Local estimation of the local roughness of non-homogenous Brownian textures by convolution neural networks

Frédéric Richard

Institut de Mathématiques de Marseille, Université Aix-Marseille

Abstract. In this talk, we focus on the analysis of non-homogeneous textures modeled by the anisotropic multi-fractional Brownian random field. Features derived from this model are helpful to locally describe textures and segment images. In particular, the local Hurst index, which measures the spatial regularity of the texture, can be used to partition an image into regions having an homogeneous roughness. However, the local estimation of such a feature is still challenging, as current methods are inaccurate or missing.

A usual estimation method of the Hurst index is based on the so-called quadratic variations which are squared averages of image filterings. We give an interpretetation of this method in terms of a convolutional neural network. Using such an architecture, we then adapt filters of the estimation method by learning network parameters. The learning step is achieved on synthetic textures generated by the PyAFBF package. The accuracy of the learned model is also evaluated on synthetic textures.