ROVIS: Robust Machine Vision for Service Robotics

**Aim**

Development of vision algorithms that are able to provide reliable information on 3D location of objects to be manipulated independently of variable external influences.

**Research areas**

- General and application specific image processing algorithms.
- Inclusion of closed-loop control at different levels of image processing for improvement of its robustness with respect to external influences.
- Closed-loop control of stereo camera gaze orientation.
- Object recognition methods for colored and pattern objects.
- Robust classification methods of segmentation results.

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**ROVIS information flow**

- Input images are taken from a stereo camera system with closed-loop gaze control orientation.
- ROVIS Object Recognition and Reconstruction chain: Region of Interest (ROI) definition, object recognition and 3D reconstruction are performed in a closed-loop manner for robustness improvement.
- Processing results at different image processing levels, stored in the World Model, are further used for robotic object manipulation.

**Closed-loop control of ROI definition in the ROVIS architecture.**

- Measure of image ROI segmentation quality:
  
  \[ y = \text{No. of segmented pixels on the ROI edges} \]

**Feature extraction**

Closed-loop object segmentation result

- Uncertainty measure

**Image understanding**

Closed-loop control of image segmentation and classification of segmentation results in the ROVIS architecture.