

Biologically Motivated Processing of Visual Signals for Robust Extraction of Contour Information

by
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The human visual system is still much more powerful compared to technical strategies for object recognition and scene interpretation. Obviously, due to the complexity of biological systems the underlying mechanisms will not be understood in detail in the near future. However, the development of models and hypotheses for biological structures is always a challenging task for actual research groups. In that way our understanding will be extended and at least some of these superior capabilities might be implemented into technical vision systems. Biology-inspired methods therefore gain more and more importance in industrial image processing systems.

Goal of this contribution is a systemtheoretical analysis of fundamental processing steps in higher developed biological vision systems, especially with regard to technical questions. Here, the properties of the biological example has been investigated concerning the extraction of oriented contour features in image data. An advantageous hexagonal signal sampling and the promising neural processing with puls-coupled mechanisms are essential differences compared to existing approaches. A further important subject of this work is dedicated to noise suppression, which of course is always necessary for contour extraction. In this aspect, adaptive algorithms for effective noise filtering in extremely dark scenes has been developed and successfully implemented.