MSc internship – Engineering school internship

Volumetric data – Machine Learning – Texture

Internship code: EntMLGrSc3D-20-21-5

We have developed, at the LARIS laboratory (University of Angers, France) together with the University of Coimbra (Portugal), an innovative algorithm for the extraction of texture features for volumetric data [1]. This algorithm is based on an entropy method issued from information theory. The results given by this algorithm are very encouraging, among others for medical images.

The objective of the internship will be to design a software, using machine learning and the features extracted by our algorithm, to classify gray scale volumes. A comparison of the results obtained with those using features from other texture analysis methods will also be performed.

The first part of the internship will thus consist of studying the principles of machine learning as well as the texture analysis algorithm designed in the laboratory and those described in the literature [2].

In the second part, the trainee will have to develop a volumetric classification tool (machine learning) using the characteristics extracted by the algorithm and test it. Several families of classifiers will be explored (among others those using neural networks). Moreover, various types of gray scale volumes will be analyzed.

The trainee will finally have to establish a synthesis of the advantages and disadvantages obtained for each algorithm, volume type and classifier.

The internship will take place at the LARIS laboratory (University of Angers, France).

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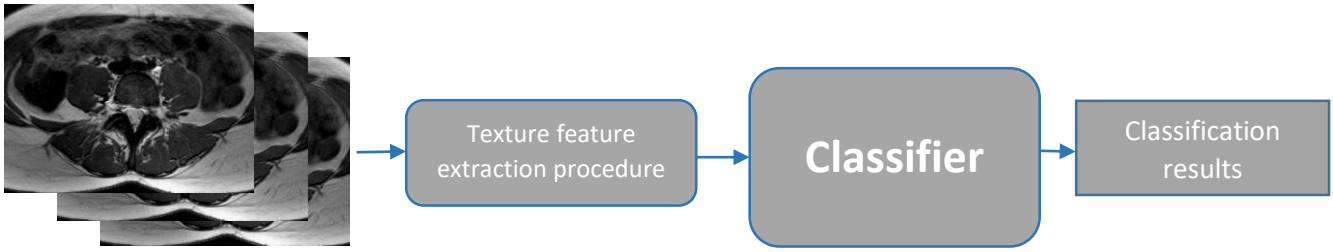
Bibliography:

[1] Gaudêncio, A. S. F., Vaz, P. G., Hilal, M., Cardoso, J. M., Mahé, G., Lederlin, M., & Humeau-Heurtier, A. (2020). Three-dimensional Multiscale Fuzzy Entropy: Validation and Application to Idiopathic Pulmonary Fibrosis. IEEE Journal of Biomedical and Health Informatics, in press.
[2] Humeau-Heurtier, A. (2019). Texture feature extraction methods: A survey. IEEE Access, 7, 8975-9000.



Flowchart of the image processing procedure