

Research: Performance Evaluation of Vision Algorithms on FPGA

Authors: Mahendra Samarawickrama, Ajith Pasqual, and Ranga Rodrigo,

*Abstract* - Real time vision is an important area in robotics and autonomous navigation. Since vision algorithms require a large amount of computational resources, the parallel processing capabilities of FPGAs become more suitable to achieve a high speed. The proposed architecture was designed by considering major aspects in the area of autonomous navigation, FPGA memory management and real-time embedded vision. As a result, the system became compact, fast, flexible and low-cost in terms of embedded system design. Algorithms implemented in the core with 100MHz system clock support image processing on a low-resolution frame of 128x128 pixels up to 200 frames/s. The architecture has been implemented and tested for spatial domain masking algorithms using a Xilinx Virtex-2 Pro (XC2VP30) FPGA.

Research: Shape Prior based Image Segmentation using a Log Distance – Theta model

Authors: Janaka Senarathna and Ranga Rodrigo

Abstract:

Image segmentation is a popular topic in computer vision. Incorporation of prior shape knowledge into this process and the subsequent extraction of objects demonstrating shape characteristics similar to the priors are being extensively researched. Major challenges include the judgment of parameters such as scale and rotation as well as tolerating object distortions such as occlusions and noise. This paper proposes a novel framework to successfully overcome these by using a log distance-theta domain mapping which greatly simplifies rotation, scaling and provides an opportunity to incorporate a decision threshold.

Research: Scene Understanding

Authors: Tharindu de Silava and Ranga Rodrigo

Abstract:

Scene understanding is an interesting problem attempted in high level vision. In this research, we try to recognize the class of the scene by identifying a predefined set of objects and their contextual relationship in an image. This approach contrasts with the idea of using the gist of the scene to identify its category. We simultaneously try to recognize individual objects using a hierarchical model and considering the problem as a multi-class classification problem. This approach gives satisfactory results in interpreting the scene.