Hierarchical Contours Based On Depth Images

G. M. Danciu¹, IEEE member, Iuliu Szekely²
¹Transilvania University, Brașov, România

Abstract

This paper proposes an algorithm of contour extraction that combines information from the two types of images captured by a Kinect camera. One image contains information about the depth and the other contains the color information. The method proposes a segmentation of different levels of depth using the distance image and for each region it extracts the contours on the color image. In order to detect the different levels of distance we used the depth image represented as gray level image in which the gray values map the distance between camera and scene. We computed the histogram, using Lagrange interpolation, we smoothed its values and performed a region segmentation based on the smoothed histogram. As a final result we obtain a hierarchical contour that depends both on the depth as well as on the color image.

![Image](image-url)

Figure 1. The results of the algorithm applied in different scenarios. a), f) The original color images. b), g) The original depth images. c), h) The contours detected on the color image for all objects at almost the same distance. d), i) The segmented regions extracted from the depth image. e), j) the hierarchical contours.

The hierarchical contours extraction has the following steps:
- Apply on the depth image a histogram equalization.
- Apply a histogram smooth using Lagrange polynomial interpolation.
- Extract the minima and maxima from the smoothed histogram.
- Use these values to perform a segmentation on the depth image. As a result several areas at different distances from the camera are obtained.
- For each found region, a contour extraction on the color image is performed.
- As a final step, through the reunion of all found contours we obtain a contour for the color image, based on the depth information.

References