ACADTUM SCIENTIFIC REPORT

TE 156/2022; Project code PN-III-P1-1.1-TE-2021-1293

Stage 3. Installing the software system at the beneficiary, testing it in real conditions and integrating it into clinical practice (O1, O2, O3, O4)

Reporting period: 01.01.2024 – 10.05.2024

Summary:
Within the 3rd stage of the ACADTUM project, corresponding to the period 01.01.2024 – 10.05.2024, the following tasks were achieved: the installation of the software application for the automatic and computer-assisted diagnosis of abdominal tumors based on medical images at the beneficiary, its testing in real conditions, respectively its integration in clinical practice. Thus, the software application was installed at the O. Fodor Regional Institute of Gastroenterology and Hepatology in Cluj-Napoca (IRGH), on an appropriate computer system, considering the need to call the functions of recognition and segmentation of abdominal tumors, carried out by means of previously trained convolutional neural networks. This application has been tested by specialist doctors in real conditions, on medical images of various types, such as ultrasonography (US), Computed Tomography (CT), respectively magnetic resonance (MRI) images, providing a satisfactory performance in most cases: in the case of abdominal tumor segmentation, there were few false positive detections of small sizes, and in the case of their recognition, the average accuracy of the trained networks was above 90%. In parallel, the steps related to the development and experimenting of our methods, based on CNN networks and their combinations, aimed both for the automatic detection of renal tumor grades and for the automatic recognition of pancreatic tumors based on CT images, were continued. In this context, we elaborated the scientific paper with the title "Pancreatic Tumor Recognition from CT Images through Advanced Deep Learning Techniques", presented at the IEEE International Conference on Automation, Quality and Testing, Robotics (AQTR 2024), Cluj-Napoca, May 16-18, 2024 (ISI Proceedings). Also, opportunities were identified to continue the research in the field of the project by the team members, making new proposals, within the Romanian Artificial Intelligence Hub 2023, respectively considering the Centers of Excellence (CoEx) 2024 competition. These steps were carried out in accordance with the project implementation plan and with the activities specified for the 3rd stage, corresponding both to the main objective of the project (O), that of the Development of a software system for automatic and computer-assisted diagnosis of abdominal tumors, based on medical images of different types, involving both conventional and deep learning techniques, as well as secondary objectives: **O1.** The development of advanced methods of image analysis and classification, for achieving a maximum performance in terms of abdominal tumor recognition from medical images of different types; **O2.** Comparing the performance of conventional methods, respectively of deep learning techniques, in multiple situations, in the case of various types of medical images; **O3.** Recognition of tumors in early stages, respectively of pre-neoplastic states, by appropriate methods; **O4.** Supporting research activities for young researchers.

Project Director,

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