

Abstract

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Project Title: Robust motion estimation in image sequences

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1. Abstract

The project is concerned with robust motion estimation in image sequences, especially under varying lighting conditions. Since conventional approaches are based on image intensities or gradients, they are sensitive to variations of lighting conditions. To overcome this problem, we propose to use gradient orientation information in place of image intensities and gradients because gradient orientation is known to be notably invariant to varying illuminations. In this project, we have developed three motion estimation techniques: the gradient orientation-based spatio-temporal gradient method (GOGM), the gradient orientation structure tensor method (GOSTM), and gradient orientation pattern matching technique (GOPM). They were compared with their respective original methods: the spatio-temporal gradient method (GM), the gradient structure tensor method (GSTM), and correlation-based methods such as the sum-of-absolute differences (SAD) matching, the sum-of-squared differences (SSD) matching, and the zero-mean normalized cross-correlation (ZNCC). Our simulation results show that the proposed methods perform motion estimation very well regardless of irregular lighting conditions, while the conventional approaches fail to work under such conditions.

Keywords: 3-5 words

Motion estimation, motion vectors, template matching, the spatio-temporal gradient method, and gradient structure tensor