文章编号

结合　　与　　算子的图像快速配准算法

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摘要

关　键　词　　；　　；　；
中图分类号　　文献标识码

Fast image registration method based on Harris and SIFT algorithm

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Abstract

Key words

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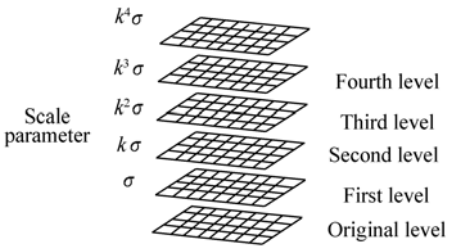
2.1 快速多尺度 Harris 角点检测

$$L(x,y,\sigma) = G(x,y,\sigma) * I(x,y)$$

$$G(x,y,\sigma) = \frac{1}{\sigma} e^{-(x+y)/\sigma}$$

$I(x,y)$ (x,y) σ



σ $\sigma_i = \sigma \cdot k^i\sigma$

$$M(x,y,\sigma_i) = G(x,y,\sigma_i) \begin{bmatrix} g_x & g_x g_y \\ g_y g_x & g_y \end{bmatrix}.$$

CRF

$$CRF(x,y) = \det(\boldsymbol{M}) - k\,tr(\boldsymbol{M})$$

$$\det(\boldsymbol{M}) = \lambda_1 \lambda_2$$

$$tr(\boldsymbol{M}) = \lambda_1 + \lambda_2$$

g_x g_y (x,y) λ_1 λ_2
$\boldsymbol{M}$ k

k

k

$$CRF\ x\ y\ \sigma_i\ = \frac{det\ \boldsymbol{M}\ \sigma_i}{tr\ \boldsymbol{M}\ \sigma_i\ + \varepsilon}$$

ε ε

$I\ x\ y$

$I\ x+j\ y+i$

T

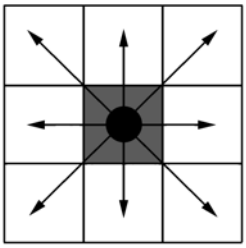
$Num\ x\ y$

$$Num\ x\ y\ = \sum_{j\ i} T\ x+j\ y+i$$

$-$ j $-$ i j i

$$T\ x+j\ y+i\ = \begin{cases} |\ I\ x+j\ y+i\ - I\ x\ y\ |\ \ T \\ |\ I\ x+j\ y+i\ - I\ x\ y\ |\ > T \end{cases}.$$

$Num\ x\ y$



2.2 Harris 角点精定位

$x\ y$ l

$\rho = x\ \ \theta + y\ \ \theta$

ρ l

θ $\theta = g_y / g_x\ \ g_y\ \ g_x$

$x\ \ y\ \ v\ \ x\ y$

l $x\ y$

$\rho + v = x\ \ \theta + y\ \ \theta$

$w\ x\ y\ = |\nabla g|\ = g_x + g_y$

$w\ x\ y$

$$\begin{bmatrix} g_x & g_x g_y \\ g_x g_y & g_y \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} g_x x & g_x g_y y \\ g_x g_y x & g_y y \end{bmatrix}$$

$x\ \ y$

3 1 特征描述与匹配

$$\begin{bmatrix} x \\ y \\ \end{bmatrix} = \begin{bmatrix} h & h & h \\ h & h & h \\ h & h & \end{bmatrix} \begin{bmatrix} x \\ y \\ \end{bmatrix}$$

x　y　　x　y

h　　h

表 1　分别用本文方法以及 SIFT SURF 进行特征点检测的时间统计

Tab. 1　Statistics of cost time for feature points detection using SIFT　SURF and the proposed method

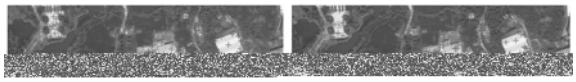


表 2　本文方法特征点匹配的正确率和时间统计

Tab. 2　Statistics of accuracy and cost time of feature points matching using the proposed method

表 3　SIFT 算法特征点匹配的正确率和时间统计

Tab. 3　Statistics of accuracy and cost time of feature points matching using SIFT

表 4　SURF 算法特征点匹配的正确率和时间统计

Tab. 4　Statistics of accuracy and cost time of feature points matching using SIFT

表 5　使用不同方法对图

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