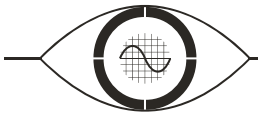

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A Theory for Multiple Orientation Estimation

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A Theory of Multiple Orientation Estimation

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Abstract. Estimation of local orientations in multivariate signals (including optical flow estimation as special case of orientation in space-time-volumes) is an important problem in image processing and computer vision. Modelling a signal using only a *single* orientation is often too restrictive, since occlusions and transparency happen frequently, thus necessitating the modelling and analysis of *multiple orientations*.
In this paper, we therefore develop a unifying mathematical model for multiple orientations: beyond describing an arbitrary number of orientations in multivariate vector-valued image data such as color image sequences, it allows the unified treatment of *transparently* and *occludingly* superimposed oriented structures. Based on this model, we derive novel estimation schemes for an arbitrary number of superimposed orientations in bivariate images as well as for double orientations in signals of arbitrary signal dimensionality. The estimated orientations themselves, but also features like the number of local orientations or the angles between multiple orientations (which are invariant under rotation) can be used for various inspection, tracking and segmentation problems. We evaluate the performance of our framework on both synthetic and real data.

1 This is only a demonstration!

This is not the full paper! This sample file only serves as a demonstration for the LaTeX package `CoverPage`. Our "real" paper will be published by Springer in the ECCV proceedings and can be downloaded at `www.lfb.rwth-aachen.de` after the conference (May 2006).