Guide to Optical Flow

Harshith Mohan Kumar

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Introduction

What is optical flow?

What are the main components of optical flow?

How can we achieve optical flow? What is the math/logic behind optical flow?

What is the current state of the art?

What are the metrics?

What are the optimizations made to compute optical flow faster and more reliable?
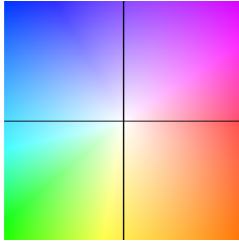
What are the applications?

What are the current problems?

Main Components

Visualization

The most widely used optical flow visual representation is adopted by Baker et al. (2007), where the direction is mapped to hue (color) and the magnitude is mapped to saturation/brightness. A full implementation is provided in flow_viz.py.

(a) Flow field color coding

Warping

Handling Occlusions

Metrics

Mathematical Beauty

Classical Approach

SOTA

Optimizations

Applications

References

Baker, Simon, Stefan Roth, Daniel Scharstein, Michael J. Black, J. P. Lewis, and Richard Szeliski. 2007. "A Database and Evaluation Methodology for Optical Flow." *2007 IEEE 11th International Conference on Computer Vision*, 1–8. https://doi.org/10.1109/ICCV. 2007.4408903.