

Abstract of Thesis presented to UFF as a partial fulfillment of the requirements for the degree of Master of Science (M.Sc.)

**Using Fractal Characteristics such as Fractal Dimension, Lacunarity and Succolarity to Characterize Texture Patterns on Images**

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Three aspects of texture are considered by the fractal geometry: Fractal Dimension (FD), Lacunarity and Succolarity. Fractal Dimension has been well studied; a great number of approaches have been presented to extract it from images. It can be computed from black-white to multi-band image. There are many approaches also, from the simple Box-Dimension to the most complex Hausdorff Dimension. The same does not happen with the other two measures. Although Lacunarity has been more and more used in works exploring its characteristics, Succolarity, until now, has not been computed.

This work presents a method to compute Succolarity, as well as a demonstration of its applicability, differences and similarities of each fractal measure. The proposed method for this computation is based on the Box Counting approach adapted to the notions of Succolarity. A simple example is shown step by step to easily explain how to compute the Succolarity for binary images and for 3D objects. Moreover, this work presents a procedure to calculate the Lacunarity of 3D objects. This proposal is organized in a way that it could be used to evaluate also the Lacunarity of grey-scale images in two different manners.

The main goal of the work is to show that the Succolarity can be used as a new feature in the pattern recognition process, especially for identification of natural textures. The combination of this measure with fractal dimension and Lacunarity is useful to identify different types of texture on images.

**Key words:** Succolarity, Fractal Dimension, 3D Lacunarity, fractal measures, binary image analysis, black & white images.