

Highly Accurate Segmentation Using Geometric Attraction-Driven Flow in Edge-Regions

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Abstract

We propose a highly accurate segmentation algorithm for objects in an image that has simple background colors or simple object colors. There are two main concepts, “geometric attraction-driven flow” and “edge-regions”, which are combined to give an exact boundary. Geometric attraction-driven flow gives us the information of exact locations for segmentation and edge-regions helps to make an initial curve quite close to an object. The method can be successfully done by a geometric analysis of eigenspace in a tensor field on a color image as a two-dimensional manifold and a statistical analysis of finding edge-regions.

There are two successful applications. One is to segment aphids in images of soybean leaves and the other is to extract a background from a commercial product in order to make 3D virtual reality contents from many real photographs of the product. Until now, those works have been done by a manual labor with a help of commercial programs such as Photoshop or Gimp, which is time-consuming and labor-intensive. Our segmentation algorithm does not have any interaction with end users and no parameter manipulations in the middle of process.

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