ACADTUM SCIENTIFIC REPORT

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Stage 1. The design of the software system for the automatic and computer aided diagnosis of abdominal tumors. Experiments and preliminary results.

Reporting period: 12.05.2022 – 31.12.2022

Summary

In the context of the 1st stage of the project "Automatic and computer aided diagnosis of abdominal tumors, through advanced machine learning techniques, based on medical images (ACADTUM)" the study of the state of the art in the field of recognition and segmentation of abdominal tumors within different types of medical images was performed, both through conventional and deep learning methods, the design of the software system for automatic and computer aided diagnosis of abdominal tumors based on various types of medical images being also achieved. A first set of techniques was developed and experimented for combining deep learning methods with conventional, texture-based methods, on one hand, respectively convolutional neural networks of different types, on the other hand, in the context of recognizing liver tumors from ultrasonography images. Also, the medical protocols for the acquisition of images corresponding to abdominal tumors were defined, being collected a first set of medical images, containing Computed Tomography (CT) images of liver and kidney tumors, respectively Magnetic Resonance Images (MRI) of liver tumors. The results obtained so far have been disseminated in a scientific paper accepted and presented at a prestigious international conference, currently being published in the volume of this conference, as well as in another scientific paper, sent for evaluation to an ISI journal of type Q2. The activities of this stage were carried out both by the postdoctoral researchers involved in the project and by the young doctoral researchers, one of them being hired through a competition, organized at the level of TUCN (Technical University of Cluj-Napoca). These steps were performed in accordance with the project implementation plan and with the activities specified for stage 1, corresponding both to the main objective of the project, that of developing a software system for the automatic and computer aided diagnosis of abdominal tumors, based on medical images of various types, involving both conventional and deep learning techniques, as well as to the secondary objectives: *O1. The development of advanced image analysis and classification methods, to achieve a maximum performance regarding the automatic diagnosis of some important abdominal tumors from medical images of different types; O2. Comparing the performance of conventional and deep learning techniques, in multiple situations, within various types of medical images; O4. Supporting research activities for young researchers.*

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