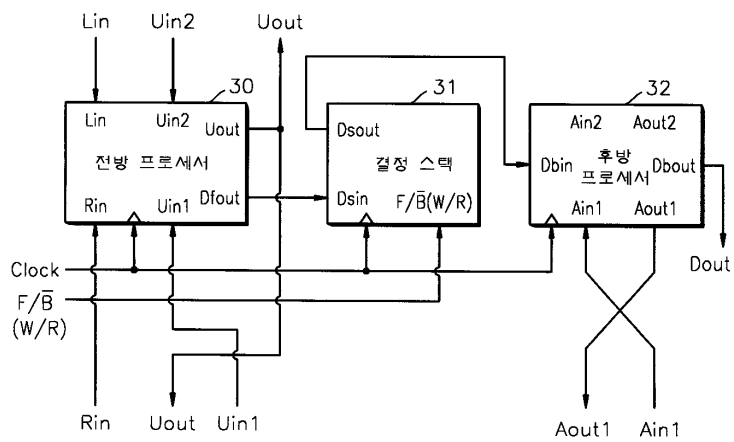
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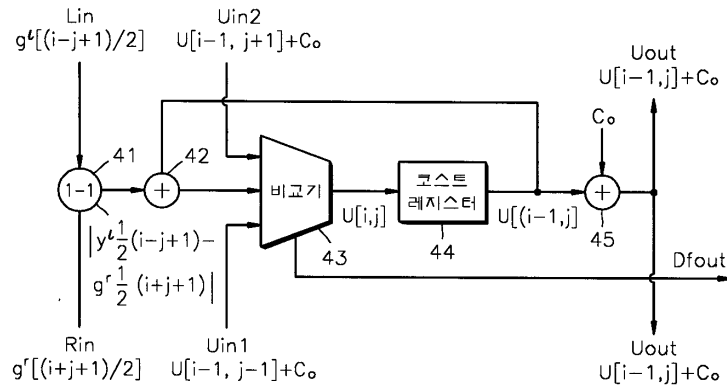
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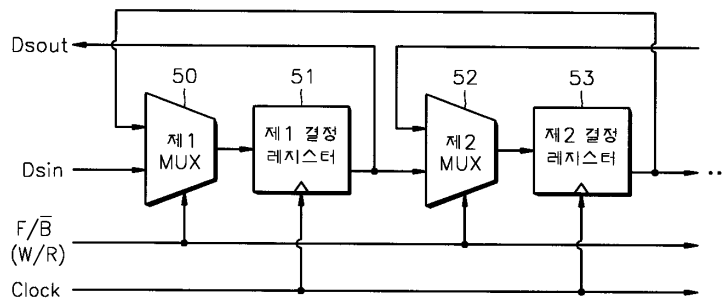
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