Many algorithms in computer vision exploit salient aspects of a scene, so-called features. Such features can be used to identify objects, stitch pictures together, or find stereoscopic correspondences to infer 3D information from 2D images. In robotics, however, there are many tasks for which existing features are insufficient. This motivates a study to find the reasons for performance deficiencies and to propose new features based on the resulting insights.

In this thesis you will do a survey of the most important and successful features which have been proposed in the last years, comparing and contrasting the most important algorithmic features. Following this, you will compare the power of these features using some standard computer vision benchmarks. You will compare, for example, SIFT features with Gabor wavelets. Since many of these features have been already integrated into computer vision libraries it would be feasible to make a comparison of a large set of features.

As an approach to improve on the state of the art, you will investigate how to optimize parametric features. One example for parametric features are convolutionary networks. Similar simple ways of (linear) parameterization of features are conceivable. Objectives for feature optimization are, for instance, robustness against illumination changes, tracking robustness under spatial transformations, etc.

This project is at the center of collaboration between professors from TU and FU. You will therefore have broad support from several professors.

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