

ارزیابی توانایی تکنیکهای مختلف شارنوری در ایجاد نقشه اختلافات (Disparity Map) در فتوگرامتری برد کوتاه

فرهاد صمدزادگان

Email: samadz@ut.ac.ir

یعقوب فرجامی

Email: farjami@ut.ac.ir

فاطمه کریمی نژاد اصل

Email: fkarimi@ut.ac.ir

چکیده

/

() .

مفاهیم اولیه در شار نوری

I)

:(

$$\frac{dI}{dt} = 0 \quad ()$$

$$\frac{dI}{dt} \quad (\quad) \quad I$$

:

$$\frac{dI}{dt} = \frac{\partial I}{\partial x} \frac{\partial x}{\partial t} + \frac{\partial I}{\partial y} \frac{\partial y}{\partial t} + \frac{\partial I}{\partial t} \quad ()$$

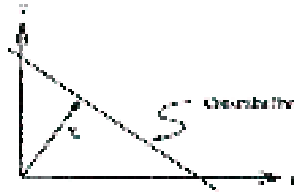
$$\nabla I = \left(\frac{\partial I}{\partial x}, \frac{\partial I}{\partial y} \right)^t, \quad I_t = \frac{\partial I}{\partial t}, \quad \mathbf{v} = (u, v)^t = \left(\frac{\partial x}{\partial t}, \frac{\partial y}{\partial t} \right)^t \quad ()$$

$$: \quad (\quad \quad \quad \mathbf{v} \quad u \quad \quad \quad \mathbf{v})$$

$$(\nabla I)^t \mathbf{v} + I_t = 0 \quad ()$$

$v \ u$

.() constraint



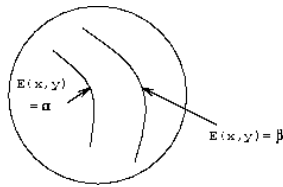
(constraint) :

$$\hat{I}(k, \omega) = \hat{I}_0(k) \delta(v^t k + \omega)$$

$$v^t k + \omega = 0$$

مشکل روزنه (aperture):

.()

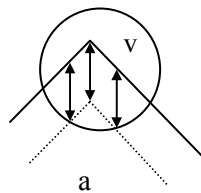


:

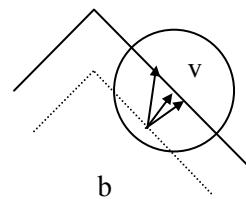
a

(aperture)

a



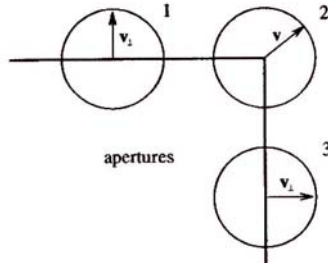
(b)



(a)

:

(corner constraint line (aperture)



$$\begin{pmatrix} x_0 \\ y_0 \end{pmatrix}$$

$$ax + by + c = 0$$

$$d = \frac{|ax_0 + by_0 + c|}{\sqrt{a^2 + b^2}}$$

()

(v_{\perp})

v

v_{\perp}

$$I_x u + I_y v + I_t = 0$$

$$\begin{pmatrix} x_0 \\ y_0 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$d = \|v_{\perp}\| = \frac{I_t}{\sqrt{I_x^2 + I_y^2}} = \frac{I_t}{\|\nabla I\|}$$

()

:($\mathbf{x} = (x, y)^t$)

v_{\perp}

$$(n = \frac{\nabla I}{\|\nabla I\|})$$

v_{\perp}

$$v_{\perp}(\mathbf{x}, t) = \|v_{\perp}(\mathbf{x}, t)\| \frac{\nabla I(\mathbf{x}, t)}{\|\nabla I(\mathbf{x}, t)\|} = \frac{I_t(\mathbf{x}, t)}{\|\nabla I(\mathbf{x}, t)\|} n$$

()

(aperture)

(robust estimation) robust statistics

(aperture)

(aperture)

مشکل انسداد و شفافیت :

()
)
 .(

۲- روشهای حل شارنوری

(Alvarez.L and et al., 1999; Fuse and et al., 2000; Klein and Huesman, 2001; Kunii and Chikatso, 20000; Simoncelli, 1993)

۲-۱- روشهای دیفرانسیلی

- $(I(x,t))$

local weighted

(global) (Local) L.S

smoothness (global)

warping

روشهای محلی.

Lucas, Kanade

روش کمترین مربعات وزندار محلی.

(v)

:

$$\|e\|_2^2 = \int_{-\infty}^{\infty} w(\mathbf{x} - \mathbf{x}') [(\nabla I)^t v + I_t]^2 d\mathbf{x}' \quad ()$$

(∇I)

روش مرتبه دوم (Second Order).

$$\frac{d\nabla I}{dt} = 0$$

()

قیود سراسری.

(.

مدلهای سطح.

مدلهای منحنی میزان.

sparse

v

prefiltering

روشهای چند قیدی (Multi Constraint) یا Multi Feature based.

aliasing

روش تخمینی حرکت از coarse به fine.

low pass

coarse

pyramid

fine

fine

coarse

۲-۲- روشهای چند حرکتی (Multiple Motion Methods)

پردازش خطی (line process).

smoothness

smooth

پخش سرعت ترکیبی (Mixed velocity distribution).

()

مدلهای پارامتریکی.

[Black and Jepsen 1993]

۳- ارزیابی و تست

Nagel &

Local weighted , Second Order

.()

corridor

Enkelmann

)

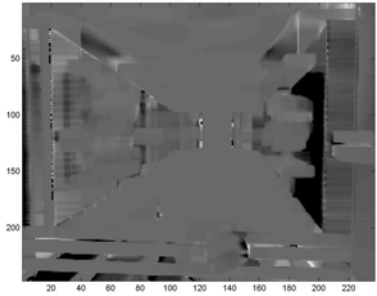
(

.(-)

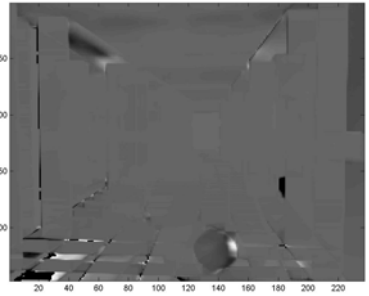
x , y



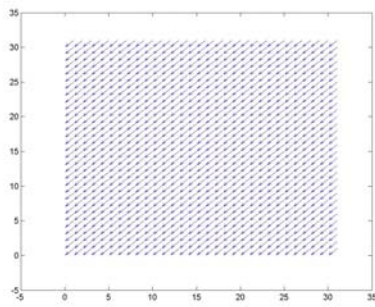
Corridor (



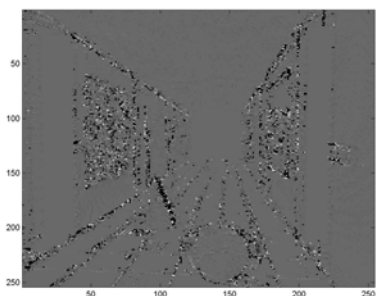
()



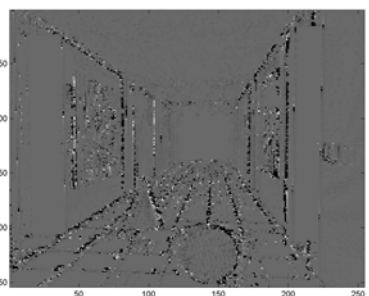
()



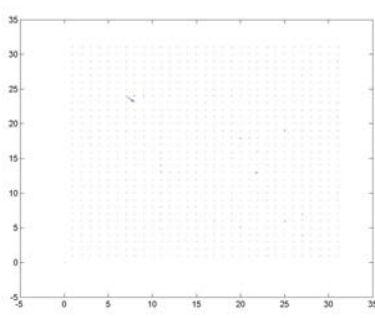
() y () x (τ) (). Local Weighted (



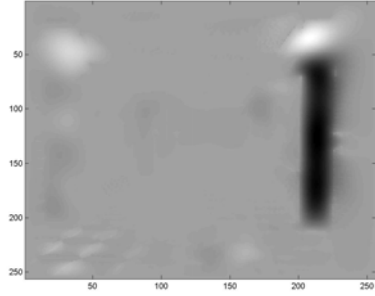
()



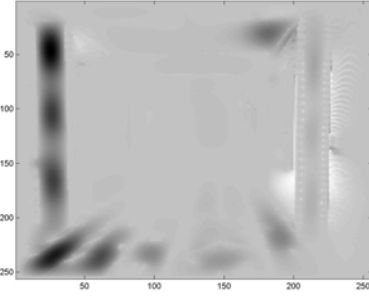
()



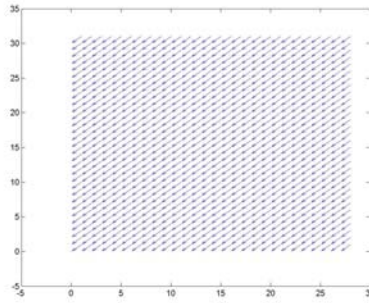
() y () x (τ) (). Second Order (



()



()



(ج)

() y

() x

() . Nagel & Enkelmann ()

۴- نتیجه گیری و بحث

()

منابع

Alvarez.L, J.Weickert, J Sanchez, 1999. A scale space approach to non-local optical flow calculations.
 Black M. J., 1991. A robust gradient based for determining optical flow, Tech. Rep. YALEW/DCS/RR-891, Yale University, New Haven, CT

- Black M. J. and P. Anandan, 1991. Robust dynamic motion estimation over time, In Proceeding IEEE CVPR, Los Alamitos, CA, 296-302
- Black M. J. and P. Anandan, 1990. A model for the detection of motion over time, In Proceedings of ICCV, Osaka, Dec, 33-37
- Fuse T. ,Shimizu.E ,Tsumi.M, 2000. A comparative Study on gradient-based Approaches for Optical Flow Estimation ,Isprs ,vol 1 .XXX 111 ,part B5 . ,Amsterdam.
- Horn B. K. P. and B. G. Schunck, 1981. Determining of optical flow, Artif. Intell, 17, 185-204
- Klein.G, Huesman.R.H, 1998. A 3D optical flow approach to addition of deformable PET volumes, University of California, Berkeley
- Kunii.Y ,Chikatso.H, 2000. Automatic Stereo Matching Using Optical Flow for 3D object Modeling , Isprs , vol 1 .XXX 111 ,part B5 . ,Amsterdam.
- Lucas B. D., 1984, Generalized image matching by the method off differences, Carnegie-Mellon Univ., Ph.D. Thesis
- Lucas, B. D. and T. Kanade, 1981. An iterative registration technique with application to stereo vision, In Proceeding of IJCAI, Vancouver, B.C., Aug, 674-679
- Nagel H.-H, 1983a. Constraint for the estimation of vector fields from image sequences, In Proceeding IJCAI, Karlsruhe, Germany, Aug., 945-951
- Nagel H.-H, 1983b. Displacements vectors derived from second order intensity variations in image sequences, CVGIP, 21, 85-117
- Nagel H.-H and W. Enkelmann, 1986. An investigation of smoothness constraint for the estimation of displacement vector fields from image sequences, IEEE PAMI, 8, 5, 565-593
- Simoncelli.E. P, 1993. Coarse to fine estimation of vision motion, IEEE Signal processing society.