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Localization and Mapping of a Mobile Robot Using a Single Camera

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Using images from a single calibrated camera, mounted on a mobile robot, it is possible to estimate the camera position and map its path in the case of a circular path. Using the Essential Matrix, all the parameters relative to the rotation and translation (including the scale factor) of both the robot and the camera can be estimated. The mapping of the robot in the world can be performed by means of 3D reconstruction. In this work this procedure was analyzed and studied in Matlab and also implemented on a mobile platform.

Liver Tumor Classification based on DCE-MRI Images

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Dynamic Contrast Enhanced - Magnetic Resonance Imaging (DCE-MRI) is a valuable medical image modality to assess blood perfusion. The typical angiogenesis process that occur during tumor growth can be detected by the abnormal accumulation of contrast agent used in this medical image modality. In this work a methodology to classify tumors and detect malignancy from DCE-MRI sequences is described. This method is composed by three main steps: definition of Regions of Interest (ROI), calculation of perfusion curves and spatial analysis of perfusion parameters. Results with real data are presented.

Segmentation of the region of interest in chromatographic images

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This work describes a segmentation method for automating the region of interest (ROI) delineation in chromatographic images. This is the first component of a screening tool for Fabry disease, which will be based on the automatic analysis of the chromatographic patterns extracted from the image ROI. Image segmentation is performed in two phases, where each individual pixel is finally considered as frame or ROI pixel. The segmentation result is post-processed using a sequence of morphological operators in order to obtain the final ROI rectangular area. The proposed methodology was successfully evaluated in a dataset of 41 chromatographic images.

A Neural Network Based Fall Detector

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In this project we present an intelligent fall detector system based on a 3-axis accelerometer and a neural network model that allows recognizing several possible motion situations and performing an emergency call only when a fall situation occurs, with low false negatives rate and low false positives rate. The system is based on a two module platform. The first one is a Mobile Station (MS) and should be carried always by the person. An accelerometer is implemented in this module and its information is transferred via a radio-frequency channel (RF) to the Base Station (BS). The BS is fixed and is connected to a GSM (Global System for Mobile communication) module. A neural network model was built into the BS and is able to identify falls from other possible motion situations, based on the received information. According to the neural network response the system sends a SMS (Short Message Service) to a destination number requesting for assistance.