

**Perceptual Organization of Object Boundaries  
using  
Anisotropic Regularization Methods**

**by Marcus Hund**

For navigating and manipulating objects, animals, as well as autonomous robots, need information about the form and the position of objects. The advantage of camera systems is that there is no need for a complex data fusion between object recognition tasks and depth perception. Furthermore it is also possible to realize low-cost solutions. Nevertheless, when a three dimensional scene is projected to the two dimensional receptive field of a camera or a biological vision system, all depth information is lost. Also in the two dimensional display the form of an object is reduced to a contour, that may be interrupted due to occluding objects.

In order to reconstruct the lost contour and depth information, animals, especially human beings, are taken as a model. The most obvious approach to such a reconstruction is the use of Stereo Vision. While there has been a great amount of research done on stereoscopic approaches, which produced many efficient algorithms, little emphasis was placed on monocular depth criteria so far. In this work, occlusion, being one of the most important monocular depth criteria, is used for the three dimensional interpretation of a scene and for the reconstruction of occluded contours. Emphasis is placed on the entire process chain, starting with the filtering of natural images. With anisotropic diffusion, a method is introduced, that enables a reduction of input images to salient features, while preserving edge information.