

Algorithms Overview

Theory

The gradient constraint equation shown in the [Lucas Kanade algorithm section](#) is an underdetermined system. Instead of computing the full motion vector one can also compute the motion of the local intensity contour. This motion is normal to the local intensity contour line which adds a second constraint to the motion vector.

This normal flow is then given by

$$-I_t I_x / (I_x^2 + I_y^2), -I_t I_y / (I_x^2 + I_y^2)$$

The normal flow can be used for egomotion estimation (See Fermüller)

References

Barron, J. L., Fleet, D., & Beauchemin, S. (1994). Performance of optical flow techniques. *International journal of computer vision*, 12(1), 43–77. Springer.

Bruhn, A., Weickert, J., & Schnörr, C. (2005). Lucas/Kanade Meets Horn/Schunck: Combining Local and Global Optic Flow Methods. *International Journal of Computer Vision*, 61(3), 1-21.

Fermüller, C., & Aloimonos, Y. (1995). Qualitative egomotion. *International Journal of Computer Vision*, 15(1-2), 7-29.

Handbook of Computer Vision and Applications, Volume 2, Signal Processing and Pattern Recognition, Academic Press, Chapter 13.2

Handbook of Mathematical Models in Computer Vision chapter 15

Algorithm

[visual_processing/opticflow/NormalFlow.cpp](#)