

Doctoral School of Information and Biomedical Technologies Polish Academy of Sciences

Subject: 3-D delineation of cell's nuclei in WSI Z-stack sequences for computer aided pathology.

Supervisors, contact, place of research

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Project Description

The full automation of 3-D scanning platforms for pathological glass slides causes a need of image processing algorithms that can accurately and robustly delineate nuclei as 3-D structures in image sequences with little to no operator intervention. However, cell' clustering/overlapping, presence of proliferating cells, complexity of nuclear staining as well as disappeared contrast between nuclei and cytoplasm or background result in unreliable 3-D image processing. In the end the process takes not acceptable long time for one so called Whole Slide Image (WSI), which contains about 500 000 of cells. Poor efficiency of nuclei delineation negatively affects the performance of studying in computational pathology [1-4].

The goal of study is to develop a rapid, reliable algorithm for the accurate nuclei segmentation in 2-D images and its robust 3-D reconstruction [5]. A method developed under this project should use segmentation of nuclei based on artificial intelligence (AI) as the automated procedure based on so far developed neural network for fibroblasts segmentation [6] from sequences of microscopic images, which document cells' behavior in culture or lymphocytes' nuclei segmentation from histochemically stained tissue sections coming from the Sjogren Syndrome patients [7].

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