Abstract ID-237

AN HERBIVOROUS ARTIFICIAL LIFE BASED MODEL FOR IMAGE SEGMENTATION

Alex Araujo(1), Christos Constantinou(2), João Tavares(3)

(1)**Instituto Federal de Educação Ciência e Tecnologia de Mato Grosso do Sul, Brazil**
fa.alex@gmail.com

(2)**School of Medicine Stanford University, United States**
constantinou@stanfordalumni.org

(3)**University of Porto, Portugal**
tavares@fe.up.pt

Keywords: Image Segmentation, ALife Model, Artificial Life Model, Noisy Image Segmentation

Summary: The image segmentation task is crucial in many computational pipelines of image processing and analysis and therefore, has gained high attention, with several efforts been made to develop efficient and robust segmentation methods. Different image difficulties, as, for example, the existence of image noise, low contrast between regions of interest and partial occlusion of regions, make more complex the segmentation problem and affect the segmentation quality. Although to be a very investigated researching area, those problems still have to be overcome in order to obtain more effective results. Therefore, various segmentation methods have been proposed in the literature, including based on thresholding, region growing, deformable models and organisms. In this work, it is proposed a segmentation method based on an artificial life model inspired on the behavior of herbivorous organisms during the process for selecting and consuming food in real environments. The proposed model was inspired on the fact that these organisms, in general, firstly search the food that have higher fitness to be consumed. This fitness depends on food features, as color intensity, size and age, and on the amount of food available in the environment. Making an analogy with digital images, the image pixels can represent the food, while the entire image represents the environment to be visited by the organisms. So, the "fitness" of each pixel was computed combining its color intensity with the average and homogeneity of its neighborhood. The experimental tests performed using synthetic and real images affected by different image noises, presented very promising results, which indicates that the proposed model can be interesting to segment images particularly affected by noise.