Chapter 4
Object-Based Visual Saliency Computation

This Chapter describes the approaches for object-based saliency computation, which can be roughly grouped into two categories. Approaches in the first category focus on segmenting the whole salient object by using location-based saliency maps, while approaches in the second category focus on directly computing visual saliency on object level. In this Chapter, we will introduce the technical details of six approaches from these two categories and their performance will be compared at the end of this Chapter.

4.1 Overview

In recent years, the number of digital images on the Internet has grown dramatically. In these images, the truly meaningful parts may be just a small proportion. The nontrivial contents, usually in the form of salient objects, are sufficient to represent the semantic meanings in most cases and consequently play an important role in many image applications such as content-based image retrieval and video advertising. Consequently, such requirements give rise to the studies on object-based saliency inference. Different from the location-based saliency for pixels and macro-blocks, these studies propose to detect and analyze the salient object as a whole. According to the neurobiological mechanisms discussed in Chap. 1, object is also a probable attentive unit. Therefore, the object-based saliency models are also compatible with the neurobiological mechanisms in human vision system.

Usually, there are two different categories of approaches to detect salient objects in a scene. Approaches in the first category focus on utilizing the location-based saliency map. They aim to extract salient objects from the saliency maps computed using the location-based saliency models. Approaches in the second category propose to directly measure the saliency of objects. They first divide an image into a set of objects (regions, superpixels) and...
then directly compute visual saliency in object level. In this Chapter, we will describe the technical details of several representative approaches from the two categories. As shown in Fig. 4.1 Sect. 4.2 will focus on detecting salient object from location-based saliency maps by assuming them to be accurate or not. In Sect. 4.3 we will propose how to directly measure object saliency by segmenting images into regions with distinct sizes or super-pixels with comparable sizes. Note that this Chapter only focuses on computing object-based saliency in images, while detecting salient objects in video is beyond the scope of this Chapter.

4.2 Salient Object Extraction from Location-Based Saliency Map

Since there already exist various saliency models that can reveal the salient locations in a scene, it is necessary to explore how to detect salient objects from location-based saliency map. In this Section, we will first discuss how to detect salient objects when assuming that the computed location-based saliency map is accurate. After that, we will propose how to detect objects from inaccurate saliency maps.